INFO-SOCIETY 2000

Ministry of Research
Denmark
November 1994

Preface

In late March 1994 the Danish Government appointed a two-member Committee on the "Information Society by the year 2000" consisting of the undersigned. We were commissioned to draft a proposal for a comprehensive project, which will tie public institutions and companies together by means of modern information technology and create new possibilities for citizens.

The Draft Proposal should

- line up the possibilities for the Danes in a future Information Society,

- formulate an overall Danish policy for information technology, and

- identify specific target areas for the next few years, and where necessary identify the needs for law reforms.

The present report is our conception of such a Draft Proposal. It is not a report by traditional standards, where no stone within the area has been left unturned.This was not the task assigned to us; rather, the aim was to prepare an outline for a strategy and proposals for an agenda of future initiatives. To this end we present a number of specific proposals, which should be ready for decision-taking and implementation. However, within a number of areas there is a need for further investigation until a more precise course can be decided for.

Apart from being a Draft Proposal for the Government the report is also intended as a contribution to a further public debate.

The Danish version of the report is accompanied by a volume with appendices elaborating on a number of proposals and the background in more detail. Apart from the appendices of the Committee the Danish volume of appendices also contains a number of external contributions made on the request of the Committee. The content of the the volume with appendices is shown in Appendix C. The volume with appendices has not been translated to English.

An electronic version on disk is inserted at the back of this report. Furthermore there are two appendices at the back of the report.

In our work we have been assisted by a Secretariat and a Support Group consisting of representatives from a number of Ministries and organisations as well as a number of individual members. The composition of these groups appear from Appendix A of the report.

Appendix B is an article by journalist Bjørn Kassøe Andersen: "Denmark in an International IT Perspective: The Country of Many

Possibilities". It has been included in this English version of the report from the volume of appendices.

Furthermore we have been aided by a number of persons who participated in a conference at the end of the preliminary phase of the work of the Committee as well as a number of workshops, where selected topics were discussed. As a support to the Conference we asked various ministries, organisations, companies and individuals to prepare background material for the Conference. In addition, a number of persons have written to us with ideas and suggestions.

Without this enthusiastic support the report would never have gained its presents contents. We should therefore like to express our sincere gratitude to all those who have contributed to the work of the Committee in this way.

Immediately prior to the printing of the Danish report the jurisdiction over information technology was subject to change as a result of the formation of the new Government; the Ministry of Research was allocated the overall jurisdiction on the applications of information technology. In this process the Government's IT policy was transferred from the Ministry of Finance, and the field of tele-communications was transferred from the former Ministry of Communication and Tourism. The designations of Ministries in this report are therefore adjusted according to the new purviews.

Lone Dybkjær   Søren Christensen

Contents

Summary

1. The Global Short-Circuit and the Explosion of Information

A revolution is in progress; a global short-circuit of time, space, people and processes. At the same time we witness an explosion in the amount and exchange of information. The instrument is modern information technology(IT), and the result is the profound change in work and communication processes throughout society.

2. A Danish Strategy for the Information Society

Applied successfully, information technology is a source of economic development, improved quality of life and better service, both public and private.

Therefore there is a need for a strategy that places Denmark in the forefront of the development towards an Information Society.

The strategy must rely upon the extensive use of information technology, and it must be based upon values such as openness, democracy and responsibility for all people in society in order to avoid a division among Danes into an "A-team" and a "B-team" with regard to information technology.

The public sector shall be actively involved with the private one and be the leading force in the efficient use of information technology. We need to define concrete objectives to be achieved within the next few years and before the year 2000.

3. The Electronic Service Network of the Public Sector

Public administration at both central and local level (*amt* and *kommune*) must be connected by an electronic service network, which should provide better service for both citizens and companies as well as more efficient administration.

The establishment of such a service network means that information which has already been given to one public institution by citizens or companies should not be requested by another agency. For citizens and companies it should be possible to send letters and information to public authorities by electronic means - and receive answers the same way.

The components of a service network include the following:

- All citizens shall be offered an electronic Citizen's Card with picture and PIN code. Consequently a number of other public identification papers, documents and certificates will become superfluous.

- all public authorities shall establish an e-mail box to which all citizens and companies can send letters and information by electronic means. A legislative overhaul shall ensure that requirements as to substantiated documents in writing and other obstacles to paper-free communication are removed.

- public authorities shall develop electronic self-service systems, which can be made available to users and customers from computers and telephones at home or at the work-place.

- *Statens Information* (The Danish State Information Service) shall set up an electronic guide for public regulations and institutions.

- the official promulgation of laws and other judicial precepts in the two newsletters: *Lovtidende* (Legal Gazette) and *Statstidende* (Official Gazette) shall in future appear in electronic form.

- Public sector communication with companies shall be simplified by means of a central register of companies and an attached *CVR code*, similar to the *CPR code* for citizens.

- Public institutions shall put an end to paper-based files and processing tasks will be based entirely on electronic means. Legislation within the area of public administration will be adjusted accordingly.

4. Utilisation of Data and Protection of Personal Data

It is necessary to renew and simplify all legislation pertaining to registration so that registration, combination and use of data for all legal and administrative purposes can take place without bureaucratic procedures.

The use of data in public files shall be optimized by being made available to both the private and the public sector. However, the submission of personal and sensitive data to e.g. banks and insurance companies will only be allowed to take place if accepted by the citizen through the use of his Citizens Card.

5. A Better Health Sector with more Efficient Treatment

The establishment of a nation-wide health network for electronic exchange of information between doctors, hospitals, pharmacies and

health authorities, and the introduction of electronic patient case files shall result in better service for the patients, quicker treatment and shall save billions, which in turn may be used to reduce waiting lists.

6. The "Global Village" of Research

Danish research must achieve maximum benefit from the worldwide electronic network for exchange of information; therefore all Danish scientists shall be connected to the network. Within certain areas of research access to "electronic highways" shall be obtained in the form of wide band services. Through a cooperation between research in-stitutions, research libraries and publishers the aim is to develop the "Danish Electronic Research Library".

The development of strongholds within IT-relevant areas shall be given priority in the allocation of research funds. Furthermore, Danish language and culture shall be secured by e.g. supporting research and the development of language technology.

7. New Ways in the Educational System

With special regard to adult education and supplementary training there is a need to strengthen the development of education supported by technology. To this end a comprehensive project will be set up, including a centre and an Experimental Fund.

8. Children, IT and the Primary and Lower Secondary Education

The Danish Primary and Lower Secondary Education must prepare all children to master modern information technology. As part of the move towards extended use of information technology in the Primary and Lower Secondary Schools all teachers shall become personal users of computers. An IT network will be established for all Danish schools enabling students and teachers to communicate with other students and teachers at schools in Denmark and abroad. To support this process students shall be allowed to bring their own computer to school, while the school will provide access to computers for the rest of the students.

9. Libraries in the Age of IT

The libraries' role and working conditions shall be re-evaluated in the light of a development, where electronic publications gradually take over the role of magazines and books. The libraries shall act as intermediaries and play a leading role in helping the users to navigate through an increasing flood of information. These things in turn demand that solutions to precarious problems of copyright and the copyright deposit of electronic publications must be found.

10. The Mass Media Through New Channels

During the next decade the technological development will change conditions for the mass media profoundly. The coming legislative initiatives with regard to radio, TV and the tele-communication networks shall grant freedom to new channels and suppliers, including nationwide, commercial radio channels. Furthermore, the so-called public service channels need to be free to enter the borderland of new interactive services and other commercial activities, also in joint-ventures with other distributers and producers.

11. Better Traffic with IT

With the specific aim to make road traffic more efficient and minimize environmental damage a number of pilot and development projects shall be established.

12. The Companies' Network

All Danish companies shall be connected by an electronic network for the interchange of business documents (EDI); the results are substantial gains in rationalisation and the possibility of promoting closer cooperation between companies. Furthermore the public sector must play a leading role in the use of EDI for procurements.

13. New and Cheaper Tele-Communication Services

The use of advanced information technology based on tele-communication in companies, public institutions and private homes shall be facilitated through substantial price reductions on wide-band services, liberalization of the hybrid networks and more extensive supply of "high-capacity connections". Furthermore the Danish government shall take the initiative at EU level to lower prices on international tele-communication traffic.

14. Open Network of Society

The computer and tele-communication networks shall be developed further in order to make up a coherent "network of society", which appears as clear and accessible to ordinary citizens and companies as the telephone system.

15. Everyday Life of the Danes: Life at Work - Life at Home

Social life in general, working life and personnel management policies shall adjust to the new possibilities and freedoms which the computer gives the individual. Restraints caused by traditional concepts about working life and consequent demands for working hours and physical presence must be removed.

For the large number of Danes who do not have the possibility of using a computer at work there must be alternative opportunities to become familiar with this basic tool of the Information Society and have access to its information network. In this respect adult education and the public libraries shall be the principal instruments.

16. The Disabled Persons in the Information Society

Those new IT applications which permit disabled persons to become increasingly integrated into society must be fully exploited. An action plan for the effective support and integration of disabled persons by means of IT and electronic communication shall be worked out.

17. The Implementation of the Strategy

For a forceful strategy for the Information Society to succeed awareness-raising activities and a debate on possibilities and problems must be launched in wider circles of society.

The Information Society shall be put on the top of the political agendas of the Danish Parliament and local governments, and an action plan for future initiatives shall be elaborated.

1. The Global Short-Circuit and the Explosion of Information

A revolution is in progress; a worldwide short-circuit of time, space, people and processes.

It all started with the first man on the moon 25 years ago. On the TV screen millions of TV viewers all over the globe could witness the very moment, when the first man set foot on the moon. The entire project was a technological triumph, but in particular a triumph for *information* technology, and TV viewers were suddenly inhabitants of a "global village". Since then this has become an everyday pheno-menon of the mass media; today we expect CNN and other TV channels to be on the spot and give the entire population of the globe access to witness the most important events as they happen via satellite.

Within other areas the world has shrunk dramatically to become a village as well - or rather: a limited market place. Transactions with currencies, shares etc. are now connected by a gigantic electronic network, where you can follow the actions everywhere, and where enormous amounts of money can change hands in a matter of seconds.

Your local shopkeeper or the manager of the supermarket short-circuit a number of processes, when the order for new supplies of certain commodity groups is merely fed into a portable terminal or identified by a bar code reader. This is just one link in a long food chain of information processes, which have been made semi- or fully automatic by means of modern information technology , and which have replaced former hand-written requisitions, procurement requests, invoices etc.

Scientists, computer freaks and business people are being connected with almost incredible speed through the American Internet. More than 25 million users in more than 100 countries now use the networks for electronic mail (e-mail), bulletin boards, fora for discussions, search and interchange of information etc. The number of subscribers grows with more than 10 percent per month.

In these examples the common trend is that we are dealing with processes of information interchange, where the speed of the process has changed from months, weeks, hours or minutes to seconds or fractions of seconds! Waiting and geographical distance - even from one end of the globe to the other - are reduced to nothing; hence the designation "short-circuit".

Sometimes it is also a short-circuit in the sense that there is a breakdown. This happened in for instance 1987, when the share prices at the Stock Exchange in New York went crazy; or in particular when the power structures in Eastern Europe broke down,

and telefax, telephones or satellite TV contributed to the penetration of closed borders and the undermining of power and information monopolies.

Apart from the short-circuit there is a simultaneous explosion in *information*, where the amount and spread of information grow stronger and stronger, and where there will appear yet unforeseen possibilities of widespread and free access to both information and interchange of information. The explosion of information exceeds the introduction of printing in the middle of the 15th century.

The *change in communication and work processes* - and not the technique and its possibilities in itself - makes up *the core of the revolution of information technology*. It changes the conditions for exchange and constitution of knowledge in a profound way.

For a *society* the *consequences* of a development towards the information society are the following:

- An unprecedented *openness, the free and uncontrolled access to information and communication*. No one can control the countless global networks with their debates, databases and scattering of information - anarchy and purifying debate at the same time. Any person with a Personal Computer and a modem attached to the telephone networks can participate and contribute with e.g. a database from his own living room.

- The products of the *information industry* with their high contents of knowledge take over traditional commodity production as the *driving economic force for the developed world*.

  Those countries that are first capable of exploiting modern information technology in the development of products, management, production and marketing will create new jobs with the highest salaries.

- *Knowledge-based services will become an export commodity*. So far services have had to be delivered face-to-face. But now knowledge-based services can be delivered long-distance and across national borders. We are already familiar with this through scientific results, journalistic work and other text-based services. But by means of new multi-media techniques it will also become possible to "export" e.g. the diagnosing of a doctor, and within a number of years it may also become possible to carry out a surgical operation by the use of long-distance tele-communication networks.

- *Companies and organisations will be fragmented with regard to geography and production processes*. Production processes or parts of companies will become easier to place where the labour

is. Simple production can be placed in low-income countries, and knowledge-demanding management and development in the more affluent and well-developed countries. Those days are gone where a company needed to be situated at one specific location.

In extreme cases this means that companies may not produce what they sell: NIKE does not produce shoes, nor does Honda produce cars. They sell the products and buy the production where it is less expensive and where it can be achieved in the global competition.

We talk about the *"virtual company"*: Independent companies, which each contribute with their competence or part of the production process, are linked by an IT network in the joint effort to make a specific product. In terms of management and production they act as though they were one company - when the job is done, they can split up again. Companies can even join as integrated parts of quite different "virtual companies".

The information technology furthermore makes it easier for individuals with specific qualifications such as e.g. consultants, designers, doctors, architects and artists to function without "assistant personnel" and participate as component parts of a "virtual company".

- *Internal organisation* in business enterprises and public institutions will become more open. The former monopoly of the management on knowledge and coordination will vanish. IT instruments may give the ordinary employee the same amount of insight - provided, of course, that the management draws the organisational consequences of the information society.

Even if central surveillance is possible too, the main results will be decentralisation, a more competent staff, fewer leaders at the medium level as well as the short-circuit and democratization of organisational power structures, where the working processes will be rearranged according to the logic of the information society.

The organisation will also become more open in the sense that the individual employee will get a job with a wider content, and he can perform his duties any time and anywhere, at home or at customers. In many jobs the work demands less and less physical presence at the work-place, and the distinction between working hours and spare time is dissolved.

- "The mobile tele-communication technique" paves the way for *"the Mobile Human Being"*, which can be reached by means of tele-communication all over the globe - and in the air. The possibilities for communication by telephone, fax or electronic mail reach an extent that resembles telepathy: No matter where you are, you can always send a thought or a request for another person - and get an answer.

- Large amounts of *routine work will disappear*. While there were great fears just a few years ago that computers would lead in the direction of increasingly monotonous and wearing work, these new realities turn out completely opposite: More and more monotonous work will vanish and be taken over by computers and other IT-based machines. At the same time IT demands, and appeals more and more to, creativity and an independent effort. A more challenging job - and a more demanding one as well - will become the results.

- There will be a tendency for the *population to become divided into an A-team and a B-team in terms of information technology*. Through work and spare-time interests the A-team members become familiar with information technology and learn to exploit its various possibilities. The B-team will not grasp the technology and try to avoid it. The job options for the B-team will become increasingly narrow.

This is partly a question of a generation gap; an increasing number within the younger generation get an even excellent grip of the technology. But even within the younger generation there will be many who fail to keep up - unless a specific effort is made - simply because they do not have daily access to use a computer.

Technological developments within the next 10 - 15 years will make these tendencies even stronger. We will witness a widening gap between work-places and persons with a firm basis in technology, and the persons not using the technology.

We probably already know most of the technology which is likely to break through within the next few years. It is either available on the market already or at least it has been tested through pilot projects or laboratory tests.

The most important tendencies will remain the drastic increases in the capacity of computers and communication and falling prices. Moreover we can add the fusion of media: text, sound and pictures, which is transmitted both through the computer - which can also become both telephone and TV - and the TV, which can also become a computer(see the box on technological trends). While the computer will remain the basic media at the work-place, it remains a question whether the new central IT link between the home and the surrounding world will be the computer or a functionally elaborated TV set. Finally the aspect of mobile communication will witness a complete breakthrough; particularly communication by satellites and other radio communication will create the possibility of total mobility, where one is completely independent from space and in most cases also the proximity to cable connections.

On top of this there are a number of special, advanced applications of IT as e.g. the "Intelligent House", "The Intelligent Car", systems for management of energy and environment targeted for companies, and further improved industrial robots and electronic systems of error finding and diagnosis, which have been developed within the space and aircraft industries; these things will find new areas of application. Moreover, there will be a further development of many well-known IT possibilities concerning diagnosing and treatment of illnesses.

<<BOX START

Technological trends

During the next 5-10 years we must expect the following main trends in the development of information technology.

- **A Dramatic Increase in Capacity and Lowering of Prices**
  It seems almost a law of nature that the power of a micro chip is doubled every 18th month without an increase in the price. It means that the capacity of the computer is increased dramatically while the price remains the same or drops. It also provides a basis for the development of increasingly complicated and powerful software.

- **A Dramatic Increase in Network Capacity and Lower Costs of Transmission**
  New technologies within fibre-optical cables and radio communication and increasingly advanced techniques to "pack" the signals will bring about a dramatic rise in the capacity of electronic networks - both globally, nationally and for internal processes within the individual building - while prices are constantly lowered.

- **The Fusion of Various Media**
  A number of devices and functions, which were formerly separated, will now merge into each other. The CD media will become vital for the storage of both text, sound and pictures.

  Apart from its present functions the PC will also become able to work as a telephone, including video telephone, and/or as a radio and TV receiver. Furthermore we shall experience a fusion of the printer, the telefax, the photo-copy machine and the scanner (for the scanning of documents).

  The TV will become "intelligent" and interactive by being used to "play with" as a computer via the remote control or an attached computer keyboard: It can turn pages in programs or carry out e.g. banking and shopping.

The combination of picture, sound and text in the new multi media programs will become very common.

The prices on the combined media and the corresponding programs will be lowered constantly. But within a number of areas they will probably not reach a price level which paves the way for a breakthrough as a mass consumption commodity until after the year 2000.

BOX END>>

In terms of application the developments will take place on very different levels of technology.

On the one hand *"Virtual Reality"* and *"Cyberspace"* will break through as the both fascinating and scaring new possibilities. (See the boxes on "Virtual reality" and "Cyberspace"); now we can explore our own, self-created universes. But "Virtual reality" can also help us tremendously with a number of more practical tasks, including education and training.

On the other hand, from societies' point of view the most dramatic break-through - at least in the years leading to the year 2000 - will appear in communication of mere *text* and *figures*. This is where the short-circuit will be felt most dramatically, and this is where all can participate: The electronic interchange of data that has just been registered once by electronic means, and the completely unpredictable contacts between people across boundaries and cultures make up some future consequences that can hardly be overestimated; even if it does not present itself as inventive as "Virtual Reality" and other technically advanced solutions.

<<BOX START

Virtual Reality

"Virtual Reality" can be translated as "artificial reality" or "experienced reality". It is a technique which uses artificial three-dimensional space created by a computer. By using the technique it becomes possible to move around in very lifelike artificial universes or in quite fantastic locations - while in reality you sit in your arm-chair or in a model, e.g. the cockpit of an aircraft.

The routine that has been used for a number of years in e.g. training of pilots or shipmasters makes use of TV or computer screens, and most often they construct a model of the cockpit or the bridge of a ship with real instruments for use during training.

In a more recent form special stereo-optical glasses are used in order to achieve the impression of three dimensions and thus reality. A

sensor at the top of your head registers the position of the head, another one registers the position of the eye, and subsequently the computer shows the picture corresponding to the direction in which you look. Thus the sensation of moving in real space is achieved. Furthermore special gloves ("data gloves") are often used to enable the user to carry out actions by the movements of hands and fingers.

The areas of application for Virtual Reality are being expanded all the time. Among the areas under present investigation are e.g. the following:

- *Entertainment:* Is expected to become a very big market in the United States. The technique is still under development with a gradual transition from the well-known computer games with a three-dimensional effect on a flat screen, e.g. racer driving games for the home computer, to the plans of the American Entertainment Industry to have Virtual Reality parks with great machines, where you walk between dinosaurs or carry out gun fights in the Wild West.

- *Process surveillance:* Instead of looking at figures in tables or bar charts on a screen you experience something that looks like physical phenomena in space. You may also imagine that you operate a video robot (with hand movements), whose picture is broadcast to your Virtual Reality glasses. In this way you may e.g. crawl into a threatened atomic installation, walk around the bottom of the sea etc; this is called "tele-presence".

- *Surgery:* A surgical specialist can operate on a patient, which is located somewhere else in the world. The surgeon will be equipped with a Virtual Reality glove and Virtual Reality glasses. The operation is carried out with a laser beam, which is operated by the surgeon with his hand; this is called "tele-surgery".

- *Architecture and Design:* An architect or a designer produce a Virtual Reality model of a building or an object, and the product can be tested, i.e. you can walk around in the building or perform actions with the object in space.

- *Training and Education:* Pilots, shipmasters, engine drivers and drivers have been trained with more or less advanced Virtual Reality systems for a number of years. They are now used for ordinary training for drivers tests as well.

- *Research:* Imagine a molecular scientist who is sitting in his chair wearing Virtual Reality glasses and gloves. The moleculars are seen as balls floating in the air. The scientist can now grab and

place the balls to form new moleculars, whose characteristics become visible by specific colours or other indications.

- *Role plays, therapy, psychology:* Persons can select sex, appearance, dress etc. at their own choice - and meet in the Virtual Reality space.

- *Database search:* A traditional database is equipped with a Virtual Reality interface so the user - instead of searching and retrieving information with keyboard commands or "mouse-clicking" of fields - experiences the sensation of walking inside a building and search for information on the various floors, through corridors and doors and in archives, drawers, and files etc.

Virtual Reality is a new way to operate via the computer - a more visual and intuitive way of operation than the conventional methods. At the same time it is a more sensuous way to receive information. Some predict that Virtual Reality will pave the way for a "body-like computer culture", where presentday computers are hidden for the users, which watch and listen in lifelike space - and give commands by acting with their hands, their feet or their voice.

BOX END>>

<<BOX START

Cyberspace

Cyberspace, which can be understood as:"Controlled space", is where users on the computer network meet each other or gather information. In physical terms Cyberspace can therefore be both remote computers and disks - as well as your own harddisk or e.g. a CD with data.

The important point is that Cyberspace is perceived as an entirely different kind of space existing independently from the physical behaviour of data signals. In Cyberspace societies are created, i.e. human networks, struggles are fought, fortunes are made, ideas are created etc.

With the general development of information technology, where more and more information is communicated in the form of data signals (digital communication) Cyberspace will be expanded to further include all that is presently released on paper, but which will be obtainable in digital form from a computer through the networks within a few years. Cyberspace is the new electronic space which contains everything from personal conversations to doctor's visits, work, education and entertainment.

BOX END>>

<<BOX START

Hot New Medium: Text

"We talk endlessly about new tech-arcana like video and virtual reality, but the conversation orbits around the stuff on this page - text.

In fact, the written word doesn't just remain; it is flourishing like kudzu vines at the boundaries of the digital revolution. The explosion of e-mail traffic on the Internet represents the largest boom in letter writing since the 18th century. Today's cutting-edge infonauts are flooding cyberspace with gigabyte upon gigabyte of ASCII musings"

Paul Saffo, research fellow at the Institute for the Future, Menlo Park, California. Excerpt of a commentary in Wired Magazine, May-June 1993.

