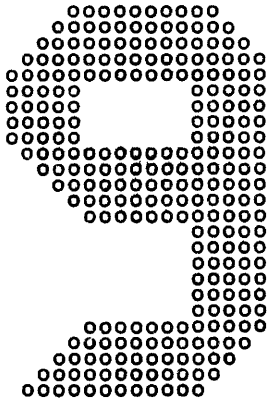

SOCIAL CHANGE AND TECHNOLOGY IN EUROPE

INFORMATION BULLETIN Nr 9

Current events in Scandinavia

September 1982

COMMISSION
OF THE
EUROPEAN COMMUNITIES

Directorate-General
Employment, Social Affairs
and Education

V/A/2/EPOS

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Telex: "COMEU B 21877"

This study was realised by the Commission of the European Community as part of its "Programmes of Research". The analysis and the results presented do not commit the Commission.

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WHAT IS THE E.P.O.S. ?

The Permanent Employment Committee was in favour of the Commission's proposal to set up an European Pool of Studies and Analyses (E.P.O.S.) in the field of new information technology and employment.

The Pool has three main functions:

- to collect and evaluate completed research and significant developments at national level;
- to compare and circulate the results of such research and developments, by making summaries available to those who take part in political and scientific debates, in particular employers and trade unions;
- to play a more directional role, in future, vis a vis factual studies and analyses.

At the moment, the Pool is essentially working on the preparation of a data bank, on annotated bibliographies, surveys and on the current bulletin.

P R E S E N T A T I O N

The European Pool of Studies and Analyses collects and evaluates completed research and significant developments at national levels. Six countries of the European Community have been analysed in previous Information Bulletins.

This ninth issue of "Social Change and Technology in Europe" is devoted to the situation in three Scandinavian countries.

These countries - i.e. Denmark, Sweden and Norway - are taking up the social challenge of informatics based on differing levels of potential and varying means of action:

- an industrial policy which is fairly single-minded, especially on promoting research into ergonomics;
- organisations with access to generous financial and human resources;
- a statutory framework and a highly developed collective bargaining system.

In spite of this willingness, there are arising problems related to the lack of resources experienced by many union branches in companies.

One major problem in many branches is that agreements, although ratified, are in fact ineffectual.

Finally problems of misinterpretation arise due to the vagueness of the terms in national agreements.

However we should also underline the fact that the measures taken by these three countries have significantly contributed to the minimizing of some social disorder resulting from the use of informatics.

E P O S

V/2237/82-EN

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Introduction

In this report we present the constituent elements and the major features of the technological issue in the Scandinavian social context. Special stress has been put on the Danish and Swedish cases, though the case of Norway is also examined.

In the first part, the governmental schemes for the promotion of research and development in the field of new technology are outlined. In Denmark, new schemes have been proposed which challenge the general industrial policy that has, until now, been predominant. In fact, a selective promotion of information technology is emerging from several of the schemes. A certain "technological political armement" seems to develop in Denmark. Numerous statements from political parties, employer organizations and unions, and official reports lay emphasis on new technology as constituting an important pawn for the development towards higher productivity and a higher growth rate as well as a reinforcement of the functioning of democracy and a bettering of working conditions. Sweden , which represents a long tradition of selective industrial policy, has drawn up in the field of information technology an immense body of governmental reports - one even talks about a "report jungle". Two initiatives are given particular attention : a promotion scheme for research and development concerning information processing, and the recently presented "principles and directives" for a co-ordinated data policy (extensive extracts of the latter are published in the annex of the present report). Finally, a short presentation of promotion schemes in Norway is given in this section.

As far as the regulation of the introduction of new technology and of its ways of use is concerned, we are in all Scandinavian countries faced with a highly elaborate structure of laws, directives and collective agreements. We describe this system of regulations and its recent developments in Denmark, Norway and Sweden. The employees' and

unions' influence in this domain is in general restricted to a consultation/negotiation right whereas the employer's established right "to direct and distribute work" remains intact. It is only in relationship to the publication of directives based on the various Work Environment Acts ,that there exists presently a formal possibility for a certain alternative guidance of technology and its ways of use.

Finally the last section of the report gives an account of research and experiences concerning new technology. We have here stressed the important role played by union organizations in all Scandinavian countries as to the choice of research subjects and as to the development of research methods. The advent of so called "one-party-research" and of "action research" have thus shown vital to the Scandinavian scientific and professional practice in the field of information technology. A general social "technological awareness" which is reflected in research and experiences sets the ground for a Scandinavian model for a future information society.

Promotion of information technology in various Scandinavian countries (Denmark, Sweden and Norway)

In comparison to other Scandinavian countries, Sweden, Norway and Finland, the industrial and technology policy of Denmark has, until recently, been considered as being of a rather rudimentary nature. Nevertheless, a number of general schemes to support research, development and especially the diffusion of technology, have been introduced. And in the recent months, we can observe new promotion schemes directed towards specific technologies like information technology.

Two ministries act as major initiators : the Ministry of Industry which is particularly associated with projects aiming at the practical application of R & D results, and the Ministry of Education the concern of which is mainly the support of "basic" research programmes.

Most of the present organizational structures of governmental activities within R & D, were set up in the early seventies, although often on the basis of former organizations. Let us outline the most important of these bodies and subsequently describe in greater detail the ones with special relevance to the field of information technology. By doing so, we cover thus the most essential of about seventy governmental schemes dealing with the promotion of industrial investment.

Under the auspices of the Ministry of Industry, and administrated by the National Agency of Technology (Teknologistyrelsen), eight schemes have been formed in order "to increase the technological readiness within Danish society, its trade and its industries", with the purpose "to turn the development of employment and balance of payment ... towards a more favourable direction" (1).

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(1) Mogens Kring, "The changing public instruments and institutions in Denmark in the area of technology policy", in P.H.Kristensen, R.Stankiewicz (eds), Technology Policy, Roskilde, Denmark/ Lund, Sweden, 1981.

The State provides firms with direct financial support, mainly through the Industrial Development Fund (Udviklingsfondet), and the Product Development Scheme (Produktudviklingstilskudsordningen). In 1981 they had in total at their disposal a budget of 190 mill. DKr. These two financial programmes were set up respectively in 1970 and 1977, the latter being created on the argumentation that "the difficult economic situation often had the effect that firms - and, most often , small and medium-sized firms - neglected the importance of developing new products or even keeping their products up to date and therefore risked being forced out of the market in the near future" (1). The programmes are providing the industry, and mainly small and medium-sized firms, with loans - on a risk sharing basis - and grants up to 40% of the project costs.

The above mentioned fund and the scheme intend to support projects in relationship to all types of technologies - among which technologies in areas such as energy, micro-electronics, bio-technology, telecommunication etc., but according to a civil servant in the Ministry of Industry, without any "advized preference" (Å.Andersen p.108): replying thereby to the critics accusing the development fund and the Product Development Scheme of supporting primarily only "high" technology.

Within recent months, the National Agency of Technology has been urged to sponsor R & D projects where the prospects for profitable production are too uncertain to attract private initiatives. These types of projects will be carried cut in collaboration with the Ministry of Energy and the Ministry of Environment. The Minister of Environment has lately announced the launching of a number of such R & D projects.

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(1) Åge Andersen, "Changing patterns on industrial policies in Denmark" in P.H. Kristensen,op. cit.

Other development schemes are, the Process Energy Scheme (Procesenergiordningen) (90 mill. DKr, 1981) which encourages projects having as a purpose to reduce the consumption of energy in production processes, and the Productivity Committee (8 mill. DKr, 1981) which finances jointly performed projects up to 50%, that is projects effectuated on a co-operation basis between groups of firms or institutions. The Consultancy Committee (Konsulentudvalget) (43 mill. DKr, 1981) on the other hand, gives financial ressources - 50% of the costs, up to a certain threshold - to organizations in the industrial sector and to labour market organizations (union and management confederations etc.), in order to subsidize their consultancy activities: the objective is thus to secure, in the various organizations, the existence of a sufficient knowledge as regards technological aspects of production and administration.

In 1980, a so called Contact Council (Formidlingsrådet) was established in order to gather and disclose information on the present and future public need for goods and services. Although there is a traditional general reluctancy in industry to build up close links between the State and private firms, the latter have nevertheless developed within recent years an understanding of the role of the State in stimulating technological development. The Danish electronic industry is thus reported to look at this specific scheme with positive expectations. A sub-commission has been formed - the EDP Commission (EDB-udvalget) - with the task to establish links with the electronic industry concerning computer requirements in public institutions. The electronic industry sees here a possibility to secure a market for its products, and to finance development costs to a certain extent (1).

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(1) Børsen, 3 June 1981 .

The funds of the Council have until now been extremely limited - 2 mill. DKr in 1981 -, but it should be mentioned that the scheme involves also the conclusion of so called " development contracts ", sponsored by the Industrial Development Fund or by particular clients.

In the presentation of the governmental schemes for the promotion of R & D, we have not yet referred to the most important of all, those brought about by the Council of Technology (Teknologirådet). This Council strives to encourage technological development "to the benefit of the Danish society, its trade and its industry". It constitutes an advisory body for the National Agency of Technology, but initiates also projects as well as other numerous activities. The Council, has for instance, formed a working group in the field of micro-electronics (1979), in order to investigate the possibilities for an extended implementation of this technology in the Danish Iron and Metal Industry. Another initiative, undertaken by the Council, was the proposal of a number of controversial recommendations regarding the setting up of institutional frames for official technology assessment.

The budget of the Council of Technology is about 260 mill. DKr (1981), a sum which counts for almost 50% of the total ressources devoted to the pro - motion of technological development by the government. A large majority of the Council's funds (80%) is attributed to two technological institutes: The Technological Institute of Copenhagen and The Jutland Technological Institute. Moreover, the

Council secures the financing of various institutes of the Danish Academy of Technical Science, among which the Central Office of Electronics.

The Technological Institute of Copenhagen (budget: 175 mil. DKr; staff: 600 employees) " sells " development and advisory services, educational training of professional experts within technical fields such as materials, processes, products, environment as well as training regarding general management. The account of the year 1981, for instance, reveals the following activities: 11 000 advisory missions (2/3 of them in firms of less than 50 employees); 15 000 professional experts have been taking part in education and training sessions (around 300 fixed training programmes are offered); 300 research projects have been carried out (65% of them being financed by the Council of Technology) (1). Following the aim of "supplement (ing) the knowledge and competence of the clients, with fully updated and solid assistance in spheres where the firms have not got sufficient capacity ", the Institute has inevitably been involved in the latest developments of micro-processors, computer design, robot techniques etc...