BOX END>>

2. A Danish Strategy for the Information Society

The global short-circuit, the explosion of information and the technological developments are realities in the international society that cannot be avoided. Just as we cannot withdraw from the international economy as a nation, but are forced to adjust our economy and competitiveness, we also have to relate to the Information Society.

A number of other countries have already launched forceful strategies to this end. In the United States the Clinton-Gore initiative on "The National Information Infrastructure" - or the "Information Super Highway" project, as it is sometimes referred to - envisages a large-scale effort, where federal authorities become the leading force in the use of IT, legislation and special projects. In Asia Singapore is already working with the realization of a far-reaching strategy for the "Intelligent Island".

In Europe the EU has indicated that IT will become a new, central issue in European cooperation in the report from the so-called Bangemann group, which was evaluated at the summit meeting for Heads of State or Governments at Corfu in June 1994. On this background the Commission has already drafted a proposal for an action plan, which has just recently been dealt with at a first meeting of European ministers responsible for information technology.

In Sweden the former government released a draft for a large-scale effort on IT titled: "Vingar åt människans förmåga" ("Wings for Human Ability"), and in Norway a proposal for a national information network has been elaborated.

The question is *not*, whether we want to become involved in the information society or not. As an open society that plays an increasingly active role in international life, we *are* involved.

The questions are rather: *How* will we participate? With a deliberate and forceful strategy to achieve a position in the front group - and consequently get the jobs, which are the side effect of being the first? Furthermore: Are there any special values and aims, which we want to translate into practice by means of a deliberate and forceful strategy? Even if market forces should not be allowed to take control of the strategy, the strategy must take market forces into account. Most of the developments towards the Information Society are controlled by market forces - internationally and in Denmark.

<<BOX START

The Opinion of the Committee:

There shall be an overall strategy, which can bring Denmark in front of the development towards the information society. Applied properly, information technology is a source for economic development and enhanced quality of life through increased openness and interchange of information as well as better public and private service.

The strategy shall be based on a Danish model, where market forces should not be the only forces involved. The strategy must secure some special values:

- IT shall secure free access to information and interchange of information.

- IT shall support democracy and individual access to influence.

- IT shall contribute to personal development, e.g. by supporting the individual at the work-place and in the spare time.

- IT shall open the Public Sector, make it more transparent and facilitate the delivery of better service.

- IT shall be used to support the weak ones of society.

- IT shall strengthen the international competitiveness of Danish companies as the basis for the Danish welfare system.

By the deliberate focus on these values and by implementing the widest possible application of IT we will achieve the best guarantee that the information society does not lead in the direction of a division of Danes into an A-team and a B-team with regard to information technology.

BOX END>>

<<BOX START

The Approach of the Committee:

A Danish View on Information, Knowledge and Welfare

Information is nothing new; for thousands of years knowledge has been based on the treatment of information. In a historical perspective information has often been "the scarcity factor". Human intelligence was probably equally good in the days of Plato and Aristotle as it is today, but reliable information was short in supply at that time; information was scarce and difficult to obtain.

Today the amount of information is overwhelming, and the demand for relevant information insatiable. Information is also the principal

"creator of values" in the developed countries (hence the name: Information Society).

The technical possibilities to provide and systematize information are practically indefinite. The access to even large amounts of information is not restricted to a small elite of scientists, but is spreading like rings in the water to larger and larger groups within society - but not necessarily to *all* groups by itself.

The Committee considers it the main task to examine the effect of the information society on the individual, the home, the school student, the scientist, and public administration, our welfare and affluence.

It is interesting, but not vital, for Denmark to exploit the information technology in the ways made possible by the various providers on the market. It is also interesting to assess in which direction the demand on the international market is likely to lead.

But the vital task is to assess the social aspects of the new situation we have been put in by the information society: What are the effects of the information society on the individual, the company, on the ones without resources, on the ones with resources, and on our democracy?

In the minds of most Danes Denmark is something special - not just because it is our country, but also because the country is characterized by some basic - and often tacit - values. Our social consciousness reaches far, we care for our welfare society and have a local system of democracy, which is quite unique in a global perspective. The distribution of incomes and fortunes is not as uneven as in most other, comparable countries; in no other country is the self-rule of local government as far-reaching and as well-founded. Our access to the educational system is influenced by the idea that all should have the chance for an education and personal development.

It has been the frame of reference for the Committee that a set of what may be labelled "special Danish values" must be incorporated into the policy that will be laid down on the area of IT:

- IT shall support the free access to information and interchange of information.

- IT shall support democracy and the individual access to influence.

- IT shall contribute to personal development, e.g. by supporting the individual at the work-place and in the spare time.

- IT shall open the public sector, make it more transparent and facilitate the delivery of better service.

- IT shall be used to support the weak ones in society.

- IT shall strengthen the international competitiveness of Danish companies as the basis for the Danish welfare system.

Information is a link in the food chain which leads to knowledge. The exploitation of knowledge makes up the source of prosperity and welfare. The Committee has considered it the task to point out development possibilities and indicate guidelines as specific as possible, and the proposals for the initiatives shall be seen in connection with a profound belief that the broadest possible application of IT is the best guarantee that information technology not by itself will contribute to a division of the population into and A-team and a B-team.

BOX END>>

In the majority of cases the international market decides *what* IT products are supplied *when* and at what prices, just as the market decides our conditions of competition.

The consumers on the Danish market decide whether they want to invest in new, advanced TV sets, if every home shall have at least one computer etc.

As a result of our widespread interaction with the international society the strategy must have its point of departure in Denmark's *strengths* and *weaknesses* measured by an international scale. Put briefly, these can be described as follows:

- It is a *strength* that we have a widespread user's knowledge about information technology:
  - 85 percent of all office employees use a computer at work - compared to an average of 55 percent in the EU countries.
  - 26 percent of all households have a computer - compared to 29 percent in the United States, 12 percent in United Kingdom, 10 percent in Germany and 7 percent in France (not including the specific French "Minitel" terminal)

- It is a *strength* that in general our labour force is well-educated and that our educational system provides children and teenagers with the chance to develop curiosity, independence and initiative - characteristics that are incredibly important in the use of IT.

- It is a *strength* that we have a public sector which is remarkably coherent in terms of administration and information technology when compared to other countries. Essential components are a number of basic registers, which connect data across the limits of various public authorities. This is particularly the case with the CPR code (cf. box on page), which combines personal data, as

well as a number of coherent registers within the areas of real property and geography. For companies a similar system of data connection is under way with a central register for companies giving each company unique identification in the shape of a CVR code (cf. box on page). *But* the potential is not even remotely exploited to its full extent.

- It is a *strength* that our tele-communication infrastructure is very extensive with a fibre-optical cable network that reaches 265 out of the 275 *kommuner* (municipalities) in the country. Furthermore Denmark is in the forefront with the implementation of the common European systems of mobile communication. Generally, we have relatively low tele-communication prices. *But* it is a *weakness* that in spite of the well-developed fibre-optical cable network we have not yet started using the broad band services to any substantial degree.

- It is a *strength* that we have a financial sector which provides unique solutions with a common *Dankort* (Danish payment card), a *Værdipapircentral* (Danish Securities Centre) and a very extensive electronic system for payment service (e.g. *PBS*).

- It is a *strength* that we have a number of strong environments within companies and knowledge of tele-communication and software. *But* it is a *weakness* that these things are not based in any large-scale IT industry.

- It is a *weakness* that Denmark makes up a small market and a small language area, where costs are high in the development and marketing of software compared to the number of sold units.

    (See Appendix B: "Denmark in an International IT Perspective. The Country of Many Possibilities", by Journalist Bjørn Kassøe Andersen)

If we shall attain optimum exploitation of the strongholds and minimize the adverse effects of some of the weaknesses a strategy with the following contents is needed:

<<BOX START

Strategy

The public sector must interact with the private sector on a forceful strategy for Denmark's development towards the information society and take the lead in the efficient use of information technology.

BOX END>>

For the next years the strategy shall have the following main components and strategic aims:

1) *Before the year 2000 the public sector shall finish the work for a coherent electronic, public service network to the benefit of citizens and companies.*

Information that has already been submitted by citizens or companies to one public institution should not be demanded from another agency. The service network should allow citizens and companies to communicate with public authorities by electronic means and gain access to advanced self-service systems and information registers etc. All citizens shall be offered an Electronic Citizen's Card with a PIN code, so a number of public cards, certificates and documents can be nullified, and the citizen can gain easier access to better service. Public registers with non-sensitive data shall be made accessible for citizens and companies.

On promising areas such as the Health Sector a particular effort must be made in order to attain improvements in service and rationalisation gains by means of IT.

Such IT applications might also become an engine for renewal within large parts of the public sector.

In relevant areas legislation shall be adjusted in order to secure that the necessary conditions for advanced IT applications throughout the Danish society are in place.

2) *Before the year 2000 Danish companies shall have mutual electronic communication of business documents and furthermore make an effort to get in the forefront with the integration of IT in their products.*

Danish companies shall be connected into an electronic network with mutual interchange of business documents such as procurement requests, invoices, payments etc. by EDI (Electronic Data Inter-change) based on the international Edifact standard. All Danish companies should establish electronic mail connections before 1996.

Furthermore Danish companies must try to attain a leading position with respect to the adoption of IT in products and services and with regard to more efficient use of IT in internal processes.

3) *All Danes shall have access to the active use of IT in order avoid a division into an A-team and a B-team in terms of information technology.*

It shall be the aim to secure a broad educational basis for all to master information technology to the necessary extent, first of all in the Primary and Lower Secondary Schools. Furthermore IT shall be used to reach supplementary and further adult education. The many publicly available IT applications must become part of an easily accessible network of society, where the public libraries retain the same central intermediate function as they do with books and printed media.

4) *For central Danish culture-bearing media areas a particular effort must be made to secure a Danish supply.*

With regard to a number of culture-bearing media there is a risk that the information technology will flood Denmark with productions which become increasingly difficult to compete with for Danish productions in terms of economy. This is particularly the case for TV, film, educational programs and certain works of reference etc. Within these areas a special effort shall be made to secure a Danish supply.

5) *Based on Danish aims and values Denmark shall try to influence EU policies on the IT area and also try to achieve maximum benefit from relevant EU programs.*

By means of directive regulations and a number of specific programs EU will set the agenda with respect to a number of areas for the introduction of information technology over the next few years and our interaction with the surrounding world on the area of information technology. Denmark must try to influence the formulation of policies as much as possible and benefit from the programs.

In the following a number of key areas relevant for the realization of the strategy will be reviewed. A description of a number of specific target areas and proposals for action will be given in each area.

In the proposed concerted effort between the public and the private sector there will be a number of areas, where we may reach that "critical mass" which is essential for new applications to get under way and become sustainable with regard to the market.

Within a number of areas as e.g electronic communication by EDI there are obvious economic advantages for the individual company - if only the rest follow along. It is analogous to the problem of selling the first telephone!

Therefore it is essential for the total strategy to lay down a number of *deadlines* for the attainment of each landmark. Similar to the realization of the internal market of EU it is the simultaneous number

of initiatives that bring about a mutually supporting effect of greatest importance.

Within a number of areas it is quite simply necessary to develop the *standards* for the interchange of information and the coherence between IT systems.

Without closer investigations it is not possible to shed light on the *economic consequences* of the strategy; at the moment the estimated total, annual public and private IT expenses in Denmark make up about 3 percent of GNP corresponding to some 25 billion DKK, where about 20 billion pertain to the private sector and 5 billion to the public sector. These figures do not include the area of tele-communication, which in itself covers almost 20 billion DKK.

For the private sector it is very difficult to say what the expenses might reach - principally this depends on the intensity with which Danish companies will embark on innovations based on information technology - and the extent to which consumers will follow the offers of the market.

Within the public sector the strategy implies that a number of investments should be advanced. Expenses will, however, mostly remain within the existing budgetary limits, since we are dealing with investments that can be earned back relatively fast and provide a steady income. However, within certain areas it will be necessary with a special, temporary effort. It is estimated that the implemen-tation of the strategy will demand investments by the billions towards the year 2000, both advanced and increased ones.

However, the crucial criteria for the successfulness of the strategy do not relate to the expenses, but rather to the applications and the results in the shape of increased efficiency and better service and welfare.

3. The Electronic Service Network of the Public Sector.

Principle 1:

Public administration (central, county and municipal level) shall be connected into a comprehensive electronic service network, which will give:

• *better service to the citizens*
• *better service to the companies and support the companies'   own use of IT*
• *rationalisation gains and*
• *more open decision-making processes*

The following will outline a number of key target areas for such a strategy, which may become the driving force for a number of innovative initiatives within the public administration.

Principle 2:

Information which has already been submitted by citizens and companies to a public institution, and which can be transferred electronically, shall not be requested by another public institution again.

The individual citizen or company should not experience a public sector of separated authorities who do not communicate, or who are unable to send information to each other. It can be annoying if information, which has already been given to one authority, has to be submitted to another one shortly after. The same situation occurs if one is asked for data which are already available from various files. It may be e.g. birth certificates, marriage certificates, information on buildings or registration on deeds and mortgages.

At the same time the citizens shall be able to discern for what information about them is being used, and in concrete cases the citizen must be apprised of the data that form the basis for the decisions.(see chapter 4: Utilization of Data and Protection of Personal Data)

Initiative:

• ***2.1.Data shall be requested only once***

All ministries overhaul their legislation in order to assess the demand for information, which citizens and companies must give. As regards information that has already been registered by another public institution a plan will be elaborated as to how information is to be transferred electronically, and how the principle of transparency is to be serviced.

The data shall be registered by the authority who can do so first and/or in the most appropriate way for the citizen or company.

Compared to other countries Denmark is already in the forefront on this field. But there is still a long way to go, especially with regard to companies' reports to the State.

Within certain areas simplifications can be implemented relatively easily and within a short time. In other areas the realization of the principle will depend on the development of entirely new software or conceptual standardizations of data definitions. Finally there may be cases where the costs of electronic transfer appear too high compared to the benefits achieved.

Initiative:

- ***2.2 Electronic Citizen's Card with a PIN code***
  All citizens will be offered an Electronic Citizen's Card with a PIN code and picture which can be used for positive identification in contact with public authorities. This means that the Health Insurance Card and a number of other public cards and certificates will become superfluous because the information can be gathered from public data registers.

When the citizen is in contact with public authorities papers, certificates or written proof, e.g. the Health Insurance Card, has to be presented in order to provide positive identification of the citizen and to substantiate rights and other matters. These documents can successfully be replaced by one Citizen's Card, where the inserted CPR code gives access to that information which is already available from public registers. The present certificates and documents are really just a print-out from the registers, and while the data are brought up-to-date on a regular basis, there is no guarantee that the written documentation is up-to-date as well.

<<BOX START

The National Population Register (CPR)

A national population register was established in the late sixties with the purpose of administering a new system for tax deducted at source. The register contains basic data on all Danish residents. Each person is identified by a ten digits figure (CPR code) which gives access to information on date of birth, address, gender, marital status, children etc. This population register has become the general service system and the source of basic personal data for all systems containing information on individuals in the Danish public sector. To the extent that legal provisions permit, this is also the case for information systems in the private sector.

BOX END>>

The Card shall be an offer to the citizens. By means of the Card the citizens can obtain better service through the more efficient use of public registers with person-related data. One example is where the citizen shows up at a public authority without his papers or if he wants information from public registers transferred for use outside the public sector, e.g. for banks, building societies or insurance companies. But citizens should still have the opportunity to get service from public authorities without using the Card.

The Card shall replace e.g. birth certificates and marriage certificates, drivers licence (except when the holder is driving abroad) or game licences. It will also be valid for identification instead of a passport when the holder travels in EU countries.

Owing to the positive identification the Card can be used for electronic self-service to the extent that electronic systems are being developed within the public sector (see initiative 3.3). But this should not imply that the possibilities of personal service are impaired so that the citizen has no choice apart from self-service.

As a starting-point the electronic components of the Card should only include the most basic data such as name, CPR code and possibly the address. There will be no technical problems involved in adding more data, but the consequences might be an increasing demand for updating as the data in the registers change.

If e.g. the EU were to introduce a standard for an international health insurance card, with relevant information in the case of emergency admission to a hospital, the Citizen's Card can be used to this end as well.

The external appearance of the card should only reveal the picture, name and a simple serial number, whereas further information, such as the CPR code and address, should only be registered electronically. This will prevent abuse of lost cards and there would be no need - as

it is now the case with the Health Insurance Card - for an entirely new card when the holder changes address or doctor.

The Card is not intended to replace cards used in the private sector, e.g. payment cards. However it is intended for simple identification vis-a-vis private companies, including banks and insurance companies, and the postal services. Possibly it will become relevant to use the card as part of a general security system in connection with PC-based communication through the tele-communication networks in order to free the citizen from the obligation to show up at public institutions (see chapter 14: Open Network of Society).

Technically there are a number of possible solutions ranging from the magnetic stripe card (similar to the present Health Insurance Card and the *Dankort*) to cards with processor (chip card).

However, taking data security and durability on capacity of equipment into consideration all speculations point clearly in the direction of a chip card.

Advantages and disadvantages in connection with the introduction of the various forms of Citizen's Card and "private cards" have been thoroughly investigated in a comprehensive work under the auspices of the Danish Board of Technology, and a pilot project under the Ministry of the Interior is presently reviewing the practical possibilities of the introduction of a Citizen's Card. In the light of these works the time now seems ready for a decision regarding the introduction of a Citizen's Card to be implemented within a few years.

Principle 3:

Citizens and companies who wish to communicate electronically with public authorities should have this possibility.

Such electronic communication creates far-reaching possibilities of improved service to citizens and companies as well as possibilities for rationalisation for all involved.

Initiative:

- *3.1. E-mailboxes in all public institutions*
  As soon as possible, and no later than the end of 1995, all public institutions will establish an electronic mailbox for the institution, which can be used by citizens and companies who wish to communicate by electronic mail with the public authorities.

The principle shall be based on the belief that anyone wishing to address the State can do so by electronic means and receive an electronic answer. In some cases, e.g. the issuing of certain certificates etc., supplementary paper documents must be forwarded.

Initiative:

- ***3.2. Development of electronic communication***
  All ministries overhaul their legislation and administration and estimate the interchange of structured information with the private sector with the aim to elaborate a plan as to enable those citizens and companies who wish so to communicate by electronic means based on the Edifact standard. In this connection possible legislative requirements with regard to the use of specific paper forms, demands for written documentation or handwritten signatures will be assessed with the aim to remove obstacles to paper-free communication.

In a number of cases the communication concerns issues of a special nature, e.g. contract agreements or transfer of payments, which demand certain standards for security and authenticity. In this case pure electronic communication presupposes a special kind of security in the form of encryption. If this is not possible for one reason or the other one may imagine intermediate types, where forms are filled out electronically and exchanged by mail in order to get a signature.

In order to ensure that electronic communication is as compatible as possible with the systems of the private sector - and the systems of parties abroad - it is important to develop it according to the international Edifact standard (see chapter 12: The Companies' Network). If within certain areas a fully specified Edifact standard does not exist, the public institution in question should take the initiative to make sure that the necessary specification takes place and secure the international acceptance of the solution.

Initiative:

- ***3.3 Development of electronic self-service systems and bulletin boards.***
  With particular regard to their own area all ministries will elaborate a plan for the development of electronic self-service systems and bulletin boards, which citizens and companies - in line with the push-button telephones - can operate from their computer.

There are large perspectives in the development of electronic bulletin boards and self-service systems. Many public institutions have already got a foretaste hereof with the push-button telephone systems, and a number of municipalities and public institutions are preparing computer-based systems in connection with Diatel.(see chapter 14: Open Network of Society).

Under the auspices of the central authorities a more systematic effort in the area is needed.

Initiative:

- *3.4. Electronic key to public schemes and institutions.*
  Before the 1st of January 1996 **Statens Information** *(Danish State Information Service) will establish an electronic key or guide informing about schemes and functions covered by the various public institutions, and giving indications of how to get in contact with them (telephone and fax numbers, e-mail addresses etc.)*

The key will be based on the book: *Samfundsnøglen* ("The key to Society"), which *Statens Information* is publishing at the moment, and furthermore on the information in the *Hof- og Statskalenderen* (Danish Official Yearbook), the Phone Book of the Ministries and information material of the local governments. The key will be made available on all those on-line systems that want it and on disk/CD-ROM. The database at *Statens Information* may furthermore be used as a currently up-dated basic database for *Hof og Statskalenderen* and the Phone Book of the Ministries, from which all interested parties can have data extracted.

Initiative:

- *3.5.Electronic bulletin board with central government press releases etc.*
  As quickly as possible **Statens Information** *will establish an electronic bulletin board with copies of all press releases, newsletters, information newspapers etc. as well as a list of released publications from Government institutions. As far as possible the publications themselves should be made electronically available as well.*

The bulletin board can be established on the basis of the present publication: "Status" (Progress Report) by *Statens Informationstjeneste* supplemented by press releases etc. from government institutions.

Principle 4:

Official publications with public promulgations will change to electronic form.

Initiative:

4.1. Lovtidende (the Legal Gazette) and Statstidende (the Official Gazette) in Electronic form.

The official promulgation of laws and other judicial precepts in **Lovtidende** *will from 1999 be made in electronic form. The official promulgations in publications such as* **Ministerialtidende**[1] *and* **Statstidende***, including* **Tingbladet** *and* **Registreringstidende** *(the Registration Gazette), will change to electronic form from 1996, while the printed versions will be published in supplementary form only as long as the need exists.*

The publications are of primary interest to professional users such as lawyers, financial institutions etc. A change to electronic promulgation may offer a number of advantages to these groups and - after an appropriate period of adjustment - the traditional paper editions will partly become superfluous. Among the advantages is the possibility of subscribing to information which is adjusted to the special needs of the individual.

For non-professional users *Lovtidende* (the Legal Gazette) and other publications are only of limited interest, but of course the free access to material that we have today, particularly the access to read copies free of charge at the public libraries, must be maintained.

The transfer to electronic form will actually improve the citizens' access to the material, among other things - apart from the Public Libraries - by giving access through terminals to the material on public places used extensively by the public as for instance "Quick Desks" and information shops in municipalities as well as various local government offices.

The transfer to electronic promulgation of laws does not imply lower priority to the additional information activities carried out by public authorities in connection with new legislation. This additional information, in the form of leaflets, "OBS" spots on TV, newspaper advertisements etc. plays a far more important role for the possibilities of citizens and companies to achieve information on

---

[1]*Ministerialtidende* is released by the Ministry of Justice once a month bringing circulars and other notifications.

existing legislation in relevant areas than the more formal promulgation which is prescribed by the constitution.

In practical terms the electronic promulgation of laws and other judicial precepts (which are today promulgated through *Lovtidende* and *Ministerialtidende*) will be based upon a further development of the present *Retsinformationssystem* (the legal information system). The debates of Parliament are also included in *Retsinformation* (legal information), and it would be relevant to change this to an electronic medium together with *Lovtidende*.

Today the contents of *Statstidende* (the Official Gazette) is very mixed and there is a need to clarify how the change to electronic promulgation of the various types of announcements can be made in the most appropriate way. In future the service, which is today offered by *Registreringstidende* (the Registration Gazette), will be offered through an extension of the information system of the Danish Commerce & Companies' Agency. In a similar way the system of registration on deeds and mortgages of the courts shall be expanded to provide that service which is today offered by the printed *Tingblad*[2].

Principle 5:

Public registers with information on persons, companies or geographical data should be more interrelated, and double registration of information should be avoided.

Initiatives:

- *5.1. CVR code to be introduced by the 1st of January 1996.*
  The plans of a central, company register and an attached CVR code, parallel to the CPR code for citizens, will be implemented so that the register and the code shall become realities from the 1st of January 1996.

- *5.2 Responsibility for cross-coordination.*
  As responsible for the basic databases on persons, companies and geographical data, the Ministry of the Interior, the Ministry of Inland Revenue, and the Ministry of Housing and Building shall be responsible for cross-coordination in order to ensure that data from these registers are put to optimum use in other public registers.

- *5.3. General conditions and payment for the delivery of data.*

---

[2]*Tingbladet* is a part of *Statstidende* bringing information on registration of deeds and mortgages.

The various schemes for the delivery and sale of public data for the use of other public authorities, private companies or citizens shall be evaluated with the aim to secure conditions of access and rates that promote the creation of surplus value for society through the use and re-use of data.

- ***5.4. Advancement and further development of the electronic system for registration on deeds and mortgages.***
It will be attempted to advance the establishment of an electronic system for registration on deeds and mortgages, which is planned to be completed by the end of the year 2000. At the same time experiments will be initiated as fast as possible regarding the electronic transfer on data on deeds and mortgages from informers such as building societies, lawyers etc. with the aim to incorporate these actors as much as possible in the working process.

<<BOX START

The National Business Register (CVR)

As a counterpart to the population register (CPR) containing data on all persons the national business register containing data on all Danish companies and enterprises is planned to be introduced by the beginning of 1996. The register will contain basic data of a general interest only (name, address, phone numbers, line of business, number of staff etc.). Each company (the legal entity) is assigned an unambiguous identification code (CVR code) and must identify itself by means of this number in all cases of contact with public authorities. The register will make life easier for the private enterprises because their obligations to inform public authorities will be minimized. As for the public authorities the business register should increase efficiency considerably.

BOX END>>>

Within the presentday public sector there are registers with information about most units and relations in society as e.g. persons, companies, real property, education etc. Denmark has a unique opportunity to take advantage of this information on a broad scale in society, because the information is connected across institutional boundaries by shared keys as e.g. the citizens CPR code and the similar codes for companies.

It is vital for the public service network with a further development of these registers, which are intended to play the intermediate role of basic registers and suppliers of services to a larger extent.

However, a number of things constitute an obstacle to the use of these data. The users of data find it difficult to get a clear picture of the possibilities of using data at different public authorities. Furthermore many registers are not ready to function as broadly applicable sources of information.

There is a need for common principles and conditions that can contribute to the development of an open and well-functioning "market" for public data. The various keys, registration units and data must be well-defined, and it must be easy to get the information on the whereabouts of data as well as their quality and how recent they are. There is also a need for precise rules regarding the transfer and value-adding of data as well as principles for price fixing that can promote the utilisation of data.

Principle 6:

Pari passu with the replacement of IT systems public institutions must change gradually from paper-based archives to electronic processing and filing over the next few years.

Initiative:

- ***6.1. Electronic processing and filing in public institutions.***

Pilot projects shall be carried out, whereby public institutions will introduce purely electronic processing and filing. No later than the middle of 1995 the The National Archives shall lay down regulations that make electronic filing possible, so that institutions that want to can abandon traditional paper archives and adopt purely electronic filing from the 1st of January 1996. Furthermore efforts to develop general demands for the future electronic filing system will be initiated. In this connection there is a need for a review of practical possibilities to facilitate the easy access to case files and archives according to the Act on Public Access to Documents in Administrative Files.

For the public institutions such a transfer to electronic processing and filing constitutes the prerequisites for a successful entrance into the information society. It will create the vital coherence in the initiatives proposed above.

Principle 7:

The establishment of the public service network should be used as the point of departure for a renewal in the functioning and interplay

between the involved institutions at central, county and local level. The performance of tasks and the division of labour will be reviewed with the aim to create more efficient interplay with maximum exploitation of those possibilities of rationalisation that are offered by the information technology (Business Process Reengineering)

If the possibilities of more efficiency and rationalisation gains are to be realized in any substantial degree it demands a very focused effort, which quite often will cut across traditional administrative structures and institutional interests. Therefore an overall political effort in this area must be initiated.

4. Utilization of Data and Protection of Personal Data

Principle 8:

The protection of persons and data should be secured through modern legislation that makes it possible to register, combine and use data for all legal and administrative purposes without bureaucratic procedures.

Initiative:

- *8.1. Revision of the Danish legislation on Registers.*
  A renewal and simplification of the Private Registers etc. Act and the Public Authorities' Registers Act shall be carried out. The present legislation on registers shall be replaced by general legislation about protection on personal information not based on the concept of registration. In the revision of the legislation on registers the peripheries of the Act on Public Administration and the Act on Public Access to Documents in Administrative Files shall also be involved, and in all areas the fully electronic systems for processing of cases and filing will be taken into account in principle treating paper-based and electronic processes equally.

During the last 15 years Denmark has had a legislation on registers. This has provided us with experiences with regard to risks involved (or not involved) in relation to protection of personal data. As public administration has become increasingly electronic, the legislation has seemed unnecessarily bureaucratic for practical administration to an increasing extent. This is particularly the case with the demands for detailed regulations for registration or the statutory reporting to *Registertilsynet* (the Data Surveillance Authority). Transfer and combination of data and on-line access to public registers are furthermore obstructed to an extent that is far from reasonably justified by considerations for the protection of personal data.

Furthermore there has been a gradual change in the very basis for the legislation; today the register is outdated as a concept from a technological point of view, and the distinction between registers - which are being regulated by the legislation on registers - and case files within the public sector, which are regulated by the Act on Public Administration, cannot be maintained in times where case files appear in electronic form. This results in problematic overlapping or legislative conflicts; are electronic case files to be erased as soon as possible after the conclusion of the case in accordance with the principles of the legislation on registers about erasure - as opposed to manual case files, which are traditionally stored for a longer period until they are filed or discarded according to the Act on Archives?

For sensitive information such as information about race, religion and colour of skin, about political, sexual or criminal matters, or about health there must of course be a firm regulation and a very high level of protection. Therefore there must be very precise rules regarding *who* can be allowed to register such information, and *what* it can be used for, including the limits for transfer.

It should as a rule of thumb be possible to collect and register non-sensitive information such as information on change of address; it should be possible to use it more or less freely, as well as transfer it, provided that due respect is paid to the principle of transparency so that the registered persons know who stores what information about them, and what the information is generally used for.

Where a public authority, a building society, an insurance company etc. collect information from another authority/company for the processing of an application, the principle of transparency can be duly served by the registered person accepting the transfer of information. In other cases the principle can be secured by informing the registered person, cf. e.g. the banks, which inform their customers of the transfer of information to tax authorities.

The administration of the principle of transparency should not, however, be rigid or inflexible. In many cases the principle can be duly fulfilled without consent or written notification: For instance by means of legislation that clearly stipulates the access to use and transfer of information. This will be fully adequate in situations where the information actually is supposed to be publicly accessible, or in situations where personal data are collected and stored with the specific intention of transfer as e.g. CPR data (name and address etc.). In cases where information is transferred for statistic use or similar cases, which have no legal consequences for the registered person, there will not be any need for personal consent or written notification either.

On the other hand the technical security systems must ensure that no unauthorised person gains access to information, and principles of the hearing of parties etc. must ensure that the registered person has access to make complaints in cases where a decision that has legal consequences for the person in question is based on registered information.

A review of the Danish legislation on registers must under all circumstances be carried through before long. During the last four years there have been negotiations on an EU directive on the protection of personal data. An adoption in principle of the directive draft - which among other things has been criticized in Denmark for being much too bureaucratic - will probably take place in the near future.

Naturally Denmark must join the efforts to create an overall framework for the legislation on protection of data in EU: That personal data exchanged between member countries must be secured by a uniform and high level of protection in each country.

But alternatively one should not automatically accept the equation between a "high" level of protection and bureaucratic procedures for the treatment of personal information - or accept that the principle of subsidiarity is neglected by detailed instructions to the individual member country regarding the practical ways of handling the concern for protection of the legitimate interests of the registered person.

In its present form the directive may obstruct IT application in the EU countries so much that Europe, instead of achieving competitive advantages compared to other parts of the world (see the Bangemann report), falls behind in the competition. For Denmark the point of departure must be that the harmonisation of the protection of personal data which has been achieved through the Council of Europe Convention of 1981 is sufficient; this Convention created the necessary, common standards, while leaving room for national regulation.

Principle 9:

Data in public registers should be utilised to the maximum by re-use in both the public and the private sector. Where warranted by considerations for personal protection, the transfer of information can be made dependent on the permission of the citizen in question, e.g. through the Citizen's Card.

Initiative:

- *9.1. Review of better utilization of data in public registers. Starting in the public basic registers for personal data (CPR), companies (CVR) and data on real property (registrers included under the CIS[3] , including the coming electronic system for registration on deeds and mortgages and electronic cards) a review of the possibilities of better general utilization of data in public registers will be established in cooperation with the trade organisations, the Consumers Council etc. In the area of real property data there is a need to estimate the extent to which supply companies and other companies can assist in the up-dating of public registers.*

---

[3] CIS is a comprehensive system for coordination of information on the area of real property, buildings and housing, initiated by the Ministry of Housing and Building.

The result of this makes up part of the basis for a revision on the legislation on registers. In connection with this review proposals will be drafted that can advance a more open, transparent and well-functioning market for non-sensitive personal data, including principles for pricing.

Within a number of areas it might be a big practical help for the citizen to get extended access to having information transferred from public registers directly to private companies (on the basis of a request from the citizen). This applies e.g. to data on real property or income for the use of loan applications in banks or building societies. In such situations the citizen quite often finds it difficult to procure and copy the necessary documentation. Inasmuch as it has to do with standard information, which is registered in public registers, it will be a significant simplification if the citizen could have this information transferred automatically by granting special permission - it would probably be the easiest way to use his Citizen's Card (see initiative 2.2). The citizens should address a public authority or - even easier - the building society or the bank, with which the citizen is already in contact.

5. A Better Health Sector with more Efficient Treatment

Principle 10:

It must be the aim to exploit the outstanding possibilities within the area of health for better service and more efficient and quicker patient treatment by the use of IT for communication and registering of personal and clinical data.

Initiatives:

- *10.1. A Nationwide Health Network for the Interchange of Information.*
  The systematic interchange of information between doctors, hospitals, pharmacies and health authorities (references, excerpts of case records, prescriptions, charges etc.) will change to electronic communication by means of a nationwide health network. Together with the counties the Ministry of Health will elaborate a plan to the effect that all such communication will take place electronically before the year 2000.

- *10.2. The Interchange of Electronic Patient Case Files.*
  A national standard for electronic patient case files for the use of hospitals and G.P.s (General Practitioners) etc. will be developed. Together with the counties the Ministry of Health will start a development work with the aim that a fully developed concept for an electronic patient case file, which has been put to use by all counties, is in place before the year 2000.

- *10.3. Development of Systems for Diagnosing and Clinical Treatment.*
  The Ministry of Health and the counties will initiate a common, nation-wide development work with systems for the support of diagnosing and clinical treatment, including communication and distance diagnosing (tele-diagnosing), image processing, and the development of equipment for juxtaposition of text, pictures, test results etc.

The consistent use of IT in the health area may provide for much better service towards the patients and substantial cost reductions, which can be used to reduce waiting lists and increase the effort with the essential treatment of patients. Furthermore a frontline effort in this area may make Danish IT companies more competitive on both the national and the international markets.
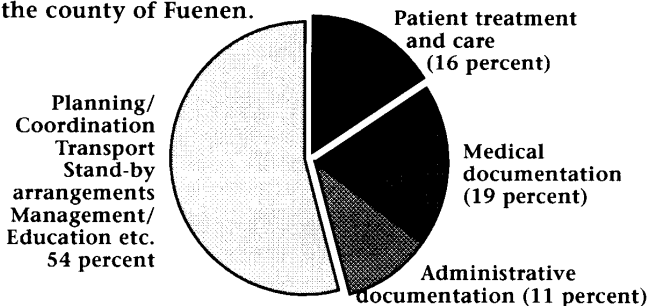
IT applications might reduce the extensive use

More efficiency via EDI

Distribution of working hours at hospitals in the county of Fuenen.

Patient treatment and care (16 percent)

Medical documentation (19 percent)

Administrative documentation (11 percent)

Planning/ Coordination Transport Stand-by arrangements Management/ Education etc. 54 percent

Medical and administrative documentation, where IT opens up for possibilities of service improvements and more efficiency, make up some 30 percent of the working hours, while the direct patient treatment and care only makes up some 16 percent of the working hours.

In the county of Fuenen, which has 10 percent of the Danish population, the total costs for transfer of messages within the Health Authorities amount to some 200 mill. DKK per year; by using EDI these costs can be reduced significantly.

The most frequent messages suitable for transfer by EDI (million units/ year)

0.210 mill. Letters for references and discharge.

0.350 mill. Requisitions for examinations and answers.

3.2 mill. Settling of accounts with the Health Insurance authorities.

2 mill. Prescriptions.

The total amount of health expenses in Denmark made up 48.8 billion DKK in 1993. Admissions to hospitals 1 mill. units/ year. Out-patient visits 3 mill. units/year.

e use of resources, which the Health sector has for registration, communication and administration today. Furthermore, the duration of much treatment can be reduced substantially, because now communication can be dealt with in seconds instead of hours or days.

An illustration of these perspectives is offered by an investigation from the County of Fyn, which shows that about 30 percent of the total working effort on hospitals is used for registration and

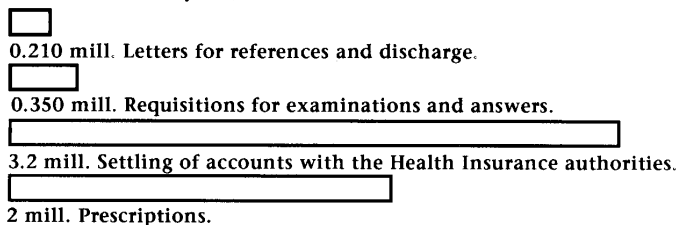administration, while direct patient treatment and care only takes 16 percent of the total amount of working hours. The remaining 54 percent is spent on planning, management, transport, stand-by arrangements etc.

The increased efficiency of IT-applications for "paper work" on registration and administration with just 10 percent will result in a nationwide release of about 1 billion a year for the increased effort for the patients. In addition there will be increased efficiency gains for G.P.s, pharmacies etc.

Successful experiments with regard to *electronic interchange of information* have already been carried out between G.P.s, hospitals, laboratories, pharmacies, and the pharmaceutical industries together with the health insurance authorities and the social authorities, which together make up the Health Sector. These development initiatives shall be expanded into a nationwide project with the ambition that all relevant forms of communication will become electronic before the year 2000.

Apart from reduced costs in all links the result will be substantial improvements in service in the shape of time reductions in duration of treatment and e.g. booking systems, with the aim that patients can make an appointment at a specialist, an out-patient's clinic, a laboratory or a hospital from their G.P.

The project demands extensive work with standardization of messages, e.g. for the electronic prescription, references and answers from laboratories. All communication of structured data should be carried out according to the international Edifact Standard.(see chapter 12: The Companies' Network). However, within a number of areas this standard has not yet been fully developed, and therefore Denmark will have the opportunity to influence the standardization process decisively.

Similar to the on-going MedCom project, which develops electronic communication in certain key areas, the proposed project demands the cooperation between a large number of parties as well as a substantial effort in terms of coordination and development. Therefore there is a need for an overall, nationwide project, where the Ministry of Health, the counties and other involved parties work together for a binding time schedule.

Further substantial gains in service and efficiency can be achieved through *electronic patient case files*, which can gather information across wards at each hospital, and with which information can be interchanged between hospitals and with G.P.s. Thus patients might avoid double examinations, diagnoses may be given more securely and free of mistakes, and the duration of treatments can be shortened.

Furthermore there are substantial rationalisation gains to be made on hospitals internally.

For these gains to be realized there is a demand for the development of general standards for electronic patient case files, which can be used on very different wards of hospitals and at G.P.s etc. This framework must be closely connected with the Edifact standards used in the health network.

Experimental projects and development projects with electronic patient case files are already in progress, but the development of a general framework for a patient case file demands the cooperation of all parties. Furthermore the experiences with the development of the patient case file and its general demands should be evaluated and made available to relevant public institutions and potential private supply companies.

Together with the counties and other involved parties the Ministry of Health should establish a project to this end with the aim to develop the concept for a general electronic patient case file before the year 2000, and secure that it - in varying extent - is in use in all counties.

Naturally it applies to both the health network and the electronic patient case file that all security aspects must be in order, so unforeseen access or abuse of personal data can be avoided.

There are other areas where IT systems for diagnoses and clinical treatment might be instrumental in obtaining substantial improvements in patient treatment and rationalisations.

Databases containing examination results might strengthen systems to the support of diagnoses. Work with projects for image transmission through the tele-communication networks, including ordinary telephone lines, is in progress at various hospitals.

Consequently there may be a decentralisation in the treatment of illnesses which presently take place at the larger, central hospitals. Diagnoses can be made without having the patient meet at the particular hospital, specialists from larger hospitals can participate in the decisions on treatment, and decisions regarding the necessity of transferring patients for other hospitals can be made more securely.

These experiments and development activities should be coordinated in a nationwide project, which should be initiated by the Ministry of Health and the counties in cooperation. The project will collect and communicate experiences and contribute to the end that the various initiatives support one another.

Based specifically on the administrative coherence of the Health System Denmark has a great opportunity to become the leading force

in the development of coherent electronic systems with maximum re-utilization and transfer of data. Furthermore an increased effort will contribute to a competitive advantage for Danish IT and medico-technical companies.

6. The "Global Village" of Research

Principle 11:

Danish research must achieve maximum benefit from the global electronic network for scientific interchange of information.

Initiatives:

- *11.1 Connection to E-mail.*
  All Danish scientists and research institutions shall be connected to the global, electronic e-mail network. The Ministry of Research will take the initiative to achieve this objective at the institutions in question.

- *11.2 Electronic Research Library.*
  As a supplement to the general paper-based publications there will be an investigation into the possibilities to establish an electronic research library, where Danish scientists can publish their results; furthermore the possibilities for new forms of cooperation with the publishing sector will be reviewed.

- *11.3 The Establishment of Broad Band Services.*
  The need for broad band services within the individual research areas of both the public and the private sector will be assessed. Furthermore the possible need for the ear-marking of special research funds for the purchase of such services will be estimated.

The "global village" of research is already a reality in the world of research. The short-circuit of time, space, persons and processes happens daily in the ways many scientists cooperate with each other. Drafts for articles are written in Copenhagen and sent by Internet, the global network, for a comment at a colleague in California, who naturally answers the author through Internet. Test results made at international research centres such as the European research centre CERN can quickly be transferred for further analysis at institutes around the world through electronic networks.

The announcements of international symposiums and conferences are gradually appearing at electronical bulletin boards exclusively, which may reduce the normal time for the arrangement of such an event with 50 percent: Enrolment, reservation of flights and hotels, practical information about the conference and the conference program are all communicated by electronic means to all participants, just as questions for the arrangement are asked electronically.

In Denmark the most intensive use of electronic communication and IT takes places within the research environments of the natural sciences. But also the "soft" disciplines of the humanities and the social sciences have caught up during the most recent years. The vast majority of the scientists have access to electronic communication - and the majority use it as an integrated part of their communication with colleagues. But there is still a number of scientists who are not connected to the network or who only use it to a minimal extent.

The access to information from databases in other central computers plays an important role for the efficient interchange of knowledge between scientists. Unpublished research reports and drafts for articles can be obtained without having to await the publication in international magazines with production processes of typically 6-12 months.

Therefore there is a need to review whether this process can be strengthened or possibly linked up to the tendency of releasing publications electronically in order to obtain access to various databases through the many channels of the network, which together might make up the "Electronic Research Library of Denmark". It may become a supplementary or further elaboration of the so-called DANDOK Database, which contains more than 80,000 descriptions of projects and publications from Danish research institutions.

The considerations within this area should also include a review of the possibilities for the further cooperation between research institutes and the publishing sector, including the possibility of "Publishing-on-Demand" on the basis of electronic publications (with regard to the research libraries, see also chapter 9: "The Libraries in the Age of IT").

Latest developments within the multi-media technology have opened up for yet unknown possibilities which will add a new dimension to the basically text-oriented electronic communication used by scientists today. The new offers include interchange of pictures, sound and video sequences mixed with ordinary text.

Advanced and powerful computers - the so-called "super computers" - are increasingly being used today on research within the areas of the natural sciences and the technical sciences, and together with international research centres such as CERN and ESO they are contributing to the creation of an increasing traffic of large quantities of data to be transported over long distances by the international electronic networks.

The multi-media technology and the increasing amount of data to be transported do even today create bottlenecks in the international networks. With the explosive development in the use of multi media

in the next few years we can already predict an increasing demand for high-capacity networks.

Principle 12:

In the allocation of Danish research funds greater emphasis must be attached to the strongholds within IT-relevant areas that relate to both technique and application. Furthermore we must emphasize and secure Danish culture and language e.g. through language technology. The effort on these areas must also be strengthened through participation in EU research programs.

The information technology is not only useful for research. In addition research in itself provides the vital basis for the further development of information technology. While there has been substantial focus on the importance of the technical aspects of research side through many years, there is an increasing need to promote research in the application-oriented areas as well.

7. New Ways in the Educational System

The Society of Knowledge demands continuous up-dating and elaboration upon achieved knowledge and education throughout life. This is evident from the increasing application of the newest technology within almost all professions. The work-place of the future will become increasingly focused on the elaboration of knowledge.

The new possibilities in the application of new technology to support education has as yet only been tested in reduced scope, and in more respects it demands a break with tradition and the development of entirely new pedagogical principles. Therefore it is decisive with development work in the next years on the areas of Primary and Lower Secondary Schools, Upper Secondary Education, technical schools and vocational training, and higher education in general. This will further influence the way of organising education, both at the single institution and in the shape of increased cooperation and the increased division of labour between institutions.

Adult Education

Principle 13:

The possibilities for technology-supported education shall be exploited fully with a specific focus on adult education and supplementary professional and vocational training.

Initiative:

- *13.1 The establishment of a centre for technology-supported education.*
  The Ministry of Education will implement a project on technology-supported education (Distance Learning) with the establishment of a development centre for technology-supported education and an experimental fund.

The explosive development in the global division of labour, where more and more industrial work-places move to areas of low wages means that companies in Denmark need flexible and dynamic employees with an open mind for changes. Specialized knowledge and the continuous process of further education will become indispensable demands for all employees.

The more intensive use of modern educational technology (electronic media such as TV and video, tele-communication networks, IT etc.)

will make it possible to diversify educational offers in terms of geographical locations and hours of the day, so more people can follow courses locally and adjusted to their own rhythm, instead of being forced to travel to one of the main educational cities.

There will be a need for short, target-effective and complete educations, which can be tailored for the individual company by means of new technology; it should also become possible to follow the lessons at either the educational institution or at the work-place. In this way it is possible to accommodate the demand for education with a highly specialized professional contents, where the student-basis is small and the students work all over in Denmark.

There will also be an increasing demand for educations with a duration of one or more years which typically have a more concentrated contents of knowledge. Typical for such education is a low weekly amount of lessons, which demand a combination of education and salaried work for the student. In this respect IT opens for the possibility of smooth adjustment between education, work and family life - not least by exploiting the increased extension of the electronic networks.

It is the vision to individualize education entirely with respect to the need and wishes of the "customer".