The Department of Automation Techniques displays a substantial number of seminars and courses in the field of new technology. Even a campaign for the promotion of micro-electronics comprising visits of an "exhibition bus" with Danish electronic products travelling throughout all Danish counties, is planned for automn 1982 (2).

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(1) Teknologisk Institut , Årberetning 1981

(2) Automatiseringsteknik n. 11, 1982

Under The Department of Automation Techniques exists, among others, a division for robotics. The Danish Robot Association founded during a conference entitled "Industrial Robots in the Danish Industry" in February 1982, was initiated both by the Department of Automation Techniques and The Department of Production Techniques at the Jutland Institute of Technology. In fact, The Danish Robot Association has been instituted on the basis of the experiences of corresponding association in Great-Britain (British Robot Association).

Furthermore, a center for computer aided design and computer aided manufacturing has been set up under the department of production techniques. The former often gets credit for the fact that the relative* number of numerical controlled tool machines in the Danish industry, and especially in the Iron and Metal Industry, is among the world's highest together with the one of Sweden and the USA.

One also has to stress, that within recent years an innovative element has been added to the institute's numerous activities. Indeed, in relationship to various governmental attempts to overcome the immense problem of unemployment, a finance-scheme to foster "inventors" has been adopted (1).

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* relatively to the number of employees.

(1) Ingeniøren, 28 August 1981.

The Institute of Technology has allocated 1,5 mill. DKr to the financing of grants for inventors. It is for example reckoned that an inventor who puts forward a project that is deemed realistic as to future production and employment can obtain a "salary" of 10 000 DKr per month for one year. The evaluation of potential inventors' projects will be carried out by the so-called "Office of Inventors " (The Office of Invention and Licence Arrangements).

The Office of Inventors (Opfinderkontoret) constitutes a notable invention by itself. The idea and know-how connected to this office has been sold to foreign countries like the USA, Brazil, Ireland and Holland (1). In order to improve the interaction between industry and inventors, this office has set up in april 1981 "a panel of inventors". The intention is here that the office presents industry formulated needs for inventions in front of the "panel". Consequently, the inventors in the panel put forward possible projects that can eventually be carried into effect in collaboration with a specific firm.

As described above, the Danish industrial and technological policy has, relatively to the one of other Scandinavian countries, remained extremely general. Firms have been granted support on the basis of economic soundness as the sole criteria. The Danish State has not, thereby, tried to influence the industrial/technological development, neither in industry in general, nor in the electronic industry specifically, in order to back up a pronounced policy vis-à-vis work environment, employment, educational structures etc.

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(1) ibid.

Nevertheless the setting up of the previously described schemes for R & D, corresponds to a certain extent to the development of an industrial policy of a less general nature. One even talks about " technology political armaments". Recent statements formulated by the Minister of Industry seem to indicate such a changing policy. The Minister has pointed out the need for governmental efforts to support the development of micro-electronics, bio-technology as well as technologies connected to the production, distribution and consumption of oil and gas products (1).

Originated from the above-mentioned promotion schemes, one can observe the setting up of a number of "development - projects". The creation of a standardized computer record-system which in future "should totally replace the traditional manual system in public services". Further, "a multi-functional" display screen which should fully satisfy the demands of public service is also under development. Both of these development projects are executed in collaboration with The Danish Computer Center (Regnecentralen).

Another development project involves the Danish Center of Datamatics (Dansk Datamatik Center) - a subdivision under the Danish academy of technical sciences - and the firm C.Rovsing A/S. The inherent goal of this specific project is to adapt the programming language ADA to the computer products of the firm C.Rovsing.

A recurrent criticism addressed to these different schemes dealing with the promotion of R & D in Danish industry lays emphasis on the fact that the majority of these schemes, mainly related to governmental employment schemes, are subject to yearly financial allocations.

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(1) Ingeniøren, 19 June 1981.

In spring 1982, the minister of industry advertised a supplementary scheme for the years 1982-85 (50 mill. DKr per year) in order to finance developments contracts between the public sector and private firms in the field of computers, telecommunication and office-automation. The government seeks thus to develop "the administrative job of the future". Mostly medium and long term development projects will be taken into account. The minister argues that in the future there will be an urgent need for these technologies if the public sector should be able to solve new and urgent future tasks , as well as in order to make public service more effective.

The ministry also sees a need for "user-relevant development projects" in the electronic industry, so that "the Danish industry will be involved as far as possible in the development of computer, telecommunication and office automation in collaboration with the public service".

The scheme will be administered by the Industrial Political Contact Council (Industripolitik Kontaktudvalg) which was founded in 1979 with representatives from ministries, public institutions, municipalities and research as well as representatives from employer and employee organizations. Partly because of its composition, which is unique in comparison to the other mentioned Danish schemes, the Minister of Industry refers frequently to the importance of this council in his industrial political statements in parliament. The council which is directly under the auspices of the Ministry of Industry shall encourage even further the collaboration between state and industry, and thus evaluate projects submitted by public service institutions. Additionally, the council is expected to analyse and describe the development potentialities in the field of information technology (1).

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(1) Politiken 5 April 1982; Kai Vangskjær, Oplæg om industriudvikling og industripolitik, Arbejderbevevægelsens Erhvervsråd, Copenhagen, 1982.

According to a study effectuated by Stanford Research International (SRI), the Danish electronic industry constitutes a strong sector in the international competition(1). In fact, the electronic industry exports about 85% of its production which represents 4,5 milliards DKr (1980), the total production being worth about 5 milliards (1980). This sector provides employment to 2 700 persons (1980) and includes mostly small and medium sized firms. Out of the 200 to 300 companies within the industry's own association (the Association of Electronics Manufacturers in Denmark), only few of them count more than a thousand employees, such as for example:

- Bang and Olufson A/S producing mainly televisions and radios
- Storno A/S known for the production of mobile telephones
- C. Rovsing A/S producing computers.

Around 90% of the firms in the electronic industry reach a yearly turnover of less than 5 mill. DKr (1979) (2).

As appears from the report we have referred to above, the Danish electronic industry has, in comparison to international standard, been subject to a remarkable development activity. The industry reveals a R & D level of around 8% which counts among the highest in Denmark. But although the cited report judged the future of the Danish electronic industry as being "promising", intensive efforts are still required in order to secure the continuation of technological development. One of the possibilities for this industry would be to concentrate on "specialized goods for certain limited markets". As shown previously, the public sector has been proposed as a potential market affording the required characteristics. Besides, the iron and metal industry would be another advantageous sector for the electronic industry. In a study on the prospects of this

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(1) Stanford Research International, The Electronic Industry in Denmark, SRI , 1978.

(2) Statistiske Efterretninger, A 16, 1981.

industrial sector ("Possible Conditions for the Iron and Metal Industry in 10-15 years") prepared by the Iron and Metal Employer Association and the Metal Workers' Organizations, the crucial role of electronics was clearly stressed. The Danish iron and metal industry had to be aware of the possibilities of this specific technology in order to satisfy the demanded considerations as to the improvement of the work environment and of the quality of products, and in order to keep the production costs at a competitive level. In other words, the implementation of new technology was necessary for meeting these considerations and for produeing:

- new materials with new properties (stronger, lighter, better corrosion resistance properties, low environmental impacts, recycling possibilities etc.)
- new methods to design products according to the clients specifications (advanced modelling techniques, computer aided design etc.)
- new production techniques (robots' and automated production handling and storage etc.) (1)

Nevertheless, a recent study on "Industrial Structures, Technology and Living Conditions" has shown that if the electronic industry has on the whole reached satifactory results during the years of crisis (since 1973/74), this is largely due to the contribution of very specific sub-branches. The major growth trend has been taking place in the sector of "advanced electronic equipment" - that is firms producing measuring instruments, medical instruments and apparatus, telematique, optical and photographic equipment etc. On the contrary, sub-branches manufacturing products for consumption have been marked by the general economic crisis. The report concluded that generally speaking, the sub-branch of the production of rationalization and automation equipment together with the one of the production of electronic measuring instruments etc. have been "industrial sectors of growth".

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(1) M. Kring,op.cit.

> "Non-consumption orientated machine and electronic branches have all been marked by a progression as to employment (...); the consumption orientated machine and electronic branches have been subject to recession" (1).

More specifically, the consumption orientated branches have, between 1977 and 1978, experienced a decrease in employment of 17,5%.

The cited study on "Industrial Structures, Technology and Living Conditions" has led to rather fierce debates because it advocated certain radical point of views as to future economic/social development strategies. Starting by pointing out the "major economic social costs" which have been induced by traditional growth strategies, the report proposed a "living condition orientated development strategy": an alternative strategy which would be adapted to social and environmental requirements. The author advanced a sector specific strategy and indicates five sectors which could be considered as propitious sectors of growth:

- building and housing (town renovation)
- trafic and transport sector (extension of collective transport)
- energy sector (alternative sources of energy and means to reduce energy consumption)
- environment sector (development of environment adapted technologies)
- improvement of social and health conditions.

In all these different areas, the need for a serious effort to develop appropriate technologies has become apparent. Moreover, the report's author reckons that the Danish industry seems to have at its disposal a definite competence in developing user-orientated technologies, directed towards conditions of work and democratization, especially in the fields of software and system development.

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(1) Jens Frøslev Christensen, Erhversstruktur Teknologi og Levevilkår, Del II, Lavindkomstkommissionens Sekretariat, Copenhagen, 1981

The quoted report was one out of the eighten reports drawn up as "work minutes" for the Commission on Low Income (Lavindkomstkommissionen). The latter was set up in 1976 with representatives from the labour market, ministries and parliament. The work of this commission should aim at defining a co-ordinated total political strategy towards a "more equal distribution of societal results of production" by integrating educational, labour, social, industrial and income policy - areas. In May 1982, the commission had difficulties in agreeing upon recommendations on a future policy for a better welfare distribution. In the field of industrial production, the commission stressed the need for a general policy with the purpose to improve the competitive capacities. A minority composed of union representatives points at a complementary need for a selective industrial policy and a continuous assessment of technology (1).