8. Children, IT and Primary and Lower Secondary School

Principle 14:

All children shall be prepared to master modern information technology. Therefore the organisation of Primary and Lower Secondary education must ensure that IT becomes a natural part of teaching in the various subjects. Thus the unique opportunities of information technology shall be used to secure that teaching is adjusted according to the needs of the individual student, which is the explicit intention with the new legislation on Primary and Lower Secondary Schools.

Initiatives:

- *14.1 General IT initiative for the Primary and Lower Secondary Schools.*
  In cooperation with the municipalities the Ministry of Education will take the general initiative to promote the application of IT in the Primary and Lower Secondary Schools. A vital element of such a strategy is to make all teachers personal users of IT, e.g. by making substantial parts of the supplementary training consist of IT-based Distance Learning. Another element should be the general introduction of IT from the earliest classes as expressed by the new legislation on Primary and Lower Secondary Schools. In order to promote the application of IT there must be given general access to let students bring their own computer, while the school provides computers for the rest of the students.

- *14.2. An IT network for all Primary and Lower Secondary Schools.*
  All Primary and Lower Secondary Schools in the country will be connected by an IT network with relevant services, e.g. access to public software libraries and the possibility of communicating via international networks, so students and teachers can communicate with other students and teachers at schools in Denmark and abroad.

- *14.3 On the Agenda of the School Board*
  The introduction of IT will be put on the agendas of the individual School Board to encourage parents to become involved in and influence the pace of IT development at the various schools.

- *14.4. Committee on Children, Media and Information Technology.*
  The Ministry of Education will appoint a Committee to investigate possible initiatives to prepare children better for an overall

orientation in the increasing flood of information and to use information technology to search and to choose information with a critical mind.

For Denmark to do well in a future international information society it is essential that all children get the opportunity to develop through childhood and school with IT as a natural part of the everyday life.

With the Primary and Lower Secondary school as the central element such an effort is vital if we want to avoid that youngsters are not already divided in an A team and a B team in terms of information technology even before they leave the educational system.

At the same time information technology carries a number of completely new opportunities, which in an illustrative way can be compared to the change in pedagogical possibilities after the invention of the art of printing.

IT gives each child the possibility to work with certain topics in its own rhythm and with the level of difficulty that suits the child. This will release teaching resources which in turn can provide efficient support to those students who need it. The teacher will get more and more into the role of consultant as supervisor and support for the individual student according to the needs and demands of the individual instead of adjusting the level according to a logic of "reaching as many as possible" - with the result that those with intellectual resources get bored whereas the weak ones fall behind.

In spite of increasing application of new technology throughout society in general, information technology has only scarcely had a breakthrough in Primary and Lower Secondary Schools. This is particularly remarkable because Denmark is one of the countries that spends most resources on educating the younger generation. The explanations may be e.g. the following:

- Lacking possibilities for the teachers to use IT daily - and thus become *personal IT users*.

- Insufficient development in the teacher's education at the teachers training colleges with the result that a new generation of teachers lack the basic prerequisites for applying IT in all aspects of teaching.

- Lacking supply of educational programs and accompanying IT-based educational material, including access to information databases.

- Insufficient pedagogical and professional development within the area of applied IT as an integral part of the education.

- A teaching staff which is unfamiliar with IT as a result of *not* growing up with IT as the younger generation.

According to the most recent estimate by the Ministry of Education (1st of January 1993) there is e.g. an average of 25 students per computer throughout the schools in the country with a spread on municipal level between 11 and 90 pupils per computer work-place, when all new as well as old work-places are counted. Therefore there will be a need for very substantial investments in computer equipment over the next years if the intentions of the new legislation on Primary and Lower Secondary Schools are to be fulfilled.

In the light of the very substantial investments, which in any case must be expected for equipment, it is essential that the available equipment can be fully exploited pedagogically. Furthermore there must be an open mind towards new ways of providing equipment, including the possibility that equipment, which may be in the student's private possession, can be brought and used in class - on the condition that the school can provide equipment for the remaining pupils.

Naturally the procurement of equipment and the expenses will become the central questions in relation to IT in the Primary and Lower Secondary Schools within the next few years. But it is vital that the qualifications of the teachers and the necessary IT-based educational materials are secured together with the procurement of new equipment - otherwise the money for equipment will be wasted.

The development of educational software with a sufficient quality is obviously also an important problem, which in character reminds of "the hen and the egg": You cannot really get started until there is a supply of good software, and the supply will not appear until there is a demand. Thus new ways should be tried here as well; this may include e.g. the more intense exploitation of programs produced abroad as long as they are adjusted to Danish conditions.

Experiments with "Schools of the Future" should also be established in order to test the new possibilities that IT and electronic communication have to offer, including the development and testing of new pedagogical principles with the "global village school" as a point of departure.

A new dimension in the application of IT is the possibility of different and direct contacts between students and teachers within and outside Denmark. Today the Primary and Lower Secondary Schools have the possibility of getting connected to the international network through the database service of the schools (Skolernes Databaseservice) - called SkoDa. For instance there have been experiments with the worldwide, American Kidlink, where it is

possible to get in contact with children all over the world. Electronic communication gives the possibility of quick interchange of ideas and points of view between children in different countries on different continents thus enhancing international understanding at an early stage of the children's life in school.

Electronic communication appeals to a different and exciting kind of contact between people, independent of space and time. The development towards the global classroom in the global school across boundaries can become a new and important dimension in the school of tomorrow. The access of students and teachers to public knowledge databases should become a natural part of the work with the various subjects in school. To an increasing extent the knowledge of the future will move from being paper-based to being electronic, and here the network offers an outstanding opportunity to learn.

9. Libraries in the Age of IT

Principle 15:

Even in the future - where electronic publications will be taking over the role of the magazines and the book - the libraries must maintain a central, intermediate function as providers of all published information for all citizens and in helping to navigate through an increasing flood of information.

Initiative:

- *15.1. Committee on the Future of Libraries.*
  The Ministry of Culture will initiate a thorough review and an evaluation of the functions and conditions of the libraries in the light of the development of electronic publications and the new conditions that consequently appear for the communication to all citizens of works with an informative and cultural value. Under this heading the precarious problems of copyright and the copyright deposit of electronic publications will be investigated as well.

An increasing number of books and magazines are now being published as electronic publications (CD-ROM and on-line database access).

Initially it was mostly international magazines and works of reference. But it happens more and more frequently with other types of publications as well, both fiction and non-fiction. Typically both a paper and an electronic edition are released simultaneously. But within certain areas, especially international scientific magazines, it is becoming evident that the electronic edition becomes "it" - first of all because of advantages in terms of distribution and search. The new combinational forms with multi media - text, pictures and speech - also pull in the direction of electronic editions. In important areas such as magazines and works of reference one must expect that the "book" and the magazine will become electronic in the future.

One may also envisage new electronic intermediate forms, where books and articles are published locally ("Publishing-on-Demand") - possibly with advanced equipment that can make nice editions with e.g. colour pictures. This form of publication will also be applicable for individual compositions of articles, chapters etc. - or for the current up-date on information and editions etc.

Because of the apparent advantages of the paper and the book, e.g. when reading longer texts, there is no reason to believe that the book

or the paper will disappear; this would demand the development of new and as yet unknown user-minded reading devices to take the place of the well-known computer screens.

But it might be difficult to predict the future allocation between traditional production and distribution of books and the electronic publications, including the intermediate forms of "Publishing-on-Demand".

This development will change the basic conditions for public libraries, school libraries and research libraries in important ways; an increasing amount of the libraries' users will find it possible to establish contact to relevant bases and networks from their homes or work-places and thereby gain direct access to the "electronic library" without the traditional libraries.

But a large part of the users of especially the public libraries will not have this possibility. For them the public library will remain an important place to gather information - from now on not only on paper, but also electronically. Compared to the commercial market the libraries secure the widespread access to all printed Danish material - because of the copyright deposit - also when it is no longer available at the market.

Seen from a democratic point of view this intermediate function of the public library is very important, and the public libraries have a central role in order to secure that the Danes will not become divided into an A-team and a B-team in terms of information technology (see also chapter 3: *The Electronic Service Network of the Public Sector* (about public information) and chapter 14: *Open Network of Society*).

The public access to electronic works implies a number of technical and practical problems with the establishment of access to the various networks, the development of user interfaces, which are suitable for the ordinary user of the library, and with the development of competence to navigate within the electronic networks.

But first of all it raises questions of economy and copyright. The general library rules for copyright deposit, authors' royalties, lending and copying cannot readily be applied to electronic documents.

The existing law on copyright contains a rule, which prohibits the lending of software in machine-readable form without special permission. Since almost all electronic works contain software, which make it possible to "record" the works on a computer, it would demand quite extensive agreement systems for the libraries to give access to the lending of this kind of material, e.g. in the shape of a CD-ROM. Software in machine-readable form is not allowed to be copied, not even for private use, and the present proposal for a new law on copyright expands this prohibition to include all forms of

works in digital form. Therefore libraries would not be able to hand out copies in digital form of e.g. magazine articles.

It would also demand specific agreements with the owners of the copyrights if the libraries were to grant e.g. home access to users to look up in dictonaries, encyclopedia or other works that the library has in electronic form.

These problems are aggravated by the fact that electronic publications differ from traditional ones in that they are easier to copy, that the copy is as good as the original and that in many cases - especially by on-line access - it is difficult to maintain a clear distinction between "lending" and "handing out a copy".

If electronic publications are to be made accessible through libraries the same way as books it is thus essential to secure the necessary agreements. The legislation lacks instruments for the simple and efficient establishment and administration of those multitudes of individual agreements we are dealing with, and in a similar way there is a need to establish a mutual understanding between libraries, publishers and owners of copyrights regarding the handling of these problems the best possible way in the interest of all parties.

In Denmark there is a tradition for the so-called "collective licence agreements", but at the electronic area in particular this may give rise to problems, e.g. in relation to the obligations within EU. Therefore there is a need for a closer examination of what can be done in this country to facilitate the clearance of rights in connection with the libraries' use of electronic publications.

The solutions to these problems, including the economic conse-quences, will decide the ways and the extent to which the libraries can enter the age of IT in a successful way.

10. The Mass Media Through New Channels

During the next 10 years *the technological development will change the conditions for the mass media drastically.*

- The digitalization of transmission channels and the cheaper supply of broad band capacity entails the technical possibility of a dramatic increase in the number of radio and TV channels.

The former technological justification for limiting the access to broadcast radio and TV and the tight public regulation of radio and TV activities therefore disappears.

There will appear a technical basis for new interactive services, which are mixtures between traditional TV and services through the tele-communication networks. This is particularly relevant for the so-called "Pay-per-View" and "Video-on-Demand" (see box on Future Television).

- The digitalization also means that those editions of programs and pieces of music that are received by users will become exactly as good as the originals in a technical sense. By copying these broadcasts the users can thus obtain a copy of e.g. a piece of music which has a quality equivalent to a CD.

Therefore questions of copyright and commercial questions will appear on the agenda in a completely new perspective, and the conditions for ordinary radio and TV may very well change on important areas.

- The widespread use of ordinary PCs in companies and at home combined with the fact that nearly all news of both the news agencies and the newspapers is now present in electronic form, open up for entirely different news services based on the tele-communication networks, including ordinary telephone lines. Similar distribution may also take place via an improved text-tv system, which will also entail the possibility of showing high-quality pictures.

<<BOX START

Future TV

Future TV can provide better technical quality, many new offers for the viewers and "pay-per-view".

Digital TV

The designation "digital TV" means: TV based on digital signals transmitted wireless or by cable; the TV of today is based on analogue signals.

By means of a compression technique most digital signals can, so to speak, be "squeezed together", so they fill less than similar analogue signals. This may save both time and storage capacity in connection with transmission or storage of signals. The capacity demanded by one presentday analogue TV channel will contain 3-12 channels with digital TV, depending on the desired quality.

Digital TV also offers possibilities for the so-called interactive TV, meaning that the viewer - as in a computer game - can interfere with what happens on the screen. TV will get similar features as a computer and can partly be used as such.

HDTV

Since the beginning of the 1980s the TV industry has been working with images of higher quality than the ones we know today; a significant phenomenon is the so-called High Definition TV (HDTV), where the quality of the image is as good as in cinema films. This is achieved by using four times as many lines and consequently four times as many dots on the screen as now.

So far the industry has not succeeded in creating HDTV receivers at a competitive price, and it is a question whether this form of TV will ever have a breakthrough.

The 16:9 format

Apart from digital TV and HDTV there is also work in progress for the introduction of a new TV screen size, the so-called 16:9 format. The screen of the presentday TV has a 4:3 format corresponding to the ratio between the width and height of the image. Compared to this cinema films have normally had a width-height ratio of approx. 16:9 for many years, because it provides the best viewer's experience for a given size of cinema screen or TV screen.

New TV sets

Both digital TV, HDTV and the 16:9 format will demand new TV sets to achieve the full benefit of the technical possibilities. During the next few years consumers will therefore have to choose TV set not only according to size or appearance as today, but also according to technical capabilities. A number of interim solutions and combinational models may be expected, and it is possible that the TV,

just like HIFI, will consist of more units, e.g. an image screen unit and one or more tuners or e.g. decoders and signal converters for the various technical formats. At any rate long interim periods must be expected - probably 10-15 years - for the process of adjustment to these new techniques.

"Pay-per-view"

The digital TV technique opens for the possibility of a new way to charge viewers for TV consumption: "Pay-per-View" or "Pay-Per-Program". It may also be called "taximeter TV" or "selling TV program-by-program". With this particular kind of program the TV set, or a special decoder, registers which channel the viewer has turned on, when and for how long; subsequently money will be charged according to consumption.

"Video-on Demand"

In "Video-on-Demand" a large number of programs are stored in a central facility, and the individual viewer can call and get the desired program from his telephone or directly from the TV set. Along the way the program can be stopped, repeated or winded forwards or backwards, in the same manner as a video film. In practice it corresponds to an electronic version of a video store.

A less complicated version is called "Near-Video-on-Demand": A particular program, e.g. a film, is broadcast with certain intervals on more channels, so a new version is started e.g. every half hour. Thus the viewer can choose to start whenever it suits him the best.

BOX END>>

An elaborate review of the consequences of this development for the media situation in Denmark takes place in the Media Commission, which has been appointed by the Government and which will deliver its final report in 1996. Therefore the Committee on the Information Society by the Year 2000 has only lined up some main trends compared to the broader considerations of the Media Commission.

In general the significant developments within the media area will be decided by the *market*, i.e. consumers' reactions and willingness to pay for the supply that is realized. On a technical level the possibilities are known to a great extent. On the other hand there are open questions regarding the extent and fastness of these new types of supply to be realized in practice, just as the reactions of consumers can only be estimated with great uncertainty.

Within the area of *newspapers* experiments and development projects are getting well under way. The emergent picture is that newspapers and news agencies as a supplement to their former main activities will offer electronic text-based news, possibly with pictures. Such news services, which will be kept up-to-date around the clock will be interesting for special topics and recipient groups.

Within the next few years the extent will probably not rise above a mere supplement to newspapers and radio/TV. But after the year 2000 it may well have profound consequences for the written press.

Within the *video area* it is the question if - and if so, to what extent - the traditional distribution of videos will be taken over by "Video-on-Demand" or "Pay-per-View" television through the tele-communication networks. Such a rearrangement would demand that users, distributors or network owners invest in decoders or special "black boxes".

For such a rearrangement to be carried through in substantial degree on this side of the year 2000 a massive effort from the supply side is demanded. Whether that happens does not least depend upon the assessment of the owners of the copyrights - whether the profits outweigh the simultaneous losses on the traditional video market. Finally a restructuring for these new services presupposes that the users see them as more beneficial than the traditional distribution of videos and the supply of TV channels.

Partly depending on the initiation of a restructuring towards "Video-on-Demand" or "Pay-per-View" it is probable that the traditional distribution of videos, which is presently based on VHS video tapes, will be put under pressure from CD-I and CD-ROM. As a physical medium such disks are more appropriate, and an increasing number of households must be expected to purchase video machines for this purpose (see chapter 15 "Everyday Life of the Danes: Life at Work - Life at Home")

On the TV area the increase in the number of foreign TV channels, which we are already familiar with through the hybrid networks and satellites, will probably have a powerful break-through; to a certain extent these channels might have Danish translation.

Compared to this the big costs on most forms of TV production probably mean that there will not be any large increase in the number of genuine Danish TV channels.

When it comes to channels that concentrate on certain themes, as e.g. news (CNN), sports (Eurosport) and music videos (MTV), sufficient profitability will probably only be attainable for those channels that broadcast globally or at least for all of Europe.

Those Danish or Scandinavian channels depending on commercials or viewers' fees via decoders are typically forced to cover a wider supply of programmes. A certain growth in the supply may be expected - to the extent that the TV channels win an increased share of the commercial market; presently TV commercials have around 12 percent. Furthermore there will probably appear a few Danish pay channels, e.g. with films.

This development will put Danish TV channels such as DR and TV2 under pressure, because they will find it difficult to maintain the existing ratings under the new circumstances, where competition will be increased further. This in turn may lead to questions about the appropriateness and extent of financing via the license fee system.

Consequently we arrive at the question of the future for the so-called "public service", which is presently taken care of by DR and TV2, including the regional channels.

Principle 16:

In a world where the electronic media is being increasingly dominated by international channels and producers, it is vital to continue with a public service function on the areas of radio and TV. The continued broadcast and production of Danish programs of high quality within all genres must be secured, including programs of high quality with regard to ethics, responsibility, journalistic versatility and quality. But the present way of organising the public service function must be reviewed critically and openly.

As the possibilities of transmission are being created, the coming legislative regulation on the areas of radio and TV - and the tele-communication networks - must grant access for new channels and providers, including nationwide, commercial radio channels. Furthermore the public service channels must be free to enter the borderlands of new interactive tele-communication services and other commercial activities, also in cooperation with other distributors or producers in order to promote a Danish supply of culture.

With the information society there is the increased risk of widening the gap between "rich" and "poor" in terms of access to information. When each of us can choose between more and more offers, it will become increasingly important to maintain a diversified supply of radio and TV which addresses the entire population and has social and cultural obligations; this factor will be important in order to secure Danish culture.

The focal point of the so-called public service function should be that Danish viewers and listeners are offered programs in the area of news

and current affairs, where the world (and Denmark) is viewed through objective Danish glasses. Within the areas of culture and entertainment we must stimulate a demand and secure the broadcast of programs which consolidate and renew Danish culture. Finally a public service function should also secure regional coverage particularly on the areas of news and current affairs.

With this point of departure for a public service function one may suggest a number of *different institutional solutions*.

A radical solution is *not* to maintain institutions like DR and TV2 as special public service channels. Instead the public service supply of programs should be secured through a fund, which buys "narrow" programs that cannot be expected to be supplied at a competitive, commercial market. The fund might buy programs from all TV channels and from all producers of TV programs.

If we prefer to maintain the *special public service channels* we have to relate to the question of the appropriateness of spreading responsibilities upon two or more institutions? It promotes competition, which may be particularly desirable within news service. But the struggle for the viewers also draws in the direction of channels that could be mistaken for being identical, and news & current affairs programs, where the creative, but misleading approach often wins in competition with objective journalistic work.

Instead one may opt for a solution of letting the one channel be purely commercial and concentrate the public service obligations (and public financing) on the other one - which may subsequently get an extra channel in order to take better care of the obligation to broadcast in the width, including geographically, similar to the other DR radio channels.

The question of institutional framework should be connected to the question of financing by license fees. In the light of the dramatically increased supply and the viewers' and listeners' increased consumption of other programs (which are not financed by the license fee): Is it realistic to maintain the system of license fees and license fee payments in its present extent in the long run? Or asked in a different way: Is financing by license fees the only way to secure both the necessary resources as well as political independence for public service radio and TV? Might it not be more appropriate to increase the forms of financing with pay TV or pay radio with decoders, so that e.g. films or certain sports programs are broadcast in code, while other programs are not coded. Or should alternative ways of financing be considered, e.g. financing through taxes?

The legislative proposal to liberalize the possibilities of activities for both radio and TV channels, tele-communication companies and other suppliers, shall be seen in connection with the development that

the former sharp distinction between radio and TV programs and tele-communication services has become so blurred that the separation between radio and TV companies and tele-communication companies as suppliers of the services cannot be maintained in practice. The conditions for allowing public service stations full liberty to go into commercial activities in the borderlands should be based on a clear separation of accounts, so public service financing is not used for cross-subsidizing or distortion of competition.

It would not be fair to maintain the present inflexible use of the transmission channels, where the terrestrial transmitters are *only* used for TV and radio, even when other services can be transported as well. In connection with an opening on this area there should be a reorientation in financing policies so the public service channels only pay for the costs to maintenance and running of the transmission installations for their own use. The thus released capacity on the terrestrial transmitters can be offered for all interested suppliers of services on equal terms.

Another important area of problems relate to *questions of copyright* and cooperation between different media distributors and media producers. For a Danish production to survive in a situation where international - above all American - supply is overwhelming at relatively low prices, Danish actors must join forces to an increasing extent about production and distribution, and it must be possible to re-use productions in various forms of distribution. This may imply that a film will be shown in the cinema and released as video first, before it is shown on TV. In this connection it is vital that a solution to copyrights can be found so Danish productions will be less expensive to re-use thus avoiding that the economy of the production is undermined.

11. Better Traffic with IT

Principle 17:

The possibilities to use traffic information technology to make the flow of traffic more efficient, reduce the environmental damages of traffic and improve the service level for road-users shall be exploited as they become possible in practical terms.

Initiative:

- ***17.1 Experimental and Development Projects with Traffic Information Technology.***
  The Ministry of Transport will establish experimental and development projects on traffic information technology with the aim that such systems can be introduced in Denmark as soon as they become ready for broad and secure application.

It is the vision that the road-user of the future can choose his destination, means of transport and travelling route via a terminal, at home or at the office, and that the actual process of travelling is supported by IT.

In the *road sector* there is work in progress with IT systems connected to the road network and IT equipment in individual vehicles. The systems on the road network may include e.g. warnings of traffic congestions, bad weather, accidents etc. Systems will also give directions to parking spots in cities and variable signposting with recommended driving routes and special signals for public transport so it is led through the remaining traffic as fast and secure as possible.

With IT systems on the road network you can also administer differentiated road tolls, i.e. tolls whose size have been arrived at not only according to distance, but also according to time of the day, special subscription relations etc.

As an example of the equipment in the vehicles we know as yet only the RDS radio receivers in Denmark, which make it possible with traffic announcements as an interruption of ordinary radio programs. In the longer run route guiding systems are envisaged, e.g. in the shape of electronic maps on a computer screen, which show the optimal choice of route and informs about special circumstances along the route. Transmission and receiving equipment in the vehicles communicate with the systems on the road network to secure a current up-date.

For *public transport* the screen connections at home and at the workplace will provide a better overall orientation and the possibility for direct ordering (see chapter 14: Open Society Network). IT can also support telebus concepts, where transport is ordered via telephone or screen, and where there is current orientation about expected times for pick-up, timetables etc.

IT systems will rationalise *transport of goods*, e.g. via EDI (see chapter 12: The Companies' Network) and a Transport Coordination Network which registers vacant capacity and transport demand.

Both the Government plan, "Trafik 2005" (Traffic 2005) from December 1993 and the Bangemann report point to the positive gains in traffic and environment in the long run by the increased application of IT in the traffic sector.

However, today there is a significant distance between visions and the present stage of traffic IT. In the next few years an increased development effort may be expected in those countries, which have the most acute problems of traffic jams and traffic pollution in connection with urban areas, and in countries where there is a certain interest in traffic IT in connection with car industries.

Denmark shall try to benefit to the full extent from this development effort with the aim to achieve fast and adjusted transfer of knowledge, so we - when the systems and products have been sufficiently developed - can introduce them in the Danish traffic system. Therefore experimental projects should be established, which can test those new technological possibilities on shorter distances that are most relevant for Danish conditions. The Danish experimental effort should be coordinated closely with similar experiments in other European countries.

12. The Companies' Network

Principle 18:

Danish companies should be at the forefront with the integration of IT in products and in the reorganisation of working procedures to achieve full benefit from the use of IT.

For many years information technology has played a significant role for Danish companies:

• An increasing number of administrative procedures can be dealt with through Electronic Data Processing.

• Computer-supported design and production (via CAD/CAM and CIM) has enhanced and rationalised internal processes.

• The IT short-circuit of time and space has facilitated internationalisation, the global division of labour, "just-in-time" production and communication of knowledge across the globe.

In this way IT has created a global and transparent market place for exchange of services, payment and knowledge within many areas; international transaction with currency provides a specific case in point.

Knowledge mixed with the ability to organise, adjust and renew, will become decisive qualities for future companies and employees.

Many Danish companies have been quick to adjust to these developments, so that IT has become an integral part of product, strategy and way of thinking in the companies in question.

In the financial sector IT is a natural component in the provision of payment services, regardless whether the transactions are made by a credit or payment card, account-to-account transfers or cash transactions. At the same time various IT-based services can be added. In principle, by means of IT the opening hours for a large number of transactions can be extended to all 24 hours of the day through electronic do-it-yourself services, "home-banking" etc.

The public sector can support this process by:

• Acting as an active and critical user of IT, and consequently become more flexible and efficient as a driving force for the Danish IT industry.

- Support and participate in the international work with standardization of the highest possible amount of links in the application of IT.

As a small country with many small and medium-sized companies, standardization and consequent transparency of the market are decisive elements for the competitiveness of Danish companies.

Both central authorities and local governments can promote the application of IT through specific projects in areas needed by the public; for instance through both qualified and effort-demanding procurement specifications and through development contracts with a high contents of IT. When making priorities for the projects it should be borne in mind that similar projects might rationalise similar functions in various private companies and organisations and thus secure a broad market basis from the beginning.

EDI

Principle 19:

Danish companies must be joined together by an electronic network for the interchange of business documents. Hereby substantial rationalisation gains can be achieved and the closer cooperation between companies can be supported.

Initiatives:

- *19.1 Electronic Mail for all Companies.*
  As fast as possible all Danish companies should establish an electronic mailbox, among other things as a precursor for the use of electronic interchange of information in a wider sense. A campaign to this end will be carried out together with the trade organisations.

- *19.2. Electronic Interchange of Business Documents (EDI).*
  In all relevant areas Danish companies will adopt the use of electronic interchange of business documents according to the international Edifact standard before the year 2000. Together with the Danish EDI Council and the involved trade organisations the Ministry of Business and Industry will launch a campaign, and a plan for the realisation of these aims before the year 2000 will be elaborated for each line of business.

- *19.3 Use of EDI in Public Sector Procurement.*

From 1996 public procurement shall be allowed to take place via EDI. This goes for both procurement systems and systems for economic management for all procedures the sending of orders, invoices, payments etc - realization will take place in a cooperation between National Procurement Ltd., the Accounting Directorate, and other suppliers of systems for economic management etc.

In open, international competition it is decisive for the growth and survival capacity of the companies that they achieve full benefit from the possibilities of IT - including the integration of information flowing from the market in the shape of trends and patterns - in the concrete "sale" for creation and delivery of the final product.

Subprocesses such as market analyses, distribution of catalogues, the sending of orders and confirmations, delivery, invoicing, registration pertaining to accounts, payments and receipts for payments, logistics, including e.g. inventory control, production planning and production all reflect a flow of information, which - if organised together - may bring about drastic cuts in time consumption and costs and thus significant improvements for customers and companies.

An important precondition for this IT short-circuit to take place is *common standards* for the interchange of information.

Electronic interchange of documents, also called EDI (Electronic Document Interchange), can take place via the international Edifact standard, which is specified under the auspices of the UN so that interchange of information all over the world can be arranged in the same manner.

The widespread support behind the Edifact standard and the strong effort to make all use it - both public and private companies - will in itself be conducive to achieve the desired benefits.

The public sector should be a leading force by opening for electronic communication and by using the Edifact standard itself with all interchange of standardized information with its surroundings as well as take part in the standardization work.

As mentioned above (see initiatives 3.1-3.4), before 1995 all public institutions should have established electronic access. Subsequently all structured communication with the public sector before the year 2000 must follow the Edifact standard. If there is a certain area where there is no such readily specified standard the public institution in question must take the initiative to have the necessary specification to take place and, if necessary, make sure to obtain international acceptance of the solution in question.

The companies' use of EDI presupposes transparency and unam-biguity in the interchange of information with others. In well-known relations between customer and supplier the mutual codes and electronic addresses are known. But full benefit demands that it is possible to contact and exchange information with each other regarding all sorts of matters.

An electronic address book with e-mail addresses will therefore become as necessary as the telephone book, and should be organised in a way that all can obtain access electronically (see chapter 14: *Open Network of Society*).

In a similar way the establishment of a unique company code reminiscent of the present SE number (a company registration number for tax purposes), but useful across all forms of application, will have great significance for the companies' IT application.(see chapter 3: *The Electronic Service Network of the Public Sector*).

In a similar way there have been initiatives regarding the area of geographical data (as mentioned above) to bring about the possibility of interchange and utilization of very different types of data register-ed e.g. in relation to certain real property. For a number of professions and lines of business, such as real estate agents, lawyers, building societies, contractors etc. such an interchange will have great importance and benefit both citizens and other companies in the long run.

Principle 20:

Together the private and the public sectors shall take the initiative to enhance the possibilities of Danish companies in relation to the "spearhead" applications of IT.

Initiatives:

- *20.1 Involvement in the International Work with Standardiza-tion.*
  The Danish business sector and the public sector shall become much more actively involved in the standardization work in the IT area in order to promote Danish influence on the standards in those areas, where they have not yet been determined.

- *20.2 Evaluation and Dissemination of "Spearhead" Experiences.*
  Within those areas, where Danish companies and/or public institutions are in front with the application of IT it may be relevant to evaluate experiences and system demands in this connection and communicate this to a wider circle of companies

and institutions with regard to their involvement in the continued product development. This regards e.g. the development of electronic systems for both archives and cases files within public administration (see initiative 6.1) and electronic patient case files (see initiative 10.2).

The Companies' Reports to the public sector.

Legislation prescribes that companies are responsible to report to the State in connection with customs and taxes, ATP[4], AER[5], AUD[6], legislation on the labour market in general, environmental laws and the Act on *Danmarks Statistik* (central agency for statistics).

All these reports, which have typically been established one by one and thus uncoordinated, are often felt to be a strain on administration, especially for smaller companies.

It is often been brought forth that it would be desirable to harmonize or standardize the above-mentioned demands for reports, so the interchange of information could be built more or less directly into the management systems regarding economy and/or personnel for the companies in question.

The various recipients of reports have each worked on an automatization of the reports. For instance *Danmarks Statistik* has elaborated disks for the reports on foreign trade and wage statistics, so the report could be carried out from a PC via menu-driven dialogue.

The Central Customs and Tax Administration, which request a lot of information for various purposes, has established a so-called integration project, which in the course of three years shall secure the same interface and reporting form for all kinds of information.

With the expectation that all public authorities will establish e-mail addresses - and thereby open up for electronic access in general - and expecting that all will use and demand the Edifact standard, these things alone will create the common, standardised road of access to public channels of reporting.

---

[4] ATP, the Danish Labour Market Supplementary Pension.

[5] AER, The Employer's Reembursement System; in order to promote the hiring of more trainees.

[6] AUD, a scheme to promote education.

13. New and Cheaper Tele-Communication Services

Principle 21:

The application of advanced information technology based on tele-communication shall be promoted through a sufficient supply of tele-communication services and appropriately low prices nationally and internationally.

Initiatives:

- *21.1 Substantial Lowering of Prices on Broad Band Connections*
  A substantial lowering on prices on broad band connections combined with changed principles for tariffs will be carried through. The question will be raised by the Ministry of Research towards Tele Danmark (Danish Telecom).

- *21.2 Liberalisation of the Hybrid Networks.*
  The liberalisation on the use of leased lines in the tele-communication networks will be further expanded to include transmission of radio and TV programs as well. Hereafter all broad band service applications of the public tele-communication network will take place on equal terms, and the special economic conditions attached to the monopoly part on the hybrid networks will be nullified.

- *21.3 Wider Supply of High Capacity Connections.*
  Tele Danmark's supply on the broad band area shall consider the present and future needs of private enterprises and public institutions. This includes the realisation of a supply on high capacity connections, which is more geared to the terminal equipment and transmission needs of the customers, e.g. through more bit rate classes and more types of interfaces. The question will be raised by the Ministry of Research towards Tele Danmark.

- *21.4. EU Initiative for Lowering Prices on International Traffic.*
  The Danish government will take the initiative on EU level to secure a lowering on the prices on international traffic in accordance with already approved directives.

Denmark has a very well-developed and well-functioning tele-communication network, which has a high quality by international standards. During the most recent years the establishment of the hybrid networks has contributed to the result that today we have a nationwide digital transmission network based on fibre optical fibres. Hereby an overall infrastructure has been established, which with a

current elaboration - combined with the increasingly advanced techniques to "pack" signals - is able to accommodate an increasing demand on tele-communication transmission services for both the existing and the new, advanced IT applications. On the other hand the new, advanced IT services based on broad band will typically demand an extension of the network to reach the subscribers in question.

It has been attempted to promote the development of tele-communication services by means of political decisions on complete liberalisation on services, including the area of satellites. Still, however, Tele Danmark has the monopoly on the public tele-communication infrastructure.

Even if the Danish tele-communication network is well-developed Denmark is not a leading country compared to others regarding the development on broad band applications. Analyses point to the fact that a substantial reduction on tariffs will increase the applications dramatically.

With substantially lower prices and a changed tariff structure it can be expected that there will be an economic basis for a significant increase of broad band communication, especially if no limitations on application are attached so transmission resources can reach optimum use.

As mentioned it has already been decided to fully implement a liberalisation of services on the area of narrow band. The transfer of speech and data for others by means of leased lines can be combined by customers and service providers from autumn 1994. In a similar way leased lines can be applied to transmission of all broad band services, except the transmission of radio and TV programs.

However, there should also be a full liberalisation on services on the broad band area through the nullification of Tele Danmark's monopoly on the transfer of radio and TV programs via the tele-communication networks. This will make it possible to exploit the broad band capacity better, which will support a process of both more broad band applications and price reductions on the services.

The liberalisation will entail a nullification of the present* limitation that only Tele Danmark is allowed to transfer radio and TV signals across municipal boundaries, just as the demand for accounts pertaining to the monopoly part of the hybrid network will be nullified. At the same time the ownership for shared antenna installations should be given free so they can be owned by e.g. companies as well.

The liberalisation on services cannot stand alone, however. In addition and through the regulation of the Ministry of Research it must be secured that the supply of transmission capacity in the tele-

communication networks is up-to-date and in accord with the needs of the market, and that the necessary reduction of tariffs take place, especially on the area of the broad band network and in relation to traffic across boundaries.

If it appears impossible to secure the necessary variation in the supply of services and sufficiently low tariffs by means of regulatory initiatives, it may be appropriate to liberalise the tele-communication infrastructure as well and consequently expose Tele Danmark to competition on this area.

Further steps towards liberalisation should by all means take place in the light of EU initiatives on the area, considering that it is typically an advantage to be up-to-date in this regard in order to prepare Danish companies the best way possible for the broader competition within EU.

Especially with regard to the infrastructure, where the Bangemann group has proposed a quick liberalisation, the European Commission will submit a draft in the shape of a Green Paper before the end of the year.

The Commission has already presented a Green Paper about further liberalisation within the area of mobile telephones. In Denmark, however, accompanying initiatives will first of all relate to the infrastructure.

At EU level pressure should be applied from Denmark to achieve tariff reductions, especially on high capacity connections. Investigations made by the European Commission indicate that prices for high capacity connections in Europe are averagely about 10 times higher than similar connections in the United States. Denmark, however, has the lowest prices in Europe.[7]

---

[7] See appendix B: "Denmark in an International IT Perspective: The Country of Many Possibilities", by journalist Bjørn Kassøe Andersen.

14. Open Network of Society

Principle 22:

The computer and tele-communication networks shall make up a coherent Network of Society which appears as clear and easily accessible for ordinary citizens and companies as the telephone system.

Initiative:

- ***22.1 Network Cooperation.***
  *In order to bring about sufficiently clear maps and guides for the virtual "road system" of the electronic networks, the Ministry of Research will take the initiative to make tele-communication companies, providers of network services and other relevant companies as well as central authorities and local governments establish a network cooperation, possibly supported by a specific network secretariat. A shared electronic e-mail book (with the same function as the telephone book), systems for the dissemination of e-mail addresses, Danish bulletin boards and databases etc. shall be developed through this cooperation - see also proposals 3.1-3.5 on bulletin boards and keys etc. at **Statens Information** (Danish State Information Service).*

The dramatic growth of the global computer network gives rise to two opposite experiences:

Experience 1: The network is the great liberator and creator of short-circuits which opens up for new worlds of communication and access to information. People with something to communicate to one another, can now get in contact easily and without problems within a matter of seconds, no matter where on the globe they may be. Lots of new contacts are being created between people who - if it were not for the computer network - never would have met. Enormous amounts of knowledge are available in accessible databases, and by means of the computer it is relatively easy to find what you want.

Experience 2: Compared to the telephone network the computer network is incredibly complicated, not to say impossible, to use. The mere achievement of connection by computer and modem can be a big problem in itself. Afterwards you have to find your way through a labyrinth, where it is easy to get lost - and often you have to give up because the images you receive on the screen are impossible to make sense of. The mere sending of a letter by electronic mail can be very difficult. Even the act of finding or writing the address can be a problem. Particularly the official international X.400-standard for

addresses is very hostile towards users. It is somewhat easier with the addresses of Internet (see the listed e-mail addresses of the Ministry of Research at the front of the report). A sort of address index similar to the telephone book does not exist. Therefore it is no surprise that most prefer to send a fax or possibly an ordinary letter - even if it is much more expensive, and even if the recipient cannot re-use the text electronically.

Both experiences makes up part of the truth about the computer network. The first one is experienced by computer people - the "freaks" and the initiated - who know how to navigate, and who become increasingly enthusiastic about the possibilities offered by the network. But the computer people still make up a limited minority group, even if they are growing dramatically in numbers.

All others - and that is the main part of the Danish population - will, if they attempt to use the networks, experience the other version.

Partly the problem will solve itself as the competence to use computers increases, and the market develops increasingly better user interfaces. But the development can be promoted through a systematic effort, where involved parties in Denmark sit together and solve a number of practical and principal problems through a network cooperation.

The aim must be the development of a number of common rules, technical coherence and architecture, and possibly to fill out where international standards are lacking, and above all to cooperate anywhere it may promote a coherent user-friendly computer network. There may be a need to support the cooperation by a mutually established and financed network secretariat. There may also appear a need for the possible adjustment of legislation or other regulations.

The simple and clear objective must be to make the electronic network appear to the users as an "Open Network of Society", which is as easily accessible as the telephone network, and where all - persons, companies, public institutions, organisations - can become connected with an e-mail address and - in case one has more to offer - with services such as databases, bulletin boards, fora for debates etc.

So far the computer people have used the American databases and service providers in particular. But now Danish equivalents really seem to be on their way, and this development must be supported ; thus the first Danish campaign with the Diatel system (see box) is soon expected, and *Politiken* (Danish newspaper), has just initiated the system "Politiken On Line". In addition there are a number of databases on the area of research, which have been in existence for a number of years. These developments also include the public database *Retsinformation* (legal information) with all Acts, promulgations and circulars, which is intended to be further

developed into an electronic *Lovtidende* (Legal Gazette, see initiative 4.1).

<<BOX START

Diatel

Shopping and information search via PC

The Diatel system, which is expected in use from 1995, is a computer-based service provider. Via the computer at home, or at the workplace, you can do shopping, search for information in electronic reference books as e.g. the phone number information and send letters or telefaxes.

Diatel opens for the possibility of two-way communication and "Quick-payments" on the services ordered. For the system to be used for "Quick-payment" it is necessary for the customer to have a Giro account. When paying for e.g. theatre tickets the money is immediately transferred from the account of the customer to that of the provider, and the customer will receive a receipt on the screen. "Quick-payment" is secured with an electronical signature and a PIN code similar to the *Dankort* (Danish payment card).

All companies or public institutions, which have a commodity or a service that is suitable for the customer's self-service, can be connected to Diatel.

The private offers will regard particularly the various shopping and ordering possibilities, e.g. travels, theatre tickets and books - but also expert assistance such as veterinary help, good advice from the doctor or similar. Furthermore you will become able to communicate with the public sector - e.g. send forms for the local tax office, the public employment service etc. You will also be able to collect the latest news from the papers. For the business sector there will also be a number of services of particular interest for companies: Services from banks, lawyers, auditors and other experts.

If you want access to Diatel as a user/customer you must invest in a software package for about 250 DKK. Furhermore you need a modem for the PC. Separate services will be paid by customers and cost from about 1 to 3.50 DKK per minute.

At the beginning Diatel will offer an introductory package to about 1,000 DKK with both a communication program and a modem. Otherwise a separate modem for "household" use will typically cost between 1,000 and 2,000 DKK, while a modem built into the computer can be purchased for a couple of hundred DKK.

Diatel is owned by *Tele Danmark/Jydsk Telefon* (Danish Telecom/Jutland), *Kommunedata* (the Local Government Computing Centre), *Morgenavisen JyllandsPosten* and *Politiken* (Danish newspapers) and GiroBank.

BOX SLUT>>

15.   Everyday Life of the Danes: Life at Work - Life at Home

The information society will not turn the everyday life of the Danes upside down. But it will have far-reaching consequences in a number of areas; probably those changes can best be compared to the introduction of the telephone and the TV. Both events have had a profound effect on society in some areas, while other areas have been affected marginally or not at all.

Around 1980 only a few Danes had access to a computer at their job, and even fewer had a computer at their disposal at home. TV satellites, the hybrid networks and the large number of channels did not exist either. All of these things are now rapidly developing, and they are expected to get a real breakthrough before the year 2010; quite a revolution in only 30 years.

We are now in the middle of this revolution; development trends for the next 15 years can be estimated with some accuracy. In preceding chapters these trends have been drawn up for a number of sectors. In these paragraphs they will be described across traditional social boundaries focusing on life at work and at home for the Danes.

Working life will become increasingly dominated by *new ways of organising* as e.g. "virtual", "network" or "knowledge-based" organisations, which rely on networks, alliances and global markets for their supplies, production capacities or sale (see chapter 1:The Global Short-Circuit and the Explosion of Information). At any rate this will be the case for private enterprises. But public institutions will become increasingly involved in international networks as well.

A characteristic feature of the working life will become the fact that close to 75 percent of the work force will be using a computer or other advanced IT equipment on a daily basis.

For the *individual* the trends will furthermore become the following:

- An increasing number of tasks can be totally or partially dealt with any time and anywhere, at home or at customers. The distinction between working hours and spare time will wither away for many jobs. Even today we experience an increasing number of business people, journalists, advertising people etc. who work with their basis at home and only show up at the workplace in connection with meetings.

However, there will be a number of professions, where the physical production or face-to-face services demand the presence on the work-place. For the vast majority of jobs the personal contact will

remain vital. Home work is not likely to develop in a way that makes personal contact disappear.

- For each job we will witness an expansion, where the employee will be able to carry out a far larger portion of the working tasks for customers/clients - often a single person can solve tasks, which earlier on demanded the work of more people ("One-stop-shopping"). Still, many jobs will be carried out in teams with the mutual substitution or help to one another with tasks that demand an element of assessment.

- Larger responsibility, but also more control in work; simultaneous with the delegation of more work to the individual, there will also be a tendency to evaluate the work of each person more. Work will become more of a challenge; but it may also be experienced as increased control.

- Higher degree of job satisfaction as a result of the contents and conditions of work.

The changes of the information society upon *home life* will first of all take the form of an increased supply on the area of the TV media and the spread of computers at home.

On the TV media area there are many new and advanced possibilities in technological terms.(see chapter 10: The Mass Media through New Channels). But they will probably not break through with the rapidity and strength which is often propagated. In this regard it is quite significant that the Danes will probably not spend a substantially increased share of their spare time on the consumption of these media. Therefore it is more important how films, entertainment, documentaries etc. are distributed and paid for in the most appropriate way.

Before the year 2000 around 75 percent of all households will probably have bought at least one computer with a modem and a drive for CD-ROM, which can be used for anything ranging from games, work, the budget of the household to home work. Probably the computers will become increasingly equipped with a modem, so you can link up to the public networks through the telephone network, send electronic mail, do "home shopping", "home banking" etc.(see chapter 14: Open Network of Society). In many homes the children will become the promoters for the introduction and application of the computer at home.

All put together *the most striking feature* of the information society - not surprisingly, in fact - will be the fact that the majority of the population, and at least the part that is in work, will become users of computers and become familiar with the possibilities of the computer to a greater or lesser extent.

The possibilities of the computer in regard to independence of time and space also imply totally new opportunities for the individual - and partly problems as well: It will turn around the traditional idea that work can only be carried out on the workplace. The distinction between working hours and spare time will be dissolved with the result that two opposite tendencies will appear: Work can steal from the spare time, but it draws in the other direction that the total "time budget" is experienced to leave more room because of the increased flexibility and the freedom to manage your own schedule.

For a number of businesses and professions the computer opens for the possibility of a wider geographical spread in settlement patterns, which may relieve rush-hour traffic in urban areas.

Principle 23:

Social life in general, including working life and personnel management policies, shall adjust to those new possibilities and freedoms that the individual is offered by the computer. The traditional idea of working life with accompanying demands for working hours etc. must in many ways be thoroughly changed.

By the effective use of the public libraries and through the Primary and Lower Secondary education it shall become possible for that large number of Danes who do not have the opportunity to use a computer through their work (or any other way) to become familiar with this basic instrument of the information society and to gain access to its information network (see chapter 8: Children, IT and the Primary and Lower Secondary School, and chapter 9: Libraries in the Age of IT).

16. Disabled Persons in the Information Society

Principle 24:

New IT applications, which open for possibilities of greater integration of disabled persons into society, must be fully exploited.

Initiatives:

- ***24.1. Action Plan for IT Use for Disabled Persons***
  The Government will elaborate an action plan for the better support and integration of disabled persons into society by use of IT and electronic communication.

- ***24.2. The Disabled Persons' Point of View in EU's Policy on Information Technology.***
  Denmark should take the initiative for the disabled persons' point of view to become integrated into EU's policy on information technology.

Lack of access to information and knowledge can be as much of an obstacle to the activities of disabled persons in society as physical barriers have been for the physically disabled.

The isolation that the disabled person can feel in relations to others will be broken in a society, where dependence of time, space and persons is reduced as a result of electronic communication and IT. Therefore it will become easier to participate in democratic processes and social activities in general, and it will enhance the quality of life and give better opportunities to exploit own resources.

Basically information technology offers flexibility and the consequent possibility to adjust functions individually on electronic systems for disabled persons.