An economist from the Danish Metalworker Union, Steffen Møller, has presented the unionists' reaction to the governmental schemes for promotion of R & D:

> " Danish firms are seperately too small to master all variants of new technology. If public institutions and higher educational bodies are able to gather and spread information about new technology, they have no means to use this knowledge for concrete actions. It is therefore of decisive importance
>
> - that the public technological service system is improved by the allocation of supplementary governmental funds to the technological institutes, the technological information centers and to the promotion schemes connected to the Council of Technology...

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(1) ibid.

- that wage earners are ensured an insight and influence on the research and product development which take place within firms, so that the ressources of firms as well as those from outside are utilized in the most rational way" (1).

The Minister of Industry, Erling Jensen, also lays stress on the co-operation aspect between all the industrial schemes. To a question from the Employers' Bulletin on a likely governmental "control of technology" in the future, the Minister answered:

"The existing technological development meets general approval in industry. I have not so far heard any criticism as regards the manner in which we administrate technical service. Technological schemes have been introduced and in all of them, the industries are represented...It is actually the Agency of technology, composed, among others, of members with an industrial background and of labour market parties, which evaluates the specific projects and decides, whether or not, they should be carried out" (2).

Additionally, the Minister of Industry declares that the present state of affairs can be considered as being satisfactory. He sees therefore no reason which should legitimate any change (3).

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(1) Speach given by S. Møller, Danish Metal Workers Union, at the conference Robots and Industry, Technological Institute, 3 February 1982

(2) Arbejdsgiveren, 20 March 1981

(3) ibid.

Sweden remains without any doubt the Scandinavian country with the most comprehensive policy discussions in the field of information technology. An innumerable number of governmental and ministerial reports have been produced. One even talks about a "report jungle" referring thus to the danger that the building up of such an overwelming body of survey results and recommendations could render the reaching of any conclusion as well as decision-making extremely difficult. Anyhow the fact is that Swedish official bodies and scientific institutions have put forward - and still produce - (about 30 official reports are presumed to be be on the way) a remarkable amount of scientific surveys and discussions as regards the development of information technology and its social consequences.

On can recall a number of reports discussing the problems of the industrial structure of Sweden. "The Boston Report" came for instance to the drastic conclusion that too much money had been attributed to declining industries (iron , forest products, steel and special steel, shipbuilding) - and that the government should in the future concentrate on supporting financially the industrial sectors attesting a growth trend (mechanical and electrical engineering, transport equipment, chemical and pharmaceutical industries). The report also revealed that in general the level of investment was toolow in industry, but what was especially required was a change in investments' patterns. Industries in growth had a particular need to reinforce their investments in marketing, applied engineering and export development. Finally, the report emphasized the need for a governmental initiative aiming at building up structures for the elaboration of industrial policy-making , on the basis of a co-operation between the government, management and the unions.
One has to remark that the Boston Report was not given much credit; moreover its conclusions have later on been characterized as being "a disaster" (1).

(1) B.A. Vedin, "Innovation Policy in Sweden", in OCDE, Innovation Policy, Paris, 1982.

Another report called "Technical Capabilities and Industrial Competence" published by the Royal Swedish Academy of Engineering Sciences has asserted that a better economic and social situation can, in the short and medium perspective, only be achieved if the change is build upon the existing industrial structure. It is therefore only in a longer perspective that one can envisage to take new fields of activities into account. The report draws our attention to the fact that a co-ordinated long term national research plan is lacking.

Yet another report from The Special Industrial Policy Commission has been particularly noticed because it lays stress on the need for general economic policy measures to cope with the general problems. This notwithstanding, the report specifies some concrete technical areas where governmental actions seem justified. The report states thus that "national development projects" should be introduced in spheres such as information technology, micro-electronics and biotechnology.

In 1979, The National Board for Technical Development raised the question to know in which technical domain it would be relevant and necessary for Sweden in the long run, to obtain a high level of technical and industrial competence. As an answer, information technology was put forward as such a strategic technical area (1).

Lets us proceed to a brief description of the Swedish electronic industry. Its covers by far the largest electronic sector in Scandinavia with a production equal to 14 milliards SKr compared to 11 milliards gathering the total of all the other electronic sectors in Scandinavia (Denmark, Norway, Finland). In 1980, this industry comprised about 400 firms employing 123 000 persons.

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(1) Teknik för framtiden, STU Perspektiv, 1979.

In contrary to the Danish case, where we have observed that specific electronic branches have experienced a decrease in real terms, the Swedish case shows a situation of increase of production in all sub-branches. The substantial growth this industry has achieved throughout the last decade (8% growth per year), has been due to a relative strong expansion of specific sub-branches. The sectors of consumption electronics and computers have displayed though a relative decrease, whereas the sector producing communication electronics has, in particular, experienced a relative increase (its share in the electronic industry is 52%).

Further, a report from the so-called Data Policy Commission informs us about the fact that the sectors which, in the seventies, revealed a relative decrease, are mainly composed of large firms, whereas the expanding sectors (industrial and medical electronics, components) count mostly a great number of smaller firms. It has to be noted that these smaller firms "produce" a growth in employment of about 8% per year (1).

If the smaller and medium sized firms have been designated as preferential actors for implementing the future electronic policy, one has to note that the most fierce debates have been taking place with regard to the larger firms. After discussion, the need for a co-ordination of the efforts within the industry has been suggested. The fusion of two of the biggest firms, Scaansaab and Datasaab, was considered as a hopeful example for such a development. It was not, however, a financial success. But the Minister of Industry declared "that the value of the Swedish electronic industry could not be measured on the ground of economic factors alone".

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(1) B.A.Vedin, "Innovation Policy in Sweden", in OCDE, Innovation Policy, Paris, 1982.

Other considerations had to be kept in mind, and therefore the State took a 50% share in a newly formed company, DATASAAB, in 1978. Later on, in 1981, this new company was bought up by L.M. Ericson. The State's share was thus reduced to 9,5%, a figure which was although reckoned as being sufficient for keeping up a certain public influence. The State's interests were taken care of by Teleinvest, a subsidiary company of the state-owned Televerket. In the middle of 1981, L.M. Ericson transferred to this newly created subdivision, its department for information systems and telephone equipment. Datasaab has, by january 1982, changed its name into Ericson Information System AB. The latter employs 4 000 persons and gives a yearly turnover of about 3 milliards SKr. In total, the Ericson Concern counts 70 000 employees and has a turnover of about 16 milliards SKr. (1).

The State's share in the electronic industry in the seventies reflects the fact that a great majority of state subsidies have been spent in these ventures. Out of a total of about 425 mill. SKr which have been distributed to the electronic industry on "industrial policy" schemes in the years 1970-79, 390 mill. Skr have been used on the State's engagement in Datasaab.

The Report from the Data Policy Commisssion insisted upon the fact that the electronic industry covers "one of the Swedish industrial sectors on which industrial expansion will depend in the coming decade", but it emphazised also that such a development will be subordinated to certain conditions and will very likely involve a certain number of problems.

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(1) Data n.4; 1981; Gunnar Lindstedt, "Svensk dataindustri en industripolitisk möjlighet ?", in G. Lindstedt (ed), Datorer på Svenska, Arbetslivcentrum, Stockholm, 1981.

First of all, "the electronic industry is extremely less labour intensive than most of the other industrial sectors". The following trends illustrate this statement: whereas the relative size of the electronic industry in the national industrial production has moved from 3% to 6% in the years 1970-80, the increase of employment during the same period has only, in relationship to global industrial employment, moved from 4% to 5%. The report estimates that this picture will be strengthened in the years 1980-1990, with the relative increase of industrial production amounting to 12%, and the relative increase of industrial employment corresponding only to 6-7%.

Secondly, "the expansion of the electronic industry requires, for the majority of its products, access to the home-market", and furthermore "a successful expansion must be founded upon the principle of the concentration of competence and capacity in the industrial sub-sectors of electronics where the Swedish small-scaled firms have, comparatively, and seen from an international perspective, got a number of advantages" (1).

Like in the rest of Scandininavia, there exists in Sweden a great deal of various schemes for the promotion of R & D. Regional Development Funds have, since 1978, been set up in each of the 24 counties: they represent a decentralized form of the former Swedish Fund for Development (SUFO) . High risk and supplementary credit, state guarantees for loans, services to new plants,expert services, educational programmes etc... are all schemes canalized by these regional funds.

Further, in order to encourage new products, processes and systems in industry, The Swedish Industrial Fund was established in 1979.

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(1) Rapport från datadelegationen, Samordnad datapolitik, Ds B 1981: 20, Liber Förlag, Stockholm, 1982.

In March 1981, the Swedish governement submitted a comprehensive Industrial Policy Bill to the Parliament. It stipulated that long term offensive measures were required in three areas:

- promotion of small and medium sized business
- increase of the supply of industrial ventures and of high risk capital
- promotion of research and development (1).

The most important role regarding the promotion of R & D is played by The National Board for Technical Development (Styrelsen för Teknisk Udveckling)(STU), a central administration under the auspices of the Ministry of Industry. STU was founded at the end of the sixties (1967-69) with the aim of creating a single institution which integrates promotion schemes of R & D of the whole innovation process that is: "from the identified need or idea until the stage where the development works have reached a working system or a product prototype". The roles of STU in "the societal system" have been defined as a societal role, an industrial role and a research supporting role, with the purpose :

- to encourage the development of products and systems
- to bring about innovations and technical quality in industry
- to rise the scientific level within technical research and to increase competence within the field (2).

The budget of STU was, for the year 1980-81, 550 mill.SKr. These funds have been subject to an increase especially after 1978. STU has, since 1978, been adopting a two-fold strategy in its promotion of R & D : "selected programme areas" and "action areas".

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(1) Lennart Lübeck, "Recent development in industrial and R&D policies of the Swedish government", in PH. Kristensen, op.cit.

(2) B.A. Vedin, op. cit.

The action areas have as characteristics to be "concentrated" and to constitute "major applied development efforts", so that the different interest parties can be mobilized around specific development endeavours over a limited period of time. Examples of such action areas are the development of "The Future Steel Plant" or the development of "The Technology for Mastering and Cleaning Spilled Oil in the Sea and in the Shore Zone". Actions undertaken in each area will normally be running 5 to 8 years.

The target of the selected programmes is, primarily, to generate new knowledge and competence corresponding to societal priorities. These programmes are suspected to run during several years (3-5 years) and aim too at reaching specific objectives (1).

In 1979, STU carried out a study with the intention to define in which technological domains there will, in the long run, be a definite necessity for Sweden to forge a high standard of technical and industrial competence. The resulting report designated, as already mentioned , information technology as representing such a strategic field (2). Moreover, the report stressed the fact that a high degree of competence within software was essential for securing the expansion of the electronic field. The obstacle impeding presently the application of new technology is precisely the low level of programme and system development as well as of basic software.

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(1) STU budget 1981-82

(2) Styrelsen för teknisk utveckling (STU), Informationsbehandling - STUs ramprogram, Information nr. 240, 1981.

On the basis of this report "Technique For The Future", and its results, STU has chosen to initiate "a frame-programme for information processing". This programme, as it finally has been settled, will last from July 1980 until July 1985, and a total budget of more than 70 mill. SKr has been allocated to it. In the preparation of the frame programme, the following members have been involved: the 400 largest firms in Sweden, representatives of "almost all institutions and research groups in the field",and also numerous foreign researchers.

The objective of "the frame-programme for information processing" is to erect in Sweden "a powerful research structure , capable of challenging the highest international standards". The research programme includes:

- methods, language and tools for system analysis and system construction including all aspects as well as all phases, such as for instance organizational problems, modelling, programme documentation and system maintenance.
- construction and use of advanced development system milieu , especially new types of computers, new methods of system development, new areas of application and new categories of users
- user-orientated aspects in interactive computers systems, particularly dialogue techniques and issues connected to the application. Use of theories and methods within the field of artificial intelligence
- distributed information processing systems, including software and hardware aspects. The programme contains the development and experimentation of global as well as local systems
- advanced data system architecture based on micro-processors, mainly architecture adapted to specific production problems (1).

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(1) ibid.

These various research programmes are all distributed to a great number of research institutions in Sweden. The work is followed up, supervised and controlled by a special committee set up by STU for these activities. A more original element lies in the fact that a number of international computer experts have been appointed by STU for visiting, once a year and this throughout the whole project period, each implicated research institution. Their task consists in effectuating "scientific evaluations" of the project as it advances.

As a result of this vast project, Sweden should be provided with a number of scientific centers in the field of information technology. They should fulfil two characteristics: - to be centers above "the critical size"; - and to answer the requirements of "centers of excellence".

However, the programme of information technology does not stand in isolation as regards the building up of competence and knowledge. It is considered as an important pawn in a " co-ordinated national data policy" and in the creation of a Swedish "model of the use of information technology in society".

The STU's activities have been reviewed by the so called Data Policy Commission and certain guidelines for the promotional schemes in information technology have been put forward. These activities should follow three principles:

- a holistic view of information technologies is requested
- information technology should primarily be regarded as a supporting technique
- users' influence should be developed and strengthened (1).

As concerns the future elaboration of the research programme, one of the announced objectives consists, among others, in reinforcing the societal orientated element in the frame-programme and in integrating a greater interest for research about the consequences of techniques in society.

Until recently, the STU frame-programme for information processing was reckoned to have been marked by a clear preference for pure technical projects. The changes which are likely to occur henceforth, are due to a certain extent to the hard criticism addressed to the frame-programme by the unions. Especially the Swedish Central Organization of Salaried Employees (Tjanstemannens Centralorganisation) (TCO) has been active in this debate (2).

In March 1980, the government decided to form the already above mentioned Data Policy Commission (Datadelegationen) with representatives from parliament, employer confederations, trade-unions, county councils and local authorities. Three directives were assigned to the Commission:

- to follow up the development of information technology, to stimulate competence and knowledge in the field and to propose schemes in order to guarantee a positive future use of information technology in society under democratic guidance and control

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(1) ibid.

(2) Industriel Datateknik, nr. 3, 1982.

- to prepare recommendations for directives about the development and use of information technology in society

- to support the co-operation between the various governmental committees working in the field of information technology as well as the co-ordination of their recommendations. This will create the ground for an aggregated data policy.

These directives are obviously interconnected. In fact, the governement considers that information technology, its development and its use, can only take place under democratic guidance and control, if an aggregated data policy is implemented.

It must be borne in mind that for the commission, one of the fundamental principles of a co-ordinated data policy, is that it must be sudordinated to major societal objectives, such as "democracy, economic growth, full employment, economic, social and cultural equality, suppression of disparities in regional development, satifying conditions of work, co-determination in working life and equality between women and men" (1).

In March 1982, the Data Policy Commission presented a set of "propositions for a co-ordinated data policy" which was well received by the government and which will be submitted for discussion to the parliament (Riksdagen). And the commission shall, within the next three years, elaborate these propositions further.

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(1) Regeringens proposition , Samordnad data-politik, Prop. 1981/82: 123.

It is not possible here to do justice extensively to the analysis of their 50 recommendations (see Appendix A), but we will nevertheless outline the major ideas through the presentation of the three categories of recommendations. The proposals are here ordered according to "their degree of topicality".

CATEGORY I includes all the recommendations which the commission considers as having been sufficiently studied for allowing it to draw up measures within the next three years. It covers thus the action scope for the period 1982-1985.

The Individual Citizen:

- personal integrity (1)*
- computers and the public (5)
- information to citizens (6)
- rights to assess techniques (7)

Industry, Administration, Working Life

- co-ordination of various factors (15)
- productivity and profitability (16, 17)
- data technique - a supporting technique (18)
- small and medium sized firms (22)
- work content and work environment (23, 24)
- development of competence, influence and codetermination (26, 27, 28)
- development and application of information systems (29, 30, 31, 32)

Society

- computer and electronic industry (33)
- employment (38, 39, 40, 41)
- regional development (42, 43)
- information society (47)
- research and education (50)

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* The figures correspond to the list of recommendations in Appendix A .

CATEGORY II covers the recommendations on which further investigations should be carried out within the next three years. Therefore the commission judges necessary that in the period 1982-1985, reports on the following subjects should be produced:

The Individual Citizen

- personal integrity in the work place (2)
- data quality (3)
- the political decision process (7)
- equality (8)
- handicaped (9)
- payment systems (10)
- new media (12, 13, 14)

Industry, Administration, Working Life

- creative capacity of organization (19)
- security and vulnerability (20, 21)
- development of competence and influence (25, 27)

Society

- societal control (34, 35, 36, 37)
- employment (41)
- data-criminality (44)
- vulnerability (45)
- data-tranfer across national borders (46)
- development of the information society (48)

CATEGORY III is covering a long term category. Studies and measures may be postponed after 1985.

The Individual Citizen

- control of quantity of information (3)

Society

- the development of information society (49)

This vast project was drawn up with the purpose to create a Swedish model for the development and use of information technology in society. The principles underlying this model were :

- "that one tends to apply a total view to data questions
- that numerous parties, groups and individuals are given the possibility to influence the development and use of information technology
- that current problems are solved in co-operation between the involved parties, groups and individuals
- that it lies in the common interest of society, firms, authorities, union organizations and individuals that a comprehensive education, adapted to the mentioned aims, is accomplished " (1).

On the basis of the reports from the Data Policy Commission, the Ministries of Education, Labour, Industry and Law are working on the outline of governmental measures. However, until now, the results have been remaining very limited. It is only in the educational domain that measures seem to have been taken. A representative of the employer confederation (SAF), who is also a member of the commission, even presumes that the propositions of the Data Policy Commission will be subject to a certain languidness "before the end of the summer" (1982)(2).

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(1) Ds B 1981: 20, op.cit., p.283f.

(2) Industriel Datateknik, nr. 4, 1982.

The Swedish Confederation of Trade-Unions, LO (Landsorganisationen i Sverige), thinks that the government's activities in the area of information technology are very important. LO expects that in the future, the State will "actively pay attention to information technology and its development"; the union confederation requests this to be done by "attributing to the Data Policy Commission the mission to produce - in co-operation with the involved ministries - a repeated 5-year-plan for the promotion of information technology in various sectors" (1). The general election which will be held in September 1982 will bring an answer as regards the future of the data commission and its work for a co-ordinated policy.

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(1) Prop. 1981/82: 123, op.cit., Annex 4 p.94.

Until recent years Norway has, altogether, shown rather great similarities with the Swedish case, especially with regard to its selective industrial policy; but it appears to move now towards a development policy of a more general nature.

A brief description of the various financial sources supporting the electronic industry will be given. The Industrial Fund (Industrifondet), created in 1973, is by far the most important industrial development fund in Norway. Representatives of industry, labour and ministries sit in its administration; its chairman is the general secretary of the Norvegian LO. The general promotion schemes of this fund benefit manifestly also the electronic industry.

Specific schemes for the launching of information technology are primarily canalized through the Norvegian Research Council of Technical Science (Norges Teknisk-Naturvitenskapelige Forskingsråd)(NTNF). In 1978, the Council devoted 45 mill. NKr to the promotion of automation and data processing. In 1980, NTNF presented "an Action Programme for Micro-Electronics and Data-Technology": a three year project (16 mill. NKr per year), the first year of which, was mainly directed towards educational and training aspects.

In 1965, The General Committee of Norvegian Research (Hovedkommiteen) was formed with the function to advise the governement in the field of research policy. Labour and employer organizations as well as various research disciplins were represented in the Committee. Some years later (1969), a special sub-committee on computer questions was established under the presidency of Professor Kristen Nygaard.

The Norvegian electronic industry reached, in 1977, a total turnover of 3,5 milliards NKr. The dominant firms in the sector are :

- A/S Elektrisk Bureau employing about 4 600 persons (telephone equipment, mobile radios, radio equiment)
- A/S Kongsberg Våbenfabrik; its electronic division employs 1 600 persons and gives a turnover of 674 mill. NKr
  (mini-computers, numerical controlled tool machines and CAD)
- Standard Telefon and Kabelfabrik A/S employs 1 600 persons
  (military electronics and telephone equipment)
- Tandberg Radiofabrik A/S reorganized after bankruptcy in 1979 into
  Tandberg Data (250 employees, partly owned by Siemens)
  Tandberg A/S (400 employees, partly owned by Norsk Data A/S)
  The Norvegian State has invested about 160 mill.NKr in this reorganization and guaranteed loans of up to 40 mill. NKr.
- Norsk Data A/S employs 700 persons and gives a turnover of 313 mill. NKr
  (mini-computers and computer equipment) (1)

A campaign for higher productivity has been launched in 1982, in the private firm as well as in the public sector in order "to create a general understanding for the importance and necessity of an increased productivity and to motivate, thus, the single firm to participate in such an activity" (2).

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(1) Nordisk Råd, Datateknologi i Norden, NU 1981:9, Stockholm, 1981.