In addition the exploitation of IT in various forms as e.g. IT-based education, tele-communication work, access to databases, "home-banking", "home shopping" etc. give greater possibilities for active involvement in activities, which were previously inaccessible for the person in question.

Information technology shall not become a new barrier for disabled persons. On the contrary its opportunities to become a help for disabled persons must be fully exploited. The disabled persons' point of view must in a similar way be placed centrally in all EU efforts of standardization within the area of IT and in relevant programs.

17. The Implementation of the Strategy

With this report the Committee has offered a draft for an overall strategy and guidelines for the further efforts in a number of key areas. At the same time a number of specific initiatives have been proposed.

In a number of areas it will soon be possible to make decisions on the establishment of specific initiatives, in other areas a closer examination is needed.

However, it is not only a question of "yes" or "no" to the proposals of the Committee. The vital point is the development of increased awareness about, and support to, the realization of the information society.

The implementation depends less on political decisions at the central level, but more on the enthusiastic and creative support of the Danes. Information technology demands - and appeals to - individual curiosity and initiative in particular.

Furthermore a number of questions appear on a number of areas demanding thorough investigation and debate until a desicion can be made.

On a practical level it is - in the light of the intended role of the public sector - vital to secure the necessary political and administrative support and coordination at central, county and municipal level. Many proposals go across administrative and organisational boundaries, and there is thus a particular risk for the good intentions *not* to receive the necessary support but instead fade out. Therefore the necessary initiatives to secure coordination and progress in the implementation must be taken on political and administrative levels.

A big step has been taken in this direction with the allocation of overall responsibility for the application of information technology in the Ministry of Research as well as the transfer of accompanying areas from other ministries.

Principle 25:

For a forceful strategy of the information society to work it demands the widespread increase in awareness throughout society and a debate on possibilities and problems, and on the political level the information society must be put on the top of the agenda.

Initiatives:

- *25.1. Further Debate.*

The report of the Committee will be presented for a further debate, which will later be followed by debates on future central themes in the realisation of the information society.

- ***25.2 Action Plan.***
  On the background of this report, as well as those reactions that may emerge from hearings and debates, the Government will elaborate an Action Plan for the information society by the year 2000.

- ***25.3 On the Agenda of the Town and City Councils.***
  On the background of a draft from the Ministry of Research each Town and City Council will put the following on the agenda: How is it possible to contribute to the implementation of the Action Plan for the information society in the municipality in question, and how can the municipality develop the public service network the best way possible to the maximum benefit of the citizens and local companies.

Appendix A

List of Participants in the Work of the Committee.

The Committee:

Ms. Lone Dybkjær, Member of the European Parliament

Prefect Søren Christensen, Copenhagen County

Secretariat:

Mr. Peter Lorentz Nielsen,
Assistant Permanent Secretary
Ministry of Finance.

Mr. Tom Togsverd,
Assistant Permanent Secretary
Accounting Directorate,
Ministry of Finance.

Mr. Jørgen Stig Andersen,
Assistant Permanent Secretary
Ministry of Research
(Former: Ministry of Communication and Tourism)

Ms. Liselotte Heslet Sestoft,
Assistant Permanent Secretary
Ministry of Culture

Secretarial Staff:

Mr. Jens Ulrik Dalgaard,
Chief Consultant
Ministry of Finance

Mr.Yih-Jeou Wang,
Head of Section
Ministry of Finance

Mr. Olav Green-Pedersen,
Head of Section
Ministry of Finance

Mr.Jørgen Lang Nielsen,

Head of Division
Telecom Agency

Ms.Susan Olsen,
Assistant Head of Section
Ministry of Finance

Support Group:

Mr. Anders Andersen,
Head of Division
The Association of County Councils in Denmark.

Mr. Jens Uffe Andersen
Head of Division
(Siemens A/S),
The IT Association of Denmark.

Mr. Mads Bryde Andersen,
Professor, dr.jur.
University of Copenhagen

Mr. Lars Axelsen,
Head of Division
Ministry of Housing and Building.

Mr. Peter Carpentier,
Head of Division
Ministry of Justice

Ms. Tarja Cronberg,
Assistant Professor
Technical University of Denmark.

Ms. Else Fabricius,
Head of Section
The Prime Minister's Office

Mr. Ove Hygum,
Chairman, HK-Stat
(The Union of Commercial and Clerical Employees in Denmark)

Ms. Inge Berg Hansen,
Information Consultant
Ministry of Research.

Mr. Helge Israelsen,
General Director

Ministry of Transport
(Former: Ministry of Communication and Tourism)

Mr. Jesper Jarmbæk
Head of Division
Ministry of Environment and Energy

Mr. Kaj Juul-Pedersen
Managing Director
(L.M.Ericsson A/S)
Electronics Industry

Ms. Birgit Kjølby
Head of Division
Ministry of Business and Industry
(Former: Ministry of Industry and Business Policy Coordination)

Ms. Lisbeth Knudsen
Chief Editor
Det Fri Aktuelt
The Economic Council of the Labour Movement

Mr.Anders Knutsen
Managing Director
(Bang & Olufsen A/S)

Mr. Kjeld Koushede,
IT manager
Ministry of Agriculture and Fishery

Mr.Preben Kristiansen
Assistant Permanent Secretary
(Central Customs and Tax Administration),
Ministry of Inland Revenue

Mr. Gregers Mogensen,
Managing Director
Tele Danmark A/S (Danish Telecom)

Ms. Mette Mønsted
Assistant Professor
(Copenhagen Business School)

Ms. Kirsten Nielsen,
Chairman
The Consumer Council

Mr. Niels Jørgen Nielsen,
Head of Division
Ministry of Culture

Mr. Vagn Nielsen,
Assistant Permanent Secretary
The Ministry of Health

Mr.Søren Møller Nielsen,
Bank Manager
(Den Danske Bank),
Danish Bankers' Association

Mr. Hans Sylvest,
Head of Division
The National Association of Local Authorities in Denmark

Ms. Bente Thomassen
Sales Manager
(Niveau Informatik Aps),
Danish Data Association

Mr. Lars Thygesen
Assistant Permanent Secretary
(Danmarks Statistik)
Ministry of Economy

Ms. Lilla Voss
Project Manager, Head of Section
Ministry of Education

Ms. Hanne Willumsen
Head of Section
Ministry of the Interior

Mr. Kim Østrup
Assistant Director
(IBM Denmark A/S)

Appendix B

Denmark in an international IT perspective: The Country of many possibilities

by journalist Bjørn Kassøe Andersen[8]

In these years Denmark has the possibility to create a position as an attractive area for the development of advanced IT systems and services. This will become clear from the following comparison, where it is attempted to sketch a picture of the IT status of Denmark compared to a number of selected Western countries.

In attempting to produce an instant picture of Denmark's position it is important to remember that the IT development is like a river that becomes more violent as you go downstream. Two aspects are particularly important, namely the development of micro processors and the developments within tele-communication and networks:

1. The progress made within micro processors means that it is possible to double the amount of transistors in each processor every 18th month. At the same time both the sale and the use of micro processors are rising dramatically, which means that computers become quicker and increasingly inexpensive. The development has been characterised by saying that in these years the efficiency of the computers related to the costs rises exponentially compared to the growth of transistors in the individual micro processor.

2. Within tele-communication and interconnection of computers in networks there have been extreme growth rates within recent years. Here it is also an exponential growth in efficiency that reduces the costs at the same time as more computers are being linked together. An example of the dramatic growth in networks is the worldwide Internet, which grows by 10-12 per cent per month in number of connected users.

The main part of the following international comparisons are gathered from IDC (an analytical company), whose research is primarily based on information from providers of IT products and services and on information from end users. Where it is possible and relevant Denmark is compared to Norway, Sweden, Netherlands, Germany,

---

[8]Bjørn Kassøe Andersen, journalist, is a specialist in information technology and works for e.g. the weekly newsletter *Mandag Morgen* (Monday Morning). The majority of the cited data were delvered by the analytical agency IDC.

United Kingdom, France and an EU average as well as the United States.

Among the Danish strongholds within IT are the following:

- The widespread use of PCs and other IT hardware, including local networks and multi-user computers.

- The extensive use of IT in the private sector and at public authorities, including the smooth interaction between   public and private actors.

- A well-developed tele-communication infrastructure

- Widespread use of both telephones and mobile telephones.

- A well-advanced liberalisation of the Danish tele-communications sector - at least according to European standards.

- A number of successful examples of early and extensive implementation of IT solutions on a large scale within both the private and the public sector (among the examples are *Dankort* (Danish payment card) and the CPR code[9])

- A few strong environments of knowledge and enterprises within advanced IT services, tele-communications and software in general.

- In an international perspective Denmark is regarded an attractive but demanding market. For instance we often emphasize otherwise neglected matters such as design and ergonomics in Denmark.

However, Denmark also has some weak points - some examples:

We have a small market and a small language area, which mean high costs in connection with the introduction of new products (relatively high costs by e.g. translation, documentation and approval procedures).

- In spite of the intentions in the new legislation the Primary and Lower Secondary Schools are still characterized by lack of knowledge about and use of computers and IT.
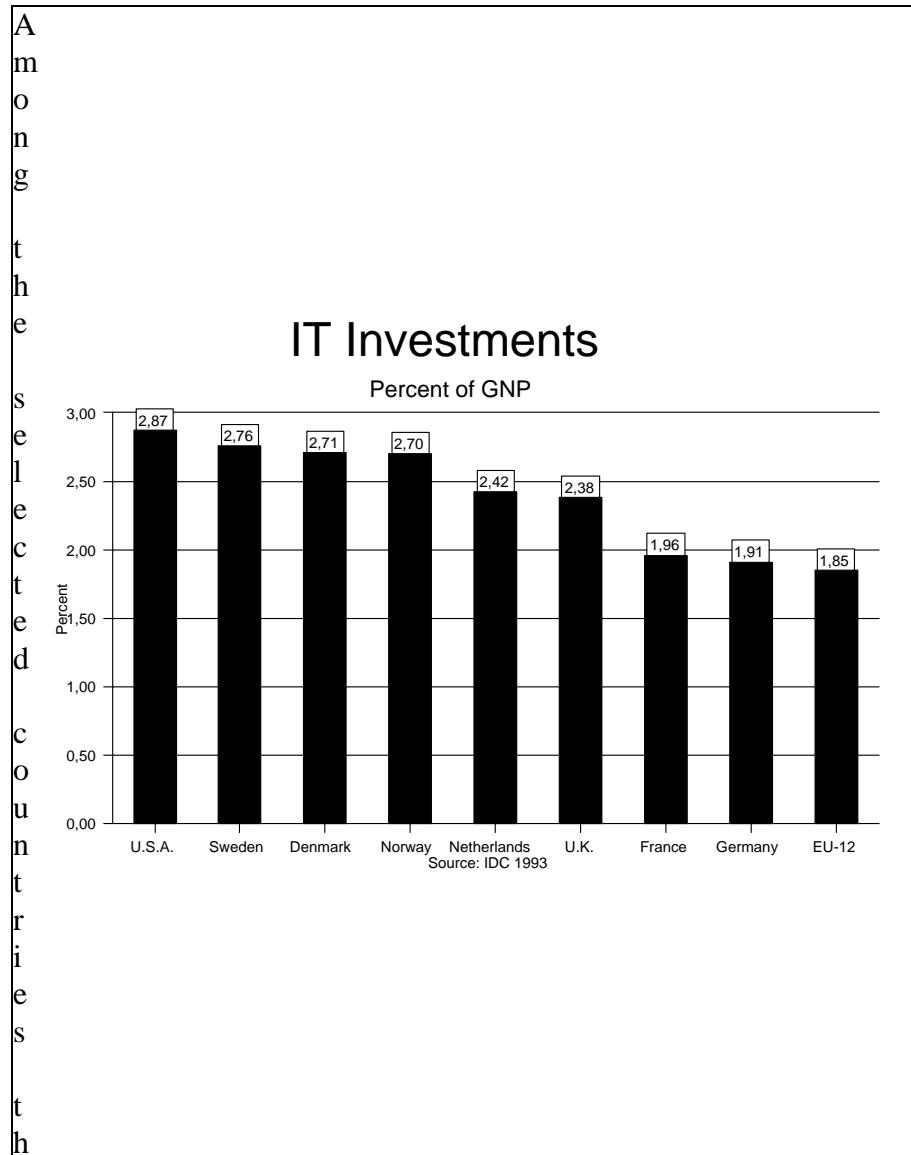
---

[9] The CPR code is a ten digit number for all Danish residents that offers unique identification.

- The Danish market for IT services (e-mail, database searches, voice-response, on-line services etc.) is far less developed compared to other countries.

- Denmark only has limited experience with Distance Learning and consequently a bad point of departure for use of IT in Distance Learning.

- Only relatively few Danish companies use computers as a strategic tool today.

In the following a further elaboration on a number of these strong and weak points follows.

The general Extension of Information Technology

If we look at the general level of IT investments Denmark is at the forefront among Western countries. By IT investment I refer to all investment in hardware, software, networks, IT services etc.

Among the selected countries th

IT Investments

Percent of GNP

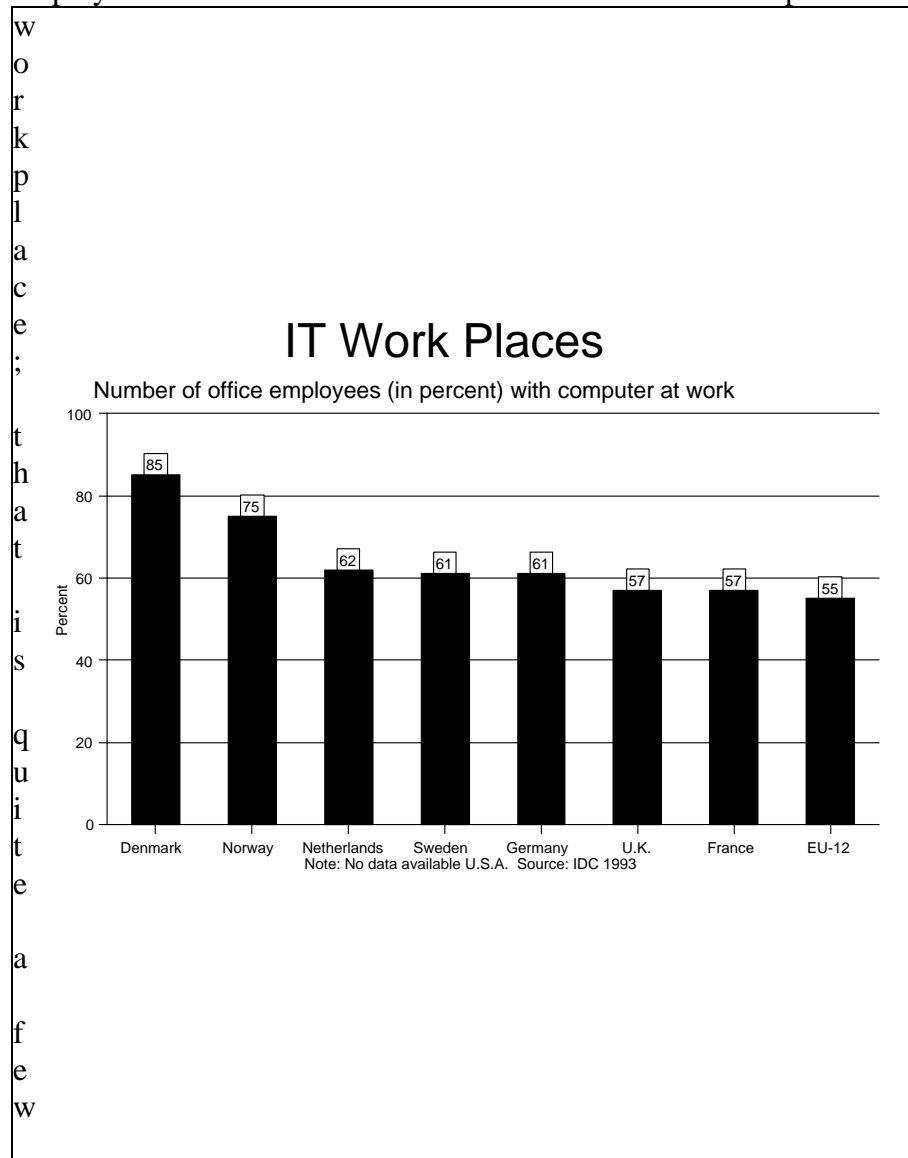|	Value
U.S.A.	2,87
Sweden	2,76
Denmark	2,71
Norway	2,70
Netherlands	2,42
U.K.	2,38
France	1,96
Germany	1,91
EU-12	1,85

Source: IDC 1993

Figur B

 United States is the leading one (as indicated by figure 1) measuring IT investment in relation to GNP. IT investments in 1993 were at 2.87 percent of GNP. In a European perspective Denmark is in the forefront just after Sweden and right in front of Norway. In a EU perspective Denmark is right in the front.

Denmark in the forefront with the extension of computers and local networks
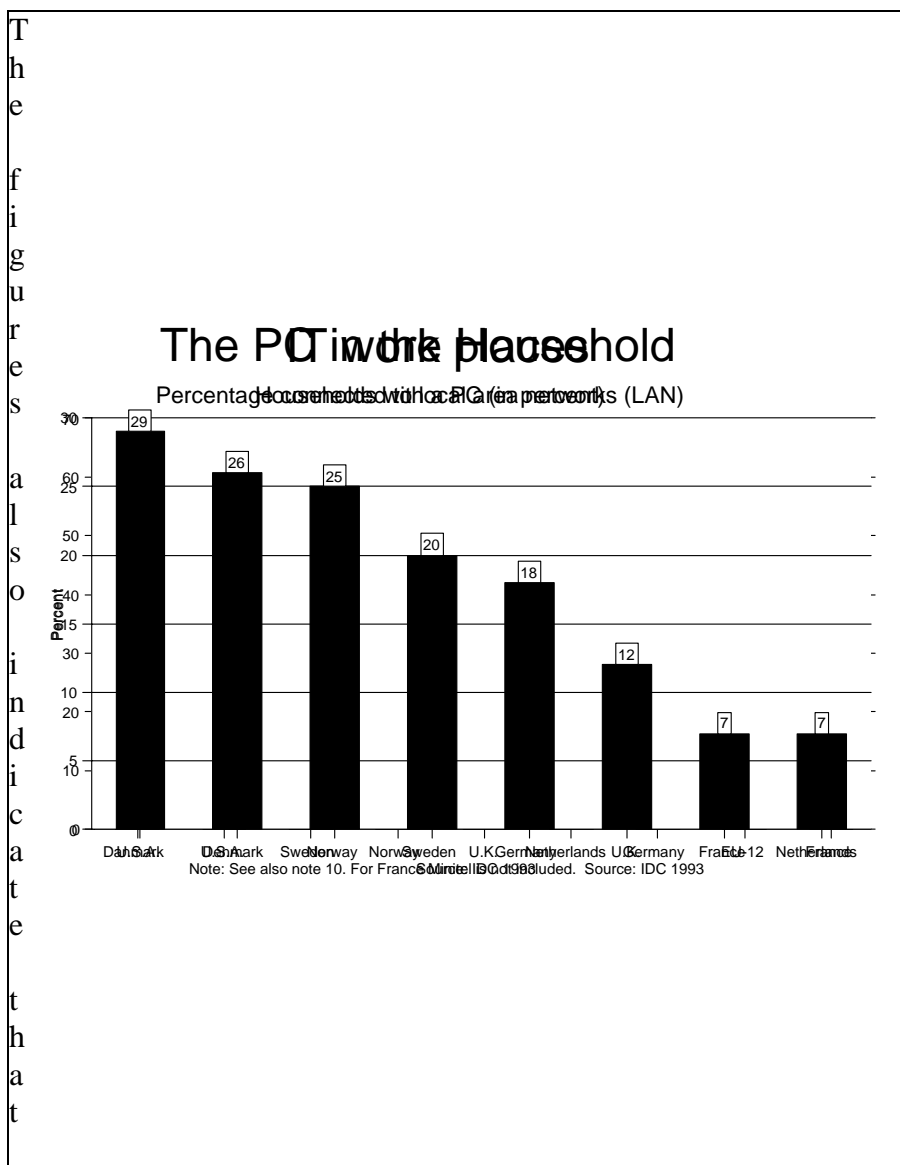
Investigating these figures a little closer it turns out that Denmark is very well-developed with respect to the use of computers, both in the private sector and in private homes. In 1993 85 out of 100 office employees in Denmark had a PC or some other form of computer

workplace; that is quite a few

IT Work Places

Number of office employees (in percent) with computer at work

Country	Percent
Denmark	85
Norway	75
Netherlands	62
Sweden	61
Germany	61
U.K.	57
France	57
EU-12	55

Note: No data available U.S.A. Source: IDC 1993

Figur C

ore than in Norway and Sweden (figure 2). As regards the connecting of IT work-places to local networks (Local Area Networks, LANs) Denmark is at the forefront as well (figure 3).

With regard to the spread of computers in private homes[10] Denmark is almost on level with the United States (see figure 4) and has a surprisingly high position in connection with other European countries. For instance there are almost 4 times as many households with a PC in Denmark compared to the Netherlands.

The PC in the household / PC in the workplace

Percentage households with a PC / households connected to local area networks (LAN)

Country	Percent
Denmark / U.S.A	29
Denmark / Norway	26
Sweden / Norway	25
Norway / Sweden	20
U.K / Germany	18
Netherlands / U.K	12
Germany / France	7
EU-12 / Netherlands	7

Note: See also note 10. For France Minitel is not included. Source: IDC 1993

Figur 4

The figures also indicate that Denmark is among the leading countries when it comes to the spread of PCs and local networks; the things we might label the "gates of access" to the information society.

Lack of knowledge and resources in the School System

[10] Regarded as PCs are: IBM compatible PCs, MacIntosh, Amiga and Commodore 64 and Commodore 128. Computers for the exclusive purpose of games such as Sega and Nintendo are not included.

While the Danes have come far with the use of information technology both at work and at home, the school system is in a pitiful condition. This has most recently become apparent in relation with the debate on the new legislation on Primary and Lower Secondary Schools, where it has now been decided that the computer and information technology must become integral parts of teaching. But at the moment, however, there is not even one Macintosh or PC per student in the Danish Primary and Lower Secondary Schools.

An important problem in this regard is that many teachers do not have any experience in the use of modern computers, and that there is insufficient training of those teachers that are presently being educated.

There is only little statistical material to shed light on these matters. But it is clear that Denmark does not stand alone with these problems; the situation is approximately the same or worse in those other countries that are otherwise in the front with the use of IT (as can be seen from figure 5).

Thus Denmark cannot be ascribed any particular strong position when it comes to the application of IT in schools. But since this is not the case in other countries either Denmark still has the opportunity to secure a position on the area in the years to come. This will be exceedingly important in order to improve the work force of tomorrow for the information society. Denmark's strongholds in this connection are:

- Extensive use of IT throughout society in general.

- Large spread of PCs in private homes and consequently an increasing number of children who become familiar with the use of computers from childhood.

- An awakening awareness of the need for instruction in the use of IT in both school, among citizens, politicians and public autho-rities.