(2) NPI - Nytt, nr.4, 1981.

The President of The Norvegian Federation of Industry (Norges Industriforbund) has evaluated that productivity in industry could be increased with 15-20% the first two years of the campaign and with 5% the following years (1).

This campaign will be organized by The Norvegian Institute for Productivity (Norsk Produktivitetsinstitut) under the auspices of the Ministry of Industry (Industridepartementet). Local productivity committees have been formed with representatives from industry, trade, union organizations and educational institutions.

"Exemplary firms" satisfying certain criteria (economically sound firms of specific relevance for the various regions and with a satisfactory co-operation system), have been chosen in each district for the carrying out of productivity projects. It is understood as important, that this productivity campaign shall be achieved on a co-operative basis.

During Spring 1982, about 1/3 of the relevant public institutions, have presented suggestions for projects. The Directorate of Rationalization (Statens Rasjonaliseringsdirektorat) proposed then to concentrate on four schemes: the simplification of administrative rules, training of top civil servants, higher productivity in the Health sector and a computer system for administrative routines (2).

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(1) Produktivitets - nytt, nr.1, 1982.

(2) Produktivitets - nytt, nr.2, 1982.

Regulation of the introduction and of the use of information technology in production and services (Work Environment Acts, Co-operation Agreements, Co-determination Acts and technology agreements)

Co-determination and the improvement of working conditions are in all Scandinavian countries regulated by a large set of laws, regulations, directives and collective agreements. We will, in the following pages, introduce these regulation schemes, and examine especially the provisions dealing with the possibility of influencing technological development and its social consequences.

In Denmark, the regulatory frame stands as follows:

- The Work Environment Act of 1975 (took effect the 1/7/1977)
- The Co-operation Agreement of 1977 (LO and DA) and its "additional agreement" :
- The Technology Agreement of 1981
- but also The Basic Agreement of 1973 (with modifications in 1981) in which the employer's "right" to direct and distribute work is stated - a "right" that can only be limited by mutual agreement(par. 4.1)
- and The Company Act of 1973 which recognizes the representation of employees on board level of joint stock companies.

In Sweden, the regulatory frame stands as follows:

- The Work Environment Act of 1977 (took effect the 1/7/1978)
- The Act on Co-determination at Work of 1976 (took effect the 1/1/1977)
- The "Development Agreement" of 1982 (LO, SAF, PTK)
- but also The Act of Worker Representation on Company Boards of 1976
- and The Act on the Status of Shop-Stewards of 1974

In Norway, the regulatory frame stands as follows:

- The Work Environment Act of 1977 (took effect the 1/7/1977)
- The Frame-Agreement on Computer Based Systems of 1977 and of 1981 (LO - NAF)
- but also a Company Act of 1973 - which gives employees a right of representation at board level
- and The Basic Agreement (goes back to 1935)

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The Danish Work Environment Act does not include specific regulations related to information technology and its implementation. It represents a frame - law defining mainly the organizational structure for a cooperation on health and security issues, so that a continuous improvement of working conditions can be ensured - in relationship to all professional activities except for naval and aeronautic activities .. The law entails a vast set of prescriptions dealing with topics such as substances, materials, techniques and technologies. Directives applying to work on visual display screens, have for instance been taken.

This Work Environment Act aims mainly at bettering physical health, but refers nevertheless to a so called "extended health concept" including thus also long term effects. However, it is by no means clear to which extent this involves psychological and sociological factors of the work environment, and to which degree issues related to work organization, work content, hierarchical structures fall within the scope of the law.

The law prescribes that in all departments and divisions of more than 10 employees, a security representative (sikkerhedsrepræsentant) shall be elected among the wage earners in order to constitute a security group (sikkerhedsgruppe) together with the foreman.The members of the security groups in an organization elect among themselves, members to a security committee (sikkerhedsudvalg). This constitutes the basic institutional structure for the improvement of the work environment in organizations.

This law rests on three principles:

- issues connected to work environment shall be solved on a co-operation basis between employees, managers and employers
- in the building up of future workplaces, a satisfactory work environment should enter at an early stage into the planning phase
- employees shall have influence from the very first step of planning

The Work Inspection (Arbejdstilsynet) has specified the function of the security group. It is stipulated that previous to its involvement in the planning of "health and security" actions, the group has to be given the possibility of participating in the planning of:

"work flow, work process, work methods and all changes related to these elements.
The security group shall also be involved in the planning of:

- the expansion or the reorganization of the deparment
- the acquisition and the changing of machines and technical equipment
- the acquisition and use of substances and materials" (1).

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(1) Arbejdstilsynet, Virksomhedernes Sikkerheds- og Sundhedsarbejde, vejledning 81/1978.

The two security bodies (security group and security committee) have, since the law has taken effect, been provided with numerous supplementary directives and recommendations, specifying thus their sphere of activity. The Work Environment Council (Arbejdsmiljørådet) and The Work Environment Fund (Arbejdsmiljøfonden) play here a crucial role. Further, The Regional Contact Committees and The Central Branch Security Committees were assigned essential functions, not least because of the representation of unions in these committees.

The Work Environment Council provides the employees with the possibility of participating in the planning and the execution of an improved work environment. The limits of these possibilities have not been circumscribed very clearly yet, but it is considered that the economic social situation imposes, for example, severe constraints on the interpretation of "the extended health concept". The changes brought about by the law, can only be evaluated on a long term basis.

Owing to its restricted prerogatives -of an advisory and co-operative nature- the security committee does not enable employees to have a "real say" in work environment issues. However, the security committee works under the authority of The National Work Inspection (Arbedjstilsynet) which may apply sanctions in case of breach of the work environment directives: the infraction must though appear "clearly".

The difficulty of drawing a clear-cut line between the functions of the co-operation committee and those of the security committee has often come to the fore, either in the case of general discussions or in the case of difficulties of application.

The Co-operation Agreement opens up for the possibility of creating co-operation committees in firms of more than 50 employees. Similar agreements have been signed since 1947. The co-operation committee counts an equal number of management representatives and shop-stewards representatives. The Co-operation Agreement stresses the general importance of co-operative work relations which permit to reach simultaneously an increased competitivity and job satisfaction. The committee is given a so called "co-determination right" as to the principles of the organization of work, security, welfare and the firm's personnel policy (the issue work organization includes also the setting up of principles regarding the daily organization of work). No discussion relative to concrete decisions can be taken within the committee, which deals exclusively with principles. It is only in the case of changes and reorganizations of a greater importance within the firm that the committee has a co-influence right on concrete decisions. In the sense of the Agreement, "co-operation" is only understood as "an engagement of both managers and employees to make their efforts converge", and by "co-influence" is simply meant a demand for consultation. In case of disagreement in the co-operation committee, the right of the employer "to direct and distribute work" will become operative.

Through the Work Environment Act, the labour movement saw possibilities for influencing decisions on technology, its development and its ways of use. As examples of steps in that direction, we shall mention the publication of two manuals, one on "the adequate working conditions concerning work on visual display screens", another one on "office-work, work environment and technology", both issued by the Work Environment Fund. But given the scope and orientation of the Act, a great number of technological consequences remain outside its competence and are not therefore regulated by it. Salary and employment condi-

tions fall for instance totally outside the scope of the Work Environment Act. These shortcomings were the major reasons for LO to enter into agreement with DA for setting up the conditions relative "to the introduction or change of a considerable nature in production technology, including computer based technology and systems". This "Technology Agreement" took effect the 1/3/1981, and covers the private sector. A similar agreement has been signed for the public sector.

This frame-agreement obliges the employer to inform the co-operation committee - or a special sub-committee called "technology committee" - about new technology or changes in present technology, this before its implementation. The information shall be clear and easily understandable,and shall include the employer's evaluation of the various consequences likely to be induced by the change.

The Technology Committee's task is to discuss possible "technical, economic , personnel and work environmental consequences" resulting from the use of new technology.

As far as the principles of training and educational activities related to the implementation of new technology are concerned, the co-operation committee can exercise "a co-determination right" (the meaning attributed by the co-operation agreement to this concept has already been explained).

The technology committee can only call for external expertise if an agreement can be reached in the firm; but it is entitled, at any moment, to use expertise available within the firm "if one of the parties wishes it, in order to clarify specific questions".

The agreement does not bring any employment guarantee to the wage earners. It merely stipulates the firm's obligation to search for replacement jobs within the firm, in case of cut-backs in jobs due to new technology. An employee who is dismissed on the ground of the introduction of new technologies, has got the right to 2 weeks leave for taking part in training courses during the period of notice, if this employee has been promised a future job to which training is relevant.

This "technology agreement" in which technological development is perceived, both by the employers and the labour movement as incarnating an "important object of co-operation", reflects the concord spirit between LO and DA for the time being. According to the employer confederation DA, this agreement has contributed "to improved possibilities for the introduction of new technologies" and "to lead the discussion into more constructive frames". It is only by discussing the introduction of new technology within the co-operation committees (and technology committees) that "the understanding and acceptance of employees can be stimulated" writes DA in its Bulletin (1).

DA has since, made use of this technology agreement, as a basis for a country wide campaign on the promotion of an extended use of new technology, with the aim "to secure the industry as well as employment". Further, "the technological frame-agreement shall, through rationalizations, conduce to revivify firms" proclaimed the Director of DA, Leif Rasmussen, at a conference in Copenhagen launching the campaign (2).

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(1) Arbejdsgiveren, 5 March and 20 February 1982.

(2) Aktuelt, 16 March 1982 ; Jyllandsposten 16 March 1982.

Moreover, DA notes with satisfaction that the Technology Agreement has been reached without the employer's "right to manage and distribute work" being touched.

Seen from the standpoint of the Metal Worker Union (Dansk Metalarbejderforbund), the Technology Agreement "secures however that the introduction of new technology is not followed by an enlargement of the employer's right to manage and distribute work" (1). A mutual guarantee about the rights and the limits of the employer's tasks in case of introduction of new technologies results from the agreement, and stands out as the dominant message of this Technology Agreement.

An analysis of the Technology Agreement, concludes that "employees are not supposed to take part actively in the decision-making process. They can receive information. (...) The discussions in which they participate can generally be characterized as ritual activities which take place in parallel with the decision-making process" (2).

But this recent report also points at the status of the agreement as being a frame-agreement; it is therefore possible by local agreement to modify the points of the frame-agreement.

Since the central Technology Agreement has come into effect, an increasing number of local agreements have been concluded in the private as well as in the public sector; they represent different degrees of employees' influence on the consequences of new technologies.

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(1) Dansk Metalarbejderforbund, Den teknologiske udvikling - Teknologien i menneskets tjeneste, February 1981.

(2) Britt-Mari Blegvad, Indførelse af ny teknologi: samarbejde og konflikt, Institute of Organization and Work Sociology , Copenhagen School of Economics and Social Sciences, 1981.

An agreement reached at SAS (Scandinavian Airline System), concedes the employees a participative role in the data development system (the development of the "system concept" and the "system outline") (par. 4 A). Another technology agreement in banking prescribes severe rules as regards employment and job cut-backs. The agreement states that "dismissals induced by technological development constitute exceptions to the rule" (par. 7). Moreover, an agreement in the brewing sector, stipulates that the decrease in employment due to "investments, the giving up of an old production system and any reorganization of production, cannot exceed the threshold of 1 100 jobs within a period of 5 years" (par.2).

The vast majority of local agreements have remained so called "soft-technology agreements" in which rules related to redundancy, information, training and education, have been determined according to the principles of the frame-agreement. In fact only a municipal agreement stands out as a highly disputed agreement of a radical nature, giving job security and real influence to employees in case of the introduction of a new technology. It is thus not surprising to see that this agreement, although it constituted the result of an agreement between the town council and the local union representation, was in reality never endorsed (1).

The inherent limits technology agreements are subject to, have been described by Hans Strunge, the head of the technology committee in the Central Organization of Salaried Employees and Civil Servants in Denmark (Funktionærernes og Tjenestemændenes Fællesråd) (FTF). He evaluated technology agreements to be "a step in the right direction", but points also out that they are related to "the age of mending", an age in which one continuously attempts to repair the consequences of the type of tech-

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(1) Teknologi- og trygghedsaftale mellem Farum kommune og H K - Klubben, July 1980.

nology resulting from the prosperity period of the sixties". Hans Strunge insists on the indispensable need for a form of political action, in order to be able to reach the core of these problems (1).

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The Swedish Work Environment Act covers a particularly wide range of activities. It deals not only with the working conditions of wage earners, but also with those of employers (in so far as they take part in production), of independent workers (for instance farmers), soldiers and even school children (from the seventh year at school), prisoners and people who live under social assistance.

The basic principles of the law state that working conditions must be satifactory, an objective which must also take into account the constraints and possibilities of the specific nature of work and of the social and technical development of society. The law also puts emphasis on the need for the employee to exert influence on his (or her) work situation. On his side, the employer shall endeavour to organize work in such a way that this need for employees' influence can be fulfilled.

The Work Environment Act envisaged to protect and better not only people's physical health (as is the case in Denmark),but also their mental health. Both the physical and the "social" work environment are taken care of by the Swedish legislation. It is of interest to note that the ministerial report preparing the Work Environment Act reflects an unanimous understanding (both employer and union representatives took as usual part in the commission) relative

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(1) Fællesrådet, nr.4, 1982.

to the fact that hierarchical relationships as well as relationships in general between individuals in the workplace are relevant to the work environment concept of the law (1).

The Swedish law on work environment prescribes clear directives as regards working hours. It forbids work between midnight and 5 a.m. (though it is possible in specific situations and by agreement with the union federation to go beyond this directive); and determines a weekly continuous rest period of 36 hours, preferably at the end of the week.

In all firms with more than 5 employees - but also in firms with less "if the situation requires it" - should the unions assign at least one security shop steward (skyddsombudet). In firms with more than 50 employees a security committee (skyddskommitén) should in addition be formed. For securing the improvement of the work environment in the smallest firms, the work inspector is entitled to ask the unions to designate regional security shop stewards, who are not working in the single firm they are supposed to represent. In 1980, the total number of security shop stewards was of about 110 000, and the one of regional security shop stewards of about 1 400.

In the same way as in Denmark, the Swedish Work Environment Act is a frame-law. More detailed prescriptions are laid down by various public work environment institutions under the form of recommendations or directives.

The National Agency of Work Environment (Arbetarskyddsstyrelsen) (ASS) has the function:

- to identify problems and development trends
- to initiate and set up research projects
- to produce instructions,recommendations and directives

(1) Prop.1981/82: 123, op.cit., Annex 4, p.41.

This agency works actively with information technology questions. In 1978, it put forward recommendations relative to work on visual display screens, recommendations which are about to be revised. A study on the long term effects induced by work with visual display screens on visual capacities, has been started in 1980. It is expected to run over 8 years and the first results should be published in 1982. The Agency has also issued general technical instructions on robots. According to ASS , research should be carried out for helping answering the following question: "how can the application of information technology be directed and modified, so that new work environment problems do not appear, but that on the contrary, the pre-conditions for a satisfactory work organization can be improved?"(1).

However, many unionists have shown a manifest impatience, especially as regards the improvement of the work environment in case of work on visual display screens. LO has asked for a change of status of the work environment recommendations (published by ASS): according to the union organization, they should become directives. Moreover, LO reckons that the results of ASS should have a broader effect. TCO has for example advanced a harsh criticism in its 1982 Congress Motion, i.e. its Action Programme for the years 1983-85. It embodies the following statements:
" The Work Environment Act has been existing since 1978. Important expectations were attached to the ambitious aims of the law. Its implementation has however come out to be extremely limited and the law has not provided adequate backing for stimulating local activities. The published directives... are far from reflecting the Work Environment Act's initial ambitions. The National Agency of Work Environment is much too defensive in its activity of defining the exact content of the law " (2).

(1) Arbetsmiljö nr. 9/1981; prop. 1981/82, Annex 4, p.77.

(2) TCO, Förslag till handlingsprogram för TCO 1983-85, Kongresstryck nr.15, 1982.

Both LO and TCO demand that ASS puts forward directives relative to minimum conditions for work content, human contact and work influence. The aim of these directives is to promote technical change in working life. On this point, LO and ASS seem to agree with each other (1).

One has to remark that the massive amount of training and education in connection to work environment matters that has been taking place, remains definitely the most crucial factor for the implementation of the principles of the Work Environment Act. One estimates that more than 350 000 persons have received such a training. These training programmes have been running since 1974 and concern security shop stewards as well as foremen. Training is provided during normal working hours and is financed by the employer. As regards the content of the courses, it is subject to negotiation between employer and employee organizations. The duration of a normal training period is of 20 to 40 hours.

Training issues are of course extensively debated in the above mentioned document of TCO. Some of its points , especially those dealing with the necessity of securing a high level of knowledge on work environment issues among employers, are especially worth recalling:

> " Although employers bear principally the responsability of the work environment, they often lack sufficient knowledge about work environment issues, in order to assume their responsability totally. These deficiencies explain why work environment elements are not always given sufficient attention to,in case of changes occuring in the workplace " (2).

TCO stresses here the urgent need for a stronger engagement in the education of employers and management on work environment topics in the future.

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(1) Prop. 1981/82:123, Annex 4,p.38ff.

(2) TCO, op.cit.

Apart from the Work Environment Act, the Co-determination Act had to conduce also to the improvement of the work environment. It appears though that the Work Environment Act regulating both physical and mental elements is "totally embodied in the Co-determination Act" (1). The major points of this law will be outlined below.

In section 11 of the Act, we read:
"Before the employer takes a decision concerning an important change in the activities of his firm, he should on his own initiative negotiate with the union to which he is bound by a collective agreement. The same should be done, if the employer decides upon a major change in work or employment conditions to which the employees of his organization are subject to".

The law does not specify at which stage of the decision process this negotiation should be engaged, but in the motives of the law it was stressed that negotiations should start "early, in the planning phase".

According to section 12, the union can at any point ask the employer to open negotiations :
"When the relevant union demands it, the employer shall even in other situations than those which have been pointed out above, negotiate with the union, before taking decisions that effect members of the organization".

There exists thus an obligation for the employer to negotiate, but no corresponding obligation to reach an agreement. Only for very specific matters, is the agreement with the relevant union organization, a pre-condition for any decision-making. This is the case under certain conditions for subcontracting of work and interim

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(1) Prop. 1981/82: 123, Annex 4.

work (section 38) on which the union has a veto right, if the decision of the employer goes against "what is generally acceptable according to the collective agreement".

One of the most elaborate part of the law on co-determination, concerns the employer's obligation to inform the union "on the evolution of the production and of the economic situation of his firm (...) and about the guidelines of his personnel policy"; it foresees also a union right to consult "books, accounts and other documents relating to the employer's business, as far as it shows necessary for the union, so that the latter can take care, in front of the employer, of their members interests" (section 19).

This law embodied without any doubt tremendous expectations in so far as it incarnated many of the unions' claims for a greater say on all levels of the organization. This explains why the numerous critics which grew out of the following years of experience with the law, became very fierce. In fact a report from the Swedish Center for Working Life (Arbetslivscentrum) describes the dynamics of the actual functioning of the co-determination law after three years of experiences:

"If management disposes of sufficient time before the introduction of a change, then negotiations can be carried out on local and central level, following the prescribed procedures, and management has then the possibility to take unilateral actions.

If, on the contrary, management is short of time, then the unions can successfully threaten to have recourse to the right of a prolongated phase of negotiations , which the Co-determination Act recognizes them, and by that, provoke the opposing party's compliance" (1).

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(1) Arbetslivscentrum, Tre år med MBL, Liber Forlag, Stockholm, 1980.

Two standpoints have been confronted in the preparatory phase of the Co-determination Act. Employer organizations have insisted on the desirability of employees' individual participation in daily work - referring to the numerous experiments with autonomous work groups in Swedish industry, and not least to the celebrated report of SAF, the Swedish Confederation of Employers, "New Factories", in which alternative work organizations were presented. The latter were supposed to satisfy four principles: "small social systems' co-ordinated autonomy, a stable production, an attractive work task and a good production milieu" (1). The union confederation on the other hand, expressed the viewpoint that the participation of individual workers should only exist, if it is built upon a coherent participatory system involving all levels of the organization and co-ordinated by the unions (2).

The specific regulations of these questions were, according to the law, supposed to be set up by collective co-determination agreements on central as well as local level (section 32). Agreements which are considered by the law of such an importance for the functioning of co-determination in the firm, that the traditional "obligation of industrial peace" during the duration of general agreements has been suspended. It is thus possible to strike or to lock-out if the negotiations are in a dead-lock or in front of the refusal to negotiate on co-determination issues: the so called "residual right to launch industrial actions".