Number of Students per Computer in Primary and Lower Secondary Schools; selected countries		
	All types of compu-ters	**Advanced PC/MacIn-tosh**
Denmark (1992)	25 (1)	40 (2)
Sweden (1992)	-	38 (3)
Norway (1993)	21	56 (4)
Finland (1992)	-	43 (5)
USA (1994)	-	44 (6)

Noter:
(1) Including e.g. the outdated Piccoline computers
(2) DOS/Windows and Macintosh computers
(3) Mainly newer computers
(4) Computers capable of running Windows
(5) No information on the age of the computers
(6) Estimate from Computer Learning Foundation (California), which includes some of the best schools in the United States; data not representative

Sources: Ministry of Education (Denmark), Skolverket (School Authorities, Sweden), Department of the Church, Education and Research (Norway), The Finnish Ministry of Education, and Computer Learning Foundation (USA).

Figure 5
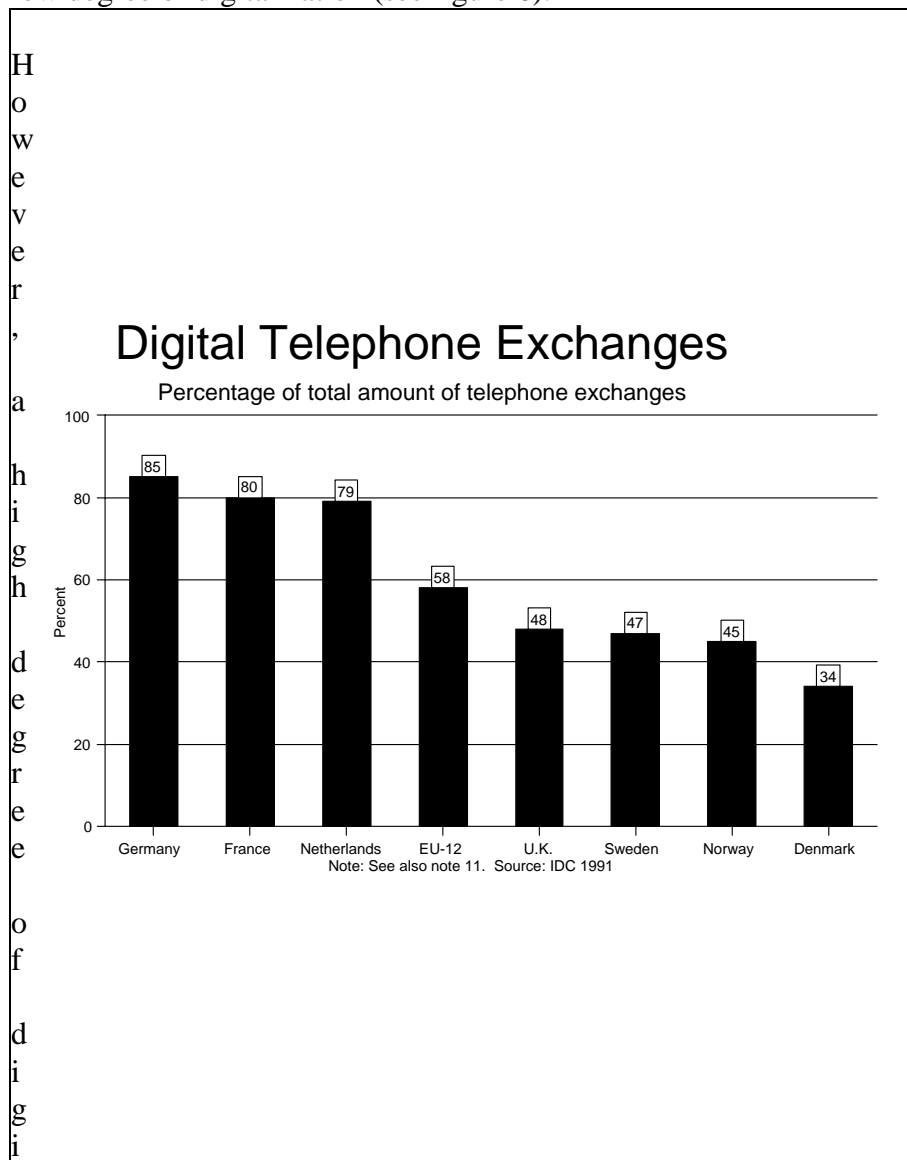

The quality of the tele-communication networks

It is the general impression that the Danish tele-communication infrastructure is regarded to has a high quality. In this connection quality means that both business customers and private customers experience that they get the commodity they have paid for. Examples of quality parameters at the tele-communication companies are e.g. the following:

- Is there are dialing tone when you lift the receiver or when you wish to have a data communication connection established?

- Is it possible to get in connection with the desired recipient?

- Is the connection clear, without interruptions or drop-outs?

- The level of tariffs

- Deadlines for delivery when establishing new connections.

- Flexible delivery when changing tele-communication connections.

- Quick error-correction.

- Contact and service for customers.

- Supply of additional services (extension services, voice-mail, nationwide unique telephone numbers (independent of area) etc.)

There are no immediate international investigations at hand with regard to these matters.

Sometimes the degree of digitalization is used as a yardstick to measure how efficient or advanced the tele-communication networks are: In such comparisons it turns out that Denmark has a relatively low degree of digitalization (see figure 6).

However, a high degree of digi

Digital Telephone Exchanges

Percentage of total amount of telephone exchanges

Germany	85
France	80
Netherlands	79
EU-12	58
U.K.	48
Sweden	47
Norway	45
Denmark	34

Note: See also note 11. Source: IDC 1991

Figure 6

alisation on the tele-communications network is not in itself a marker of high quality. Before the advancement of the digitalisation technique Denmark - and the remaining Scandinavian countries as well - had very well-functioning analogue networks. The relative low degree of digitalisation thus reflects a lacking need for the total renovation of worn-out analogue telephone exchanges.[11]

Instead of embarking upon a total renovation the regional telephone companies, and in recent years Tele Danmark (Telecom Denmark), have followed a strategy of using digitalisation for expansion. This implies that digital connections can be established all over the country, where subscribers may wish access to the particular opportunities offered by digital connections. Where there is no such need the use of well-functioning analogue technique is continued.

Tele Danmark remarks that at the present there would be no qualitative advantage in the exchange of well-functioning analogue telephone exchanges - and based on the generally high standard of the tele-communications network Tele Danmark does not think that digitalization would provide the same gains of rationalisation as has been the case in other countries.

The central part of the Danish tele-communication infrastructure is, by the way, fully digital and installed in fibre-optical cables on all principal distances. The same goes for almost all Northern European countries.

Denmark in front with the establishment of data communication connections

The number of data communication connections can be seen as an indication for the extent to which the infrastructure of the information society has been constructed.

There are a number of different data communication connections. Information gathered by IDC indicates that the selected countries have different profiles with regard to the types of data communication connections that are most common.
Compared to the number of citizens the following picture emerges:

- **PSDN:** France has the highest amount of data communication connections, but in general there are no big differences between the European countries in terms of data connections. PSDN means: Packed Switched Data Network, where traffic from many
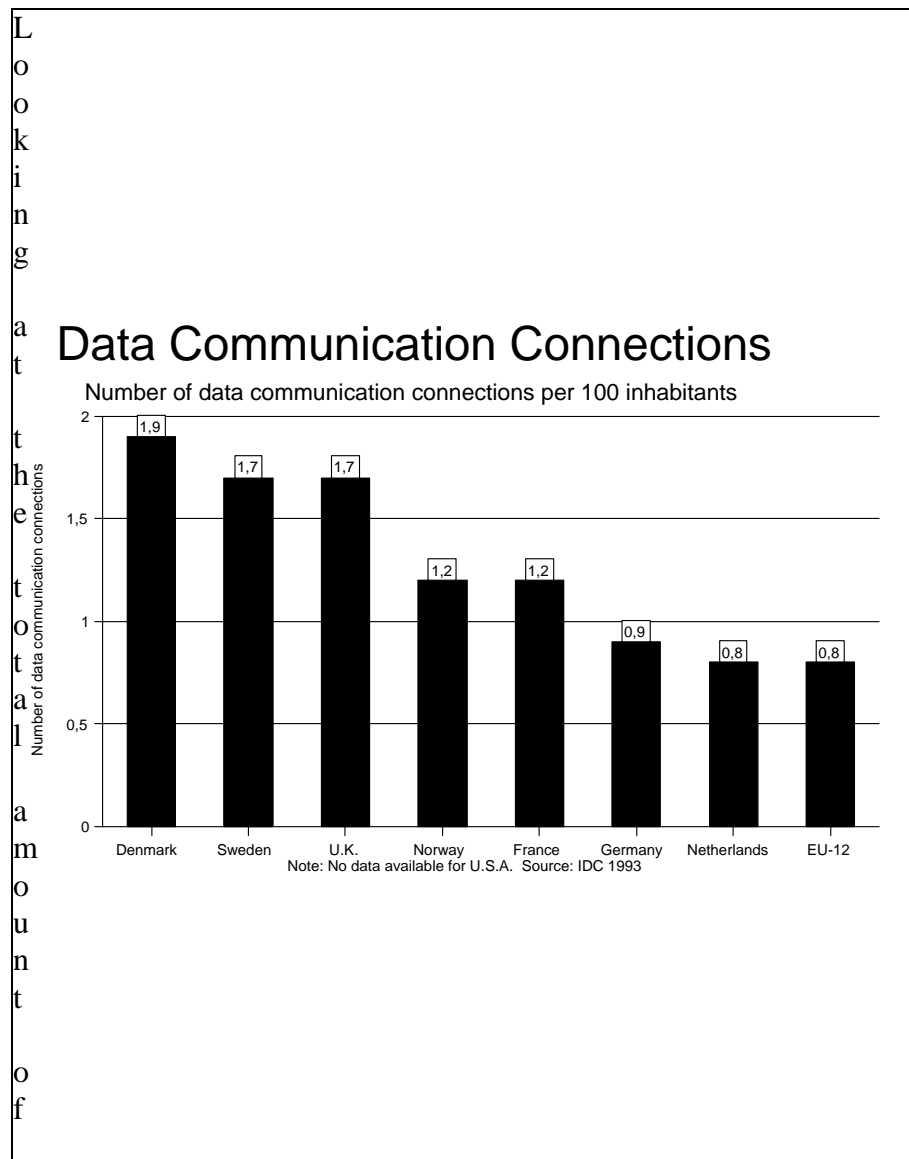
---

[11] According to Tele-Danmark the share of digitalised Danish telephone exchanges by Jan.1, 1994 had reached 46 percent.

different customers is transported on the same data communication connection.

- **CSDN:** Denmark has the largest amount of lines closely followed by Sweden; Norway comes in third place. The remaining part of the investigated European countries have very few of these kinds of data lines. CSDN means: Circuit Switched Data Network, which is a data connection from point to point (a leased line) established on selected hours of day and used by one customer alone.

- **Leased circuits:** United Kingdom has the largest amount of lines, closely followed by Denmark and Sweden. A leased line is a steady connection between two points. Tariffs are measured by distance and transmission speed, but is independent of the amount of use of the line.

- **ISDN:** The level of extension is still very low in the selected countries. ISDN means: Integrated Services Digital Network and it is a fully digital network able to transmit both telephony and data.
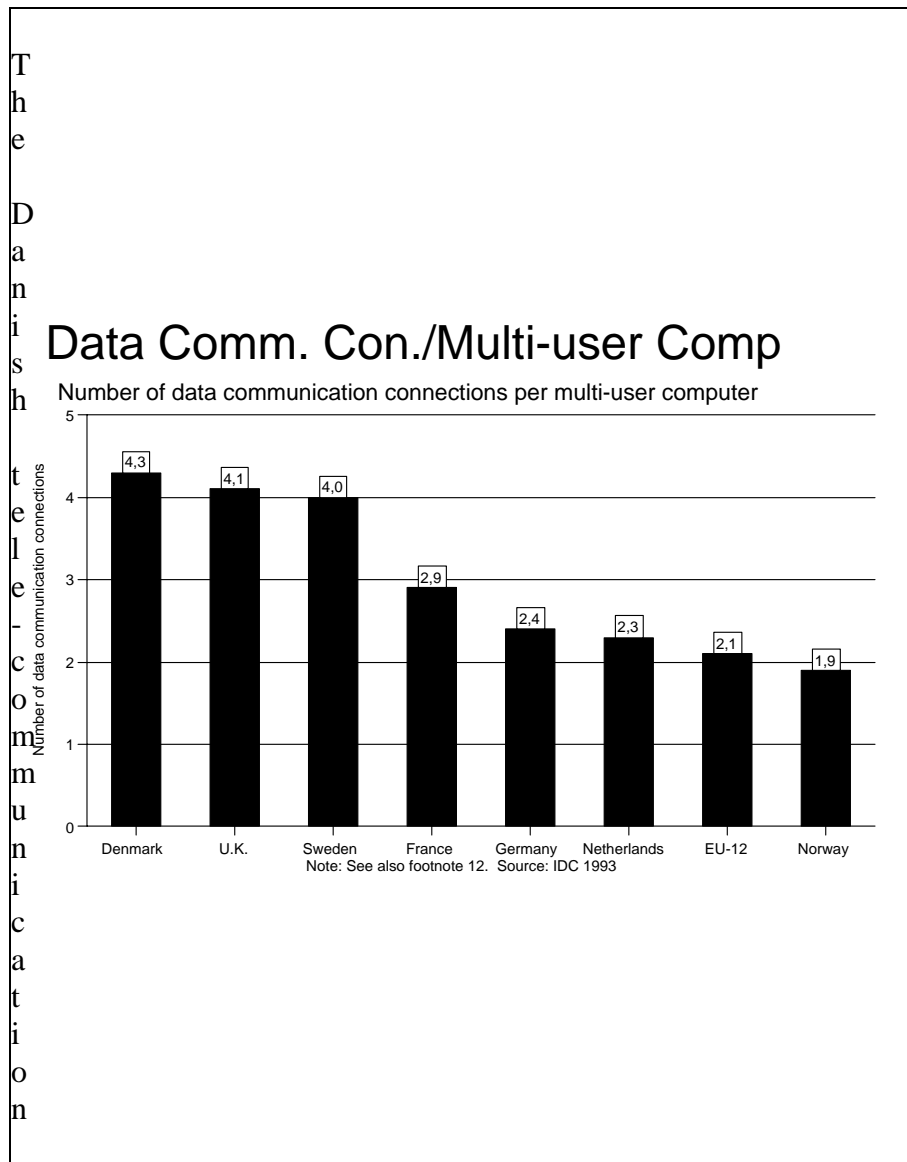
The types of digital connections that are most common are very much a reflection of the tariff policies of the tele-communication operators of the various nations. In Germany, for instance, it is disproportionately expensive to lease a leased line in relation to using PSDN.

L
o
o
k
i
n
g

a
t

t
h
e

t
o
t
a
l

a
m
o
u
n
t

o
f

Data Communication Connections

Number of data communication connections per 100 inhabitants

Number of data communication connections

1,9	1,7	1,7	1,2	1,2	0,9	0,8	0,8

Denmark Sweden U.K. Norway France Germany Netherlands EU-12

Note: No data available for U.S.A. Source: IDC 1993

Figure 7

ata lines put together Denmark has the largest coverage among the
investigated European countries - both in relation to the number of in-
habitants (see figure 7), and in relation to the number of multi-user
computers (see figure 8).[12] Notice that the data given relate to *number*
of lines irrespective of capacity.

---

[12] Multi-user computers include e.g. "Mainframes", IBM AS/400, IBM RS/6000 and
Digital VAX, but not PC servers.

The Danish tele-communication

Data Comm. Con./Multi-user Comp

Number of data communication connections per multi-user computer

Number of data communication connections

| Denmark | U.K. | Sweden | France | Germany | Netherlands | EU-12 | Norway |
| 4,3 | 4,1 | 4,0 | 2,9 | 2,4 | 2,3 | 2,1 | 1,9 |

Note: See also footnote 12.   Source: IDC 1993

Figure 8

ompanies still have the monopoly on the tele-communication infrastructure. The present legislation has, however, allowed DSB (Danish State Railway) and the municipalities the right to establish tele-communication networks for internal communication.

Thus at DSB there is a nationwide network of fibre-optical cables which might be able to compete with or supplement the infrastructure of Tele Danmark. The DSB fibre-optical cable network, which is placed parallel to the railway lines has been established for purposes of signalling control and internal communication. However, combined with the development of the transmission technology the capacity of the network has been increased dramatically. If DSB were allowed to it would be possible to sell this capacity at tariffs well below the present prices of Tele Danmark. A 1991 estimate indicates that by exploiting the surplus capacity DSB would be able to earn 366

mill. DKK over a period of ten years.[13] In Sweden, for instance, the *Banverket* (the Swedish State railway) has been granted permission to sell surplus data capacity in a similar network of fibre-optical cables.

Copenhagen Energy, which belong to the Municipality of Copenhagen, has work in progress to gather about half the municipalities' internal telephone and data communication in their own fibre-optical cable network with 15 nodes.

In the municipality of Esbjerg a system with almost full coverage for cable distribution of TV signals has been established from 1972 onwards. Today the supply for this cable network come from the hybrid networks. The capacity of the networks reaches an extent so that in future it will also be able to contain telephony and data transmission. There is also work in progress to exploit part of this capacity for the internal tele-communication of the municipalities.

Furthermore towns such as Frederikshavn, Herning and Fredericia have large TV distribution networks.

The Danes have many Telephones

While the data lines make up the highways of infrastructure of the information society the telephone lines can be seen as by-paths reaching each, small user. As the progress in the development of the compression techniques take place an increasing amount of data can be transferred via ordinary telephone lines and via (digital) mobile telephony. The spread of telephones and mobile telephones is thus an indicator of the extent to which it might be possible to create a mass-consumption market for the new services of the information society.

Both in relation to the spread of conventional telephones and the mobile telephones Denmark is in the forefront.
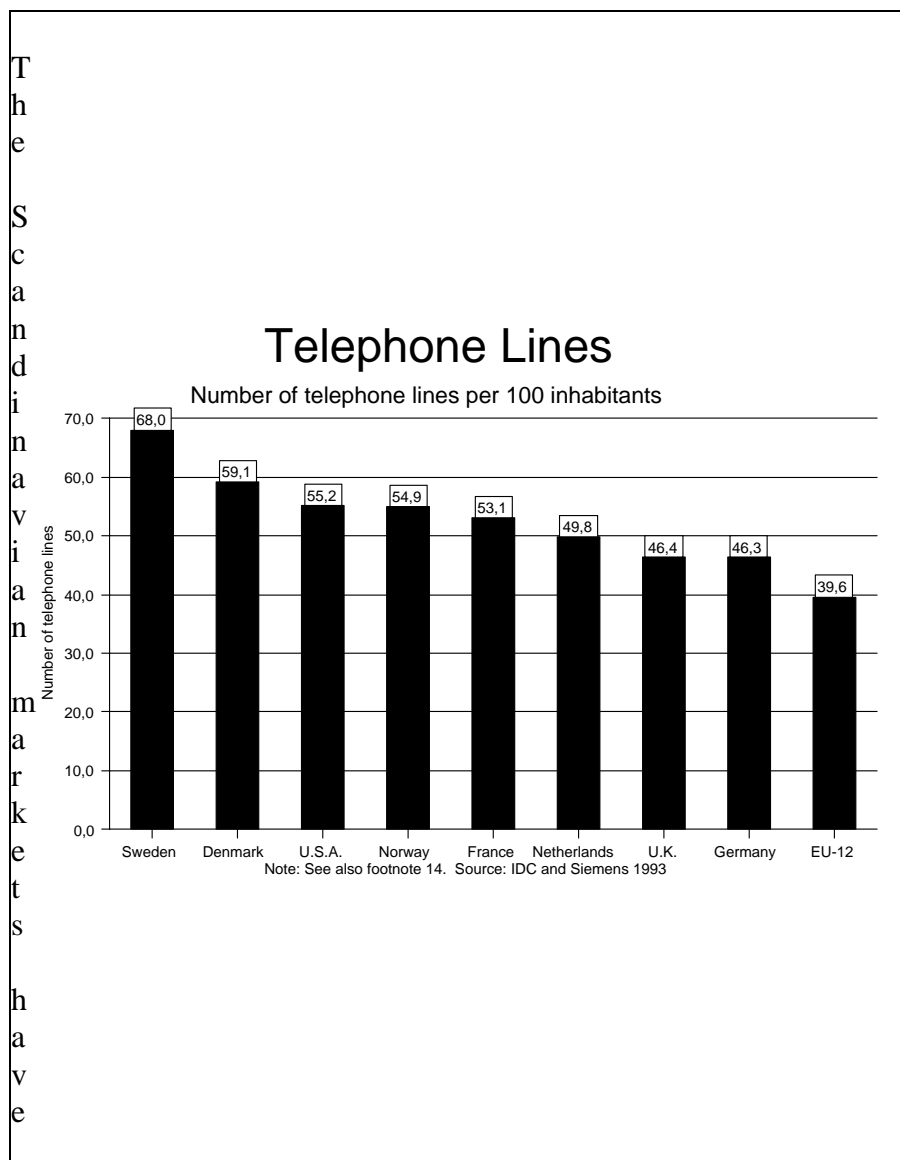
When it comes to conventional telephones Sweden is the country in the world that has most telephones compared to the number of inhabitants. Switzerland and Canada follow right after, while Denmark follows in fourth position. In Denmark there are 59 telephone lines for each 100 inhabitants. In Sweden the figure is 68 (the figures for the selected countries are shown in figure 9).[14]

---

[13] Kristiansen, Perregaard, Rasmussen, and Als: "DSB en joker i spillet om den fremtidige danske tele-struktur" (DSB - a joker in the game of the future tele-communication structure in Denmark), RUC 1991.
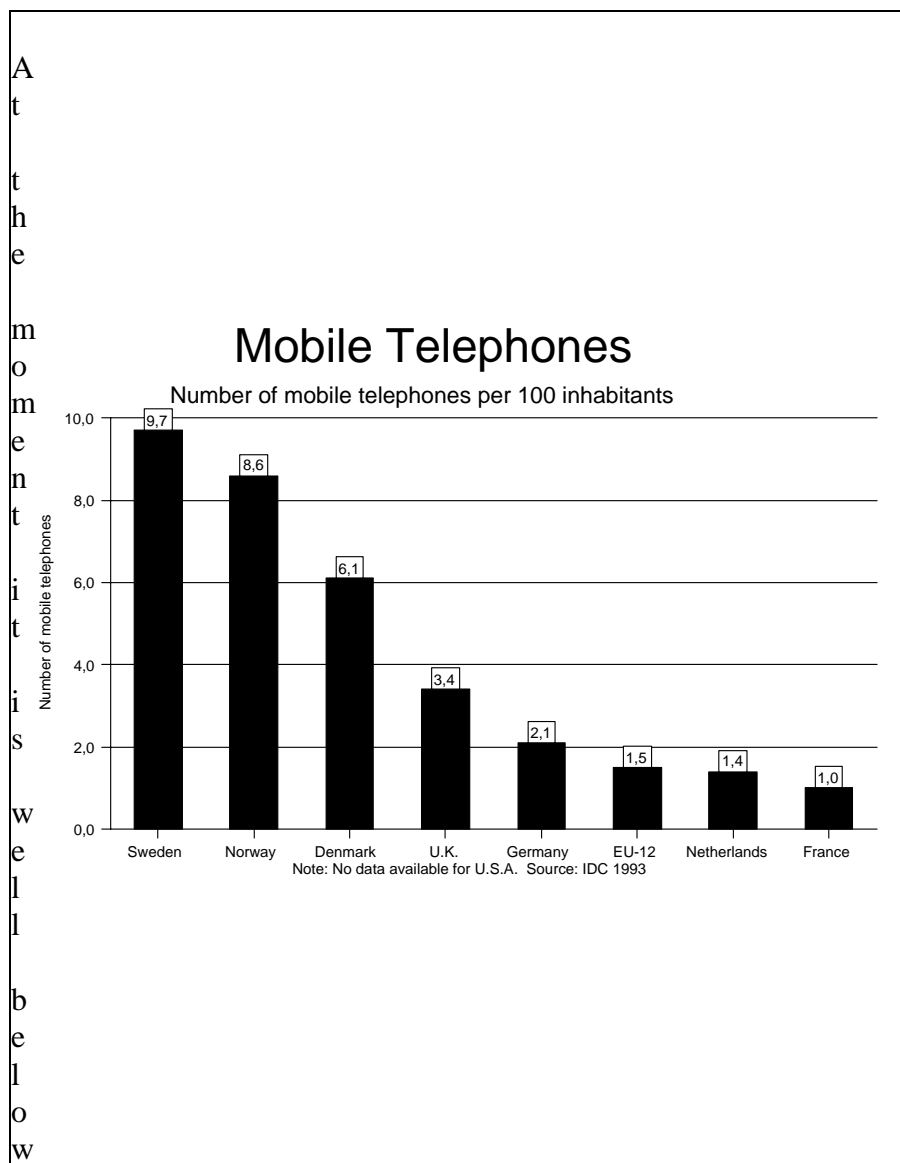
[14] Figures for United States from Siemens "International Telephone Statistics" from Jan. 1, 1992, and indicate the number of access lines to telephone exchanges.