The unions called first for the opening of central negotiations in the Public sector (State, municipalities),

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(1) SAF, Nya fabriker, Stockholm, 1978.

(2) Arbetslivcentrum, op.cit.

in banking, in public entreprises, in cooperatives and in the insurance sector.In all these sectors,agreements were effectively reached at a rather early stage. After a tiresome five-year-period of difficult negotiations, a central agreement was finally signed in the private sector, i.e.the Development Agreement, in April 1982, between LO, SAF and PKT (The Federation of White-Collar Employees in the Private Sector) (Privattjänstemannerkartellen).

This Development Agreement (Udvecklingsavtal) begins with a definition of mutually agreed principles relating to the objectives of a co-determinated development of firms, which read as follows:

- high efficiency at all levels and in all departments of the organization; this represents the basis for competitivity, job-security and employment.
- work and the work environment should be designed in accordance with a good definition of the work environment (provided by laws and agreements)
- the organization of work as well as the task of the single employee should as far as possible be designed in order to offer an engaging and stimulating work situation
- equality between men and women is ... an important aim (section 2.1)

The development areas leading to the achievement of these aims are enumerated in the agreement; these are: "the development of the organization of work", "technical development" and "the economic and other ressource related issues of the firm". The employer and the relevant union organization should - if they wish so - negotiate the principles of this development activity. On this basis, and by means of 'decentralization' and 'delegation', should "the influence and responsability of employees be increased" (section 2.2; 3.3). Conditions should be set up, so that employees have the opportunity to participate in the de-

sign of their own work situation and in the development activity which affects their tasks. Employees should also be stimulated to take part in problem-solving, especially in domains such as "efficiency, restructuration, planning, work organization, technical development and energy consumption" (section 3.5).

This constitutes clearly a compromise between LO and SAF on the respective roles of the union and the individual worker in a co-determination system. Further, when it comes to the question to know if "one single form of co-determination" (LO) or "different forms of co-determination corresponding to the specific contingencies of the single firm" (SAF), should be given the preference, one has to remark that a compromise has likewise been reached. In fact, the development agreement mentions that local agreements have the choice between three alternative co-determination systems:

- negotiations between the firm and the union organization
- union representatives taking part in decision-making at the various levels of the line-organization within the firm (line negotiation, line information)
- the forming of a co-operation and information committee with representatives from both sides (section 8.1).

With regard to co-determination on the issue of technological development, let us quote section 4 which follows a number of preliminary statements on the mutual agreement of the parties about the necessity of technical development and the general benefits the latter induces:

" 2. In case of technical change, shall one intend to create a good work content as well as possibilities for employees to increase their competence and responsability at work. The employees' knowledge should be taken into account and the opportunities for co-operation and contact among work colleagues should be multiplied.

3. Union organizations shall participate in areas where important technical changes, involving major consequences for employees, are planned (..)

The employer shall give an account of the diagnostic which has rendered the new technique topical; he shall give an account of the technical, environmental, economic consequences as well as of the repercusssions on employment; he should make eventual suggestions for the forming of project-groups.

4. It is important that employees are given the possibilities to develop further their professional skills. As early as possible, should the firm provide for training as to the new working task which has been shaped by technical development. Such an education has to be paid by the firm and should not modify present employment and salary conditions (section 4.2 - 4.4)".

It ought to be added that the development agreement provides the unions with the right to 5 hours working time (per year)(and these hours are paid) in order to hold meetings within the workplace for discussing about the firm's problems (section 10). Moreover, the local union can obtain the help of internal experts or call for external experts in case of planned changes which entail essential consequences for the economic situation of the firm or the employment situation (section 12.2).

Concerning now technology agreements, only a few have been signed. Yet, they do exist in the private as well as in the public sector: for example the Union of Journalists and Printers has reached such an agreement with the employer organization; another agreement has been signed at the state owned firm, Televerket; another one at the state department for salaries and pension etc.

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The Norvegian Data-Agreement between The Norvegian Confederation of Trade-Unions (LO) (Landsorganisajonen i Norge) and The Norvegian Employer Confederation (NAF) was signed in April 1975. The knowledge relative to its content has been widely distributed. We shall here outline the major points of the revised version of the agreement which dates from 1978.

The Agreement covers issues dealing with "the development, introduction and use of computer-based systems (...) affecting employees and their working conditions, as well as systems for data storage and for the use of personal data" (preambule).

The Agreement states the following points:

- employees through their unions have the right to get all relevant information about systems which may affect their interests. The information should be given sufficiently early to allow the unions to exercise a real influence upon the decisions made, and given in a language understandable to non-specialists. Systems descriptions also shall include information about the

effect upon the interests of the employees.

- employees and their unions have the right to participate in the system development.

- unions may elect an additional shop steward ("data steward") with systems as his special field of responsability. He has the right to get a proper education for his job.

-the agreement may be supplemented by another agreement on the rules for collecting, using and protecting information about individual persons ("person data")"(1).

This Technology Agreement has been followed by a substantial number of local agreements (over 700), as well as by central agreements in the public sector, banking and insurances - all sectors which are not covered by NAF. A similar agreement has been signed by LO and NAF in november 1981 covering technological change and data systems.
Directly or indirectly, the Technology Agreement together with the Work Environment Act deals with the use of data technics, its physical and mental effects on the work environment, and the field of co-determination.

The Work Environment Act of Norway has adopted a work environment concept which includes physical, psychological and sociological aspects. It applies to all enterprises that engage employees (with the exception of the maritime and aeronautical sectors, and the agricultural sector which is covered by a special law). The general demand of the Work Environment Act is a "fully satisfactory work environment" : this should be achieved within a reasonable period of time by means of a

(1) K. Nygaard, "The 'Iron and Metal Project' : Trade Union Participation, in A.Sandberg, Computers Dividing Man and Work, Arbetslivcentrum, Stockholm, 1979.

"Work Environment Improvement Program " negotiated between employers and employees. According to the spirit of the law, the employer has to ensure the improvement of the work environment, but it is equally the duty of the employees "to take part in the creation of a sound and safe work environment" (section 16.1). Moreover, the employee's duty consists in "ceasing his work", if "he reckons that his work cannot continue without putting his life or his health into danger" (ibid).

Like in Denmark and Sweden, the Work Environment Act of Norway has prescribed the creation of a formal work environment organization. Firms with more than 5 employees are obliged to elect safety delegates; firms with 50 employees or more have to form work environment committees, and similar obligations apply to firms with more than 20 employees, if one of the parties demands it. The committee counts an equal number of employees' and management's representatives, its chairman being elected on a rotating basis. The law also provides for the appointment of a security manager, a function which has been introduced for the moment mainly in medium sized and larger firms (1).

Section 12 of the law containing prescriptions for the planning of work, has been paid special attention. It stresses, as a general requirement, that "technology, organization of work, working hours and wage systems" shall be set up in such a way

-that employees are not exposed to undesirable physical and mental strain

-that the possibilities for displaying caution and observing safety measures are not impaired.

Another general requirement is, that employees should be secured "reasonable opportunities for professional and personal development in their work". The sub-sections relative to the "arrangement of work" need to be quoted at this stage:

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(1) B.Gustavsen and G.Hunnius, New Patterns of Work Reform, The Case of Norway, Universitetsforlaget, Oslo, 1981.

" (...)

Arrangement of work

The individual employee's opportunity for self-determination and professional responsability shall be taken into consideration when planning and arranging the work. Effort shall be made to avoid undiversified, repetitive work and work that is governed by machine or assembly line in such a manner that the employees themselves are prevented from varying the speed of the work. Otherwise efforts shall be made to arrange the work so as to provide possibilities for variation and contact with others for connection beween individual job assignments, and for employees to keep themselves informed about production requirements and results.

Control and planning systems

The employees and their elected union representatives shall be kept informed about the systems employed for planning and effecting the work, and about planned changes in such systems. They shall be given the training necessary to enable them to learn these systems, and they shall take part in planning them.

Work involving safety hazards

a)performance premium wage systems shall not be employed for work where this may materially affect safety.
(...) ".

In April 1981, The Norvegian Work Inspection (Arbeidstilsynet) put forward a proposal on how to organize jobs at visual display screens, enriching thus section 12 of the law with rules about the use of this type of technology. The proposal embodied a number of rather classical ergonomic norms, but contained also a more controversial part involving work time and work organization. It was stated that if his work consisted in data registering " the employer should spend only 50% of the working time

at the terminal...and only over periods of 2 hours interrupted by a short pause". Because they entailed precise proposals on working time, they have been subject to a vast debate questioning the status of such rules. The public employers and the employee organizations would like to obtain directives, whereas the employer organization gives its preference to recommendations. The Norvegian Work Inspection should settle the issue in August 1982 (1).

As it was the case in relationship to the Danish and Swedish Work Environment Acts,tremendous expectations were vested in the law. But also in Norway did the law generate sharp criticism.

The Norvegian Work Environment Act has experienced a long "initial phase of hesitation and confusion" (2). Bjørn Gustavson who was one of the fathers of the law has written the following statements as to its implementation:

> "The application of the Act ... remains at a embryonic stage in Norvegian working life and it is not certain that the reform will mature so as to become a broad and systematic pattern for a new reform praxis encompassing all Norvegian workplaces. the fate of the work environment reform is bound to the broader development of Norvegian society" (3).

These words were written in 1980. It seems that the law has inspired more optimism since. In fact, a report from the Ministry of Labour conjectures that with a decrease in absenteism,less leaves due to sickness, early retirement, induced by the bettering of the work environment, Norway can suspect to save between 1 and 2,5 milliards Dollars until the end of this century.

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(1) Arbetsmiljö, nr.9, 1981.

(2) B. Gustavsen, G.Hunnius, op.cit., p.172 ; Pas På, nr.9, 1981.

(3) op.cit. p.173.

Recent research projects and experiences in the field of information technology in Scandinavia

In Scandinavian countries union organizations are, directly or indirectly, involved in most governmental schemes for the promotion of R & D, in the preparation of ministerial reports as well as in the writing up of specific laws. In Norway, Sweden and Denmark, the Work Environment Acts are all passed on the basis of the viewpoints expressed by the parties on the labour market. Moreover, unions are also in general present in scientific boards which finance research projects. In the latest years, union organizations have themselves submitted applications in order to obtain financial support for research projects which are defined according to "union specific interests". This type of research was developed in Norway at the beginning of the seventies. The Norvegian Union of Iron and Metal Workers concluded during its Congress of 1970 that there was a strong need for trade-unions to start up their own research. Therefore they presented a research project in front of The Royal Norvegian Council for Scientific and Industrial Research; financial support was asked for studying "planning, control and data processing systems from the point of view of workers" (1). Although it was contested and designated as being a "political demonstration", this project - the so-called "Iron and Metal Project" - was given public funds. The study was completed in 1973. The research method which had been adopted, has since then incarnated an ideal-type for similar projects in Sweden and Denmark.