The Scandinavian markets have

Telephone Lines

Number of telephone lines per 100 inhabitants

Note: See also footnote 14. Source: IDC and Siemens 1993

Figure 9

een well-developed with respect to mobile telephones for decades. The spread of mobile telephones (both the analogue and the digital systems) in the selected countries can be seen in figure 10.

A
t

t
h
e

m
o
m
e
n
t

i
t

i
s

w
e
l
l

b
e
l
o
w

Mobile Telephones

Number of mobile telephones per 100 inhabitants

Country	Value
Sweden	9,7
Norway	8,6
Denmark	6,1
U.K.	3,4
Germany	2,1
EU-12	1,5
Netherlands	1,4
France	1,0

Note: No data available for U.S.A. Source: IDC 1993

Figure 10

half of the Danish mobile telephones that operate under the new digital GSM system. The GSM system, which gives access to data transmission, will soon overtake the old NMT system since the GSM system recieves the vast majority of the explosive growth in these years.

Looking at the total amount of conventional telephone lines and mobile telephones together, Denmark had 65 lines per 100 inhabitants in 1993. Sweden had a total of 77 lines per 100 inhabitants.

Weak spread of modems

A measure for the possibilities of smaller users to gain access to the infrastructure of the information society is the extension of modems. A modem translates the digital signal of the computer to analogue signals, which makes it possible to use the traditional tele-communication network as a relatively slow road of transportation.

The number of modems is an expression of:

a) The number of PC owners that use data communication via the tele-communication networks, and
b) The number of users that might be able to connect immediately to new electronic services, e.g. the Danish Diatel.

Among the investigated countries United Kingdom and the Netherlands have the largest amount of modems (figure 11) - followed by Denmark, Norway and Sweden.

Notice that the count of modem

Modems

Number of modems per 100 inhabitants

Note: No data available for U.S.A. For France Minitel not incl. Source: IDC 1993
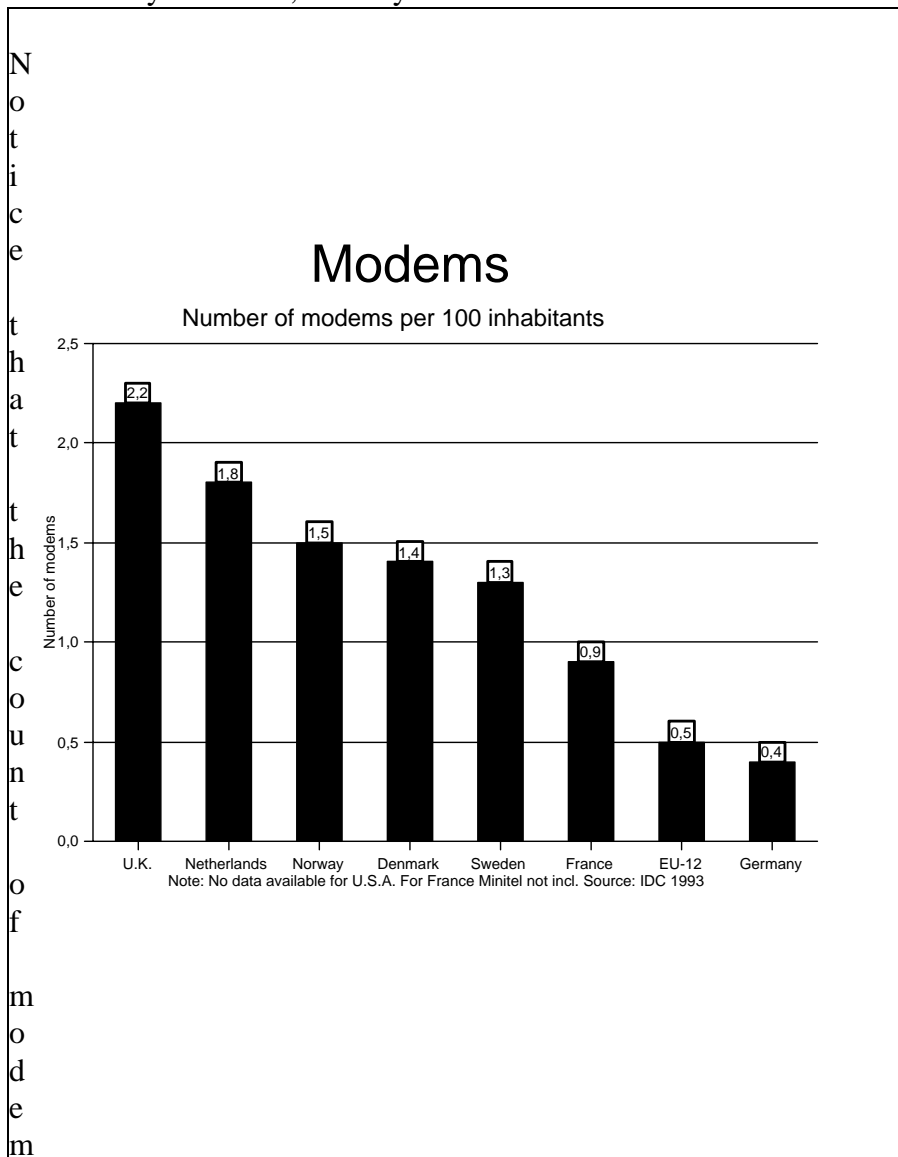
Figure 11

 does not include terminals belonging to the Minitel system of France. The Minitel system had more than 6.1 mill. terminals in 1993 (where most had been distributed for free) and offered more than 18,000 different on-line services.

A probable explanation on the relatively poor distribution of modems in the Scandinavian countries is that there have only been a few accessible IT services in the national languages.

Tele-communication is too expensive in Europe

A decisive factor for the spread of the new services of the information society is the tariffs on the use of infrastructure.

Many tariffs investigations indicate that tariffs on telephones in Denmark are relatively low compared to other Western countries. This does not in itself indicate very much, since the tele-communication monopolies of the Western countries in general have had a very high level of tariffs.

The fact that there is a continued overpricing on especially the international tele-communication connections is evident from the explosive appearance of the so-called "call-back" operators throughout Europe. Typically the "call-back" systems originate in the United States, which has substantially lower international tariffs than the European countries. The principle is as follows: The European consumer calls a computer in the United States, which calls back immediately and thus establishes the required connection from an "American dialling tone". To countries outside Europe this can often be 20-40 percent cheaper than calling directly from the country of origin - even if the "call-back" operator has to secure a profit from the arrangement as well.

Furthermore Denmark - and Europe in general - has a big problem in the shape of very high tariffs on high-capacity data connections. Thus it is averagely 10 times as expensive to use the high-capacity networks in Europe compared to the United States (figure 12).

Tariffs for the monthly lease of high-capacity data connections in EU and USA (in ECU, January 1, 1994)		
Half-circuit connections in EU(1)	**Tariffs to nearest EU country(2)**	**Tariffs to most distant EU country(2)**
Belgium	21793	29380
Denmark	17658	19865
Germany	27889	33422
Greece	26115	33174
Spain	30192	30821
France	24185	31815
Ireland	4027 (3)	30312
Italy	27685	33769
Luxemburg	16739	27170
Netherlands	18700	24933
Portugal	21117	31777
United Kingdom (British Telecom)	10041(4)	40778
United Kingdom (Mercury)	8817	23958
EU average (half-circuit connections)	20461	29901
EU average (full-circuit connections) (5)	40922	59802
U.S.A. (6)	4601	6236

Notes:
(1)   I.e. from the border of the country of establishment to the border for the recipient country. Prices are excl. VAT.
(2)   Nearest and most distant country do not automatically correspond with lowest and highest price.
(3)   Using the connection from Dublin to England as an example.
(4)   Using the connection from London to Ireland as an example.
(5)   Twice the EU average tariff for a half-circuit connection.
(6)   The price indicates the AT&T tariffs for en 1.5 Mbit connection from New York to Washington D.C. (320 km) og Chicago (1100 km), respectively.

Source: EU-kommissionen / Coopers & Lybrand

Figure 12

As can be seen the prices of Tele Danmark on international high-capacity connections are among the lowest in Europe. However, they are far above the American level.

A drastic increase in prices takes place in Europe - and Denmark too - the moment a (national) border is crossed. The tariffs for a connection from Skagen to Gedser (Jydsk Telephone to KTAS, i.e. from Jutland to Sealand via the respective telephone companies and thus national tariffs) is thus only ECU 3,954 (29,850 DKK) per month excl. VAT. This price only makes up a tenth of the cheapest possible connection across the Danish/German border (as at January 1, 1994). The domestic Danish tariff level is thus close to the American one.

A decisive aspect in the development of competitive IT services is the full liberalisation and competition on the establishment of high-capacity connections. As most recently approved at the Corfu summit meeting, on the background of the so-called Bangemann report of EU, it was recommended to work effectively for a full liberalisation of the tele-communication infrastructure of Europe.

Experiences with liberalisation from United Kingdom suggest that free competition has opened for the development of a large number of new services. Thus British Telecom and other cable operators plan to invest 37 billion dollars in new cable installations over the next six years - cables that are capable of communicating images, speech and data.[15] An investment of this magnitude may make United Kingdom a future laboratory for multi-media services.

Also a number of other countries, for instance the United States and Sweden, have plans for enormous investments in new tele-communications infrastructure and in the general development of IT.

International experiences suggest that low and competitive prices on tele-communication are decisive for the developments of the national IT markets.

Denmark has a Number of Unique IT Services

As indicated earlier (figure 1) Denmark has a high level for the total amount of IT investments. A relatively large share of these investments - as is also the case in Norway and Sweden -lie within the areas of IT services; this will appear from figure 13.

---

[15] Business Week, June 13, 1994.
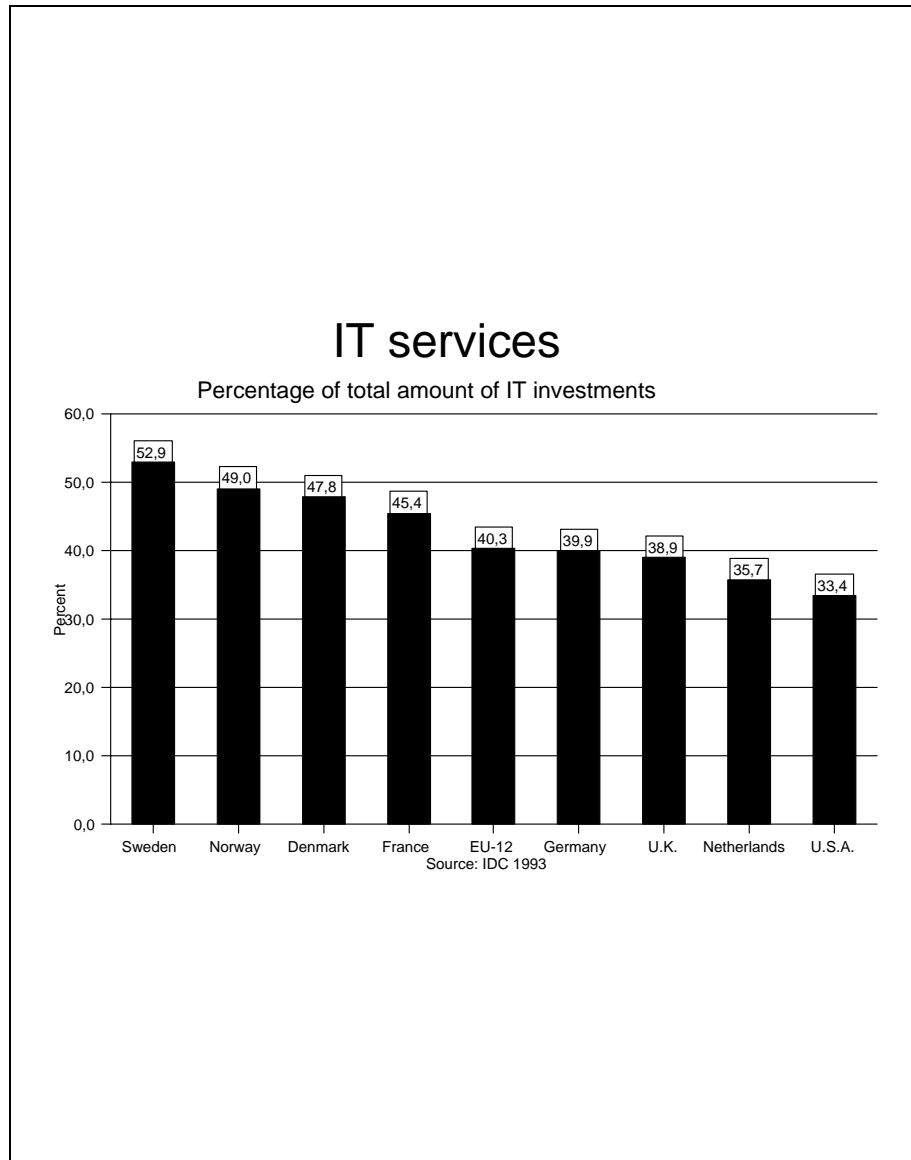
Figure 13

IT services include e.g. education, consultant's work, technical service, service agencies and VANS (Value Added Network Services - i.e. tele-communication with "built-in" extra services, e.g. voice-mail, e-mail, EDI, video conferences and particular fax services).

When it comes to the development of the new services of the tele-communications system the European countries are generally behind when compared to the United States; this regards areas like the relatively simple but useful services such as extension of phone calls, pagers, telefon systems with direct call, voice response, voice mail, charge-free numbers and nationwide unique telephone numbers. With regard to the construction of database services and a shared "entrance" for the new services Denmark generally lags behind compared to e.g. the Minitel of France and a number of privately owned American operators, e.g. CompuServe, Prodigy and America Online. The Danish Diatel will probably not open until 1995.

Thus European tele-communication companies have not marketed new technological innovations in terms of "products" as have e.g. the (privatized) American operators.

Special Danish strongholds within the area of IT services are first of all found within the public sector and in the shape of particularly developed solutions in the private sector. In the following some examples of such Danish strongholds are reviewed one by one:

- **The *Dankort* system:** The Danish *Dankort* system is unique in being a common system for all financial institutions in Denmark. It is very much a consensus solution: Pay-card systems with a similar extension do not exist in other European countries. Furthermore the *Dankort* system is unique in having a very high degree of security based on the use of PIN codes. In e.g. United Kingdom transactions with pay cards are almost exclusively based on signatures. The *Dankort* was planned at the end of the 1970s and introduced in 1983. Today it must be regarded a success in that the number of issued cards passed 2.5 mill. in August 1994. The system has caused the establishment of expert knowledge among a number of Danish companies. Similar expert knowledge has also been developed in other countries, however, and there has been no virtual systems export.

- **EDI:** When it comes to the introduction of EDI (Electronic Data Interchange - typically used for sending of orders, procurement confirmations and invoicing) Denmark is in the leading group, though not entirely in front. Within e.g. the financial sector and the sector for everyday necessities there are a number of Danish examples of advanced use of EDI. A decisive question in relation to EDI is standards. In Denmark it is only approx. 1 percent of the total amount of EDI that takes place according to the new Edifact standard defined by the UN. However, the situation is the same in many other countries. A country like United Kingdom is handicapped by having come relatively far with EDI on the basis of a national standard, which is incompatible with the newer Edifact standard. In Denmark it is especially retail trade companies like FDB (Co-op Denmark) and Dansk Supermarked (a Danish chain of supermarkets) that are the driving forces of the development. Other relatively advanced EDI users are found within the transport sector and *VVS* (Manufactures of Heating, ventilation and Sanitary Equioment) and wholesale dealers of electrical supplies. Within the Public sector the Ministry of Inland Revenue has started to send information and receive tax accounts via EDI. Furthermore there is EDI of a traversive character, e.g. at the DSB (Danish State Railway) travel agency and Tele Danmark/KTAS[16]. These networks do not have a large amount of users as yet but help to add incentives for the further establishment of EDI.

- **Public Data Systems:** Danish authorities have decades of experience with the establishment and use of relatively advanced IT systems. The income tax system, where the fully automatic report on tax information is now common makes up perhaps the most apparent example. The almost 30 year old CPR system is a basic precondition in this connection and still unique compared to what can be found in other countries. The CPR system offers unique identification of the individual citizen. This offers great advantages within public administration and in the elaboration of e.g. statistics. An almost scrupulously precise population census is thus carried out in Denmark in a few working hours entirely by administrative means. A population census in the United States takes almost 10 years from start to end, where the result is furthermore rather imprecise. Furthermore, in connection with elections CPR has become an almost indispensable and very efficient system.

The Danish business sector saves substantial resources by the use of CPR registers. Companies such as banks can thus subscribe for the current up-date of the addresses of their customers.

---

[16] KTAS, the former regional telephone company for Sealand and Bornholm .

Denmark has developed expert knowledge on this area which has resulted in sale for countries like Kuwait, Malaysia and Latvia. Even in Denmark many of the potential advantages of CPR have not been attained. For instance various public authorities incessantly demand information from citizens that is already available in other registers.

The CPR register is the backbone in the future Danish information society. The fact that many benefits have not yet been achieved is due to the lack of adjustment on the legislation on registration compared to the advances of the technological and administrative developments.

The overall registering of Danish companies will create the same advantages as can be found in the CPR system. Such a central register (with a CVR code)[17] in under establishment. CVR will provide unique registration of Danish companies, which at present have both an SE code at the Central Customs and Tax Administration and also a registration code at Danish Commerce and Companies' Agency according to the type of business.

In the Ministry of Housing a similar system under the name of CIS (Coordinated Information System) is under establishment for all information related to buildings, housing, supply infrastructure and city planning. Information of this kind will become related to electronic cards, and the many different kinds of information will just be registered and illustrated graphically on a map. In the longer run it will thus become possible to juxtapose information on a map on the condition of a building and the appraised price with the local demography and future city planning. Another example relates to the possibility of creating shared maps on the supply infrastructure (electricity, gas, water,district heating, telephone/TV cables, sewage etc.) Information of this kind will be very important for public institutions, supply companies and contractors.

With regard to the establishment of the three mentioned systems of public administration Denmark is among the leading countries together with Norway and Sweden. With regard to the establishment of central registers for companies both Norway and Sweden are in front of Denmark.

---

[17] Unique identification code for companies; not yet introduced.

- **Værdipapircentralen:** The Danish Securities Centre (Værdipapircentral) is unique. Denmark is the first country in the world to establish a fully paper-free system for purchase and sale of securities. The system started in 1983, and in 1988 it was expanded to include transactions of shares as well. At the moment work is in progress to find a solution so both futures and options will become fully incorporated into the system of the *Værdipapircentral*. The special thing about the Danish Securities Centre is the close cooperation with the Stock Exchange of Copenhagen. The same kind of integration does not exist in e.g. Norway and Sweden. The establishment of the Danish Securities Centre has encouraged the establishment of specific Danish expert knowledge on the area. But so far it has only been possible to sell this to Norway. Experiences are that local, sectoral interests are indeed very decisive when other countries have attempted to establish electronic registering of securities transactions.

- **Database and Marketing:** In Denmark a small number of companies within advertising and direct mail have promoted themselves internationally. The concept of *database marketing* covers a fusion of advertising and "direct mail", where the newest IT is applied. The basis for this form of marketing is the establishment of very precise and detailed database profiles over potential customers. For instance you identify earlier and potential buyers of a special product, you send them personally elaborated questionnaires and thus receive a precise description of the respondents. The received data are used in the continued marketing so that marketing in future is adjusted to the special preferences of the individual customer. Typically the work involves thousands of "individually" elaborated campaign letters. The number of respondents on this kind of campaign often reaches some 80 percent, which is exceptional within marketing. Three small Danish companies, Action, Ahead and Sepia have achieved an international position in the area. The very restrictive Danish legislation on registers has been an important incentive for the development of this kind of marketing - since it is impossible to use address lists as e.g. in the United States.

As can be seen it is a general feature that the established systems are unique and only have been suitable for export on a reduced scale. Thus it can be concluded that the presence of even relatively advanced IT systems and environments does not in itself create export opportunities.

At the same time the experiences of the latest years indicate that Danish IT companies do not have sufficient size to cope when former niche markets develop into global mass markets. As examples we can mention the closing of Great Northern's telephone production and Dancalls problems of keeping pace with developments on the market for mobile telephones.

The presented examples can be seen as an indication that the Danish market offers beneficial conditions for especially the development and testing of new IT systems, first of all with emphasis on the service side.

- The Danish market for IT is demanding and quality-conscious

- The democratic traditions and public administrative solutions in Denmark have contributed to the creation of unique IT solutions.

- Based on a relatively homogeneous population it has become possible to establish widely applied and accepted IT solutions.

With a point of departure in these conditions Denmark has the potential to develop into and be marketed as the leading "IT laboratory" of the West the next few years. It thus makes good sense to characterize Denmark as the "country of possibilities" when it comes to the development of future IT services and systems. In this regard it is necessary to remember, however, that a number of other countries, e.g. Norway and Sweden have almost the same characteristics and possibilities. Furthermore it is important to bear in mind that at the moment many countries make a genuine effort to establish competitive advantages for their own IT industries.

Appendix C

Volume of Appendices

Contents

The Volume of Appendices has not been translated except Appendix 2, which has been included in this volume as Appendix B.

The "Info-Society 2000" on Windows 3.1 disk

The title on the disk is in Windows 3.1 format and also works on Windows NT systems as well as in a OS/2 Windows box. Earlier versions of Windows are not recommended.
System requirements (minimum):

- an IBM ® compatible personal computer with an 386SX processor or better
- 2 megabytes of RAM
- 2 megabytes of free hard-disk storage
- a Microsoft-compatible mouse
- VGA colour-graphics capability

Read the setup instructions on the disk label and follow the questions asked by the setup program.

It is easy to navigate through the title. You can select topics from the *Content screen*, jump from one topic to another from a *hot spot*. If the hot spot is inside the text you will see a little black arrow, move the cursor to the arrow and the cursor changes into a hand. Click and you will jump to the related topic or get a popup window.

You can perform full-text searches by clicking the *Search button* in the lower right corner of the screen or by clicking the Search button in the menu bar. For further information use Help or press F1.