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(1) K. Nygaard, op.cit., p.95f.

The research project, 'Democratic Planning and Control in Working Life' (DEMOS), carried out in the years 1975-1979 by a group of researchers of The Swedish Center for Working Life was inspired by the Norvegian Iron and Metal Project (1). The aim of the project was to build up knowledge and gather experiences about the unions' possibilities to influence the planning and the use of new technology on a firm level: a study which was carried out in co-operation with local unions. The selected method rested upon the principles "that trade-unions themselves, through the use of investigative groups, make inquiries into the conditions of their own enterprises . The research workers take part in the investigative groups as resource persons". The intention is thus "to build up knowledge within the investigative groups - a knowledge which elucidates and widens the possibilities for action"(2). Four firms were included in the project. An evaluation, initiated later on by the Swedish LO and TCO, put the DEMOS project forward as one of the most relevant and advantageous projects for the unions. Such "action research" has since then been applied to numerous research projects in Sweden(3).

However, the fact that the "Development Agreement" (see above) writes about " a necessary differentiation between the role of the researcher and the role of the decision-makers in the firm" and further points out that the function of researchers is "to follow, describe, analyse and conclude (...)"(section 13 annotation), can represent a threat for the future of action research in Sweden.

In Denmark too were the experiences of the Norvegian Iron and Metal Project taken up. The newly formed Danish Trade-Union Research Council (Fagbevægelsens Forskningsråd)(1975), decided to initiate research in the field of data processing: as a result, the project Democracy, development and

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(1) P.Ehn, Å.Sandberg, "Local union influence on technology and work organization: some results from the DEMOS project",mimeo, Arbetslivcentrum, 1982; P.Ehn, A.Sandberg, Företagsstyrning och Löntagermakt, Prisma, Stockholm, 1982.

(2) Å.Sandberg, op.cit., p.111.

(3) J.Stange, O.Ivarsson, Forskning för demokrati, ASF, Stockholm, 1982.

edp (DUE) was started up by a research group of the Computer Science Department at the University of Aarhus in co-operation with three unions within the Danish LO: The Federation of Commercial and Clerical Employees (Handels- og Kontorfunktionærernes Forbund, HK), The Danish Union of Metal Workers (Dansk Metalarbejderforbund), The Federation of Semi-Skilled Workers (Specialarbejderforbundet, SID) (1).

The project obtained financial support from the Danish Council of Technology. It first phase consisted of a survey on problems arising from the use of edp but exclusively problems considered as such by the employees and the local unions - in almost 100 private and public organizations. It was on the basis of an understanding of these problems that the second phase was carried out; it contained:

- a detailed investigation in three workplaces
- theoretically orientated studies on methods of planning and control of system development
- educational material .

As it was the case in the Iron and Metal Project in Norway and the DEMOS Project in Sweden, probably the most important part of the DUE Project - as to time used and research results - was the co-operative development between local unionists and researchers of a greater understanding of employees' possibilities of influencing their working conditions. The adopted method has been summarized as follows:

- the research project is interest founded
- the project has a democratic research project as an ideal
- the project is action orientated

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(1) The DUE Project Group, "Project DUE: Democracy, Development and EDP" in A. Sandberg, op. cit.
M.Kyng, L.Mathiassen,"Systems developments and trade union activity", Aarhus University, Computer Science Department, June 1980.

As regards the results of such action research projects, it is of course possible to point out series of publications, mostly under the form of training material for trade-unions (1). But in general results of "action research" must be understood in terms of "actions carried out by the union ,centrally or locally, as a part of, or initiated by the project" (2). This accentuation of the action element in research has been subject to many discussions. The Swedish Center for Working Life which was actually formed in order "to engage itself in social life", has in the last years been actively involved in the debate about the development of this sort of research practice (3). Especially in relationship to research on information technology, has the endeavour to establish links between "theoretical research" and the search for "union alternatives" shown itself clearly at the Center (4).

A major problem in all Scandinavian countries is the financing of projects which are union interest orientated. In Sweden, the government allocated 5 mill.SKr per year for the budget years 1979-81 to trade-unions in order "to give them genuine possibilities of intervening in the process of research planning at an earlier stage than when the question is only about giving priorities to projects put forward by researchers". In 1981, the Swedish government decided that this type of allocations "should not become permanent": "if unions wish such research initiatives to become part of their function, they should finance it themselves" (5). As a result, no financial resources for union research activities shall be attributed by the budget 1981/82.

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(1) i.e. from the DUE project, Klubarbejde og EDB, DUE-report nr.4, 1981.
(2) K. Nygaard, op.cit., p.98.
(3) Arbetslivcentrum, Verksamheten 1980-81, Plan för verksamheten 1981-83, Stockholm, 1982.
(4) A.Sandberg (ed), Forskning for förändring - om metoder och förutsättningar för handlingsinriktad forskning i arbetslivet, Arbetslivcentrum, Stockholm, 1981.
(5) Regeringens proposition, Om Forskning m.m., Prop.1981/82:106, Stockholm, 1982, p. 195; J.Stange , op.cit., Annex 4.

In Denmark the controversy as to one-party research has been clearly related to the debate on assessment of new technology. The Trade-Union Research Council has, since its formation in 1975, pleaded for the public financing of such projects. And the Council has thus recommended projects mainly in the area of work environment (11 out of 25 finished or ongoing studies), but also studies on consequences of new technology and workers' influence in firms (8 projects) (1).

In 1980, The Council of Technology published (as mentioned above) a report, "Technology Assessment in Denmark". One of the reasons of its controversial nature, was its use and acceptance of the concept "one-party-technology assessment" and the claim that production technology should be included among assessment relevant areas. Both employee and employer organizations were represented in the committee preparing the report. After its publication, the employer organization strongly opposed its recommendations. We do not intend here to present the proposals for the formal organization of technology assessment in Denmark - no decision has been fostered on the basis of the report's recommendations - but we wish to stress that the latter represents the first formal acceptance of one-party-research. The Council drew the consequences from the report and launched a number of technology assessment projects, some of them being one-party projects:

- "Microelectronics, employment and the balance of payment" (MIKE project) which is carried out at the Institute of Production, Aalborg University Center (1980-83)
  In an introductory phase of the project, international research in the field has been collected and analysed. The core of the project aims at describing "how various forms of microelectronics application can be expected to affect employment and the balance of payment of Denmark (...), and in the prolongation of this, points at major development trends in the Danish economy"(2).

(1)Fagbevægelsens forskningsråd, Fagbevægelsen og forskningen, LO, 1979; H.Tjørnehøj, Forskningsplaner, Fagbevægelsen Forskningsråd, mimeo.

(2)A.Brændgaard,B.Lundvall, Mikroelektronikken, beskæftigelsen og betalingsbalancen, Inst. of production, Aalborg Universitycenter, 1981.

- "Technology Assessment in the Computarized Daily Recording in the Public Administration"
  which is carried out in the Information System Research Group (IFA), Copenhagen School of Economics and Social Sciences (1981-83).
  It applies the action research method in a co-operative activity involving 5 public institutions (which have introduced a new computerized daily recording system). The Civil Service Department and the union organizations (The Central Organization of Salaried Employees and Civil Servants (FTF), and the Federation of Employees in Commerces and Offices (HK)) participate in the project. One of its objectives is to study the present conditions for building up a practice in institutions, which would render possible a continuous assesement of new technology, and points out which technologies one wishes to implement in institutions (1).

- "A project on changes in decision processes and influence structures due to the application of information technology
  carried out by the firm Jens Bisballe Planning; this study is part of the FAST project of the EEC.

- "Education, Technique and Product in a Work Quality Perspective (UTOPIA)
  It is a Nordic research project on organized labour development of (and training in) computer technology - particularly as regards text and image processing in the graphic industry (1981-85).
  The Danish part of this Nordic co-operation project is carried out by the Computer Science Department, University of Aarhus and constitutes a direct prolongation of the DUE Project.
  The other Scandinavian research groups are at the Swedish Center for Working Life (prolongation of the DEMOS

(1) H.Clausen et als., Teknologivurdering af EDB-Journalisering i statsadministrationen ?, Information Systems Research Group, Copenhagen School of Economics and Social Sciences, 1981.

project) and at the Department of Numerical Analysis and Computing Science, Institute of Technology in Stockholm. A Norvegian team is about to be formed.
The project is led in co-operation with the various unions of graphic workers in Denmark, Sweden and Norway and its essential aim is to develop alternative work procedures, systems for text and picture processing, programmes for the unions (1).

- "Development of Production Technology and of Workplaces in the Metal Industry (PUMA) (1981-84)
A project at the Institute of Production Techniques, Technical University, carried out with the Union of Semi-Skilled Workers (SID).
It intends primarily to analyse the future technological development in the Iron and Metal Industry and to produce information material to unions.(2).

- "Telecommunication, electronic text processing, electronic data processsing and organization - a technology-assessment (TEEO)
This project is conducted by a research team in co-operation with the National Agency of Telecommunications (Telestyrelsen) (1981-85).
It investigates possible development trends for information technology in private and public administration. It aims also at evaluating the prospects for a geographical as well as managerial decentralization on the basis of the application of this technology.(3).

These studies count among the major ones which have been initiated within the field of information technology and its social consequences. However, other institutions allow funds to this field of research.

(1) The Utopia Project, On training, technology and products, Viewed from the quality of work perspective, Arbetslivcentrum, 1982; Rapport fra Utopia-Projektet, n.1, Utbildning, teknik och produkt i arbetskvalitetsperspektiv, Arbetslivcentrum, 1981.

(2) Fagbladet, nr.7, 10 April 1982

(3) LTP-Tele, April 1982, Kvartalsredegørelse, 4/81 + 1/82.

In 1979, The Social Science Research Council (Statens Samfundsvidenskabelige Forskingsråd) set up a research seminar,organized by Prof. Torben Agersnap (Institute of Cross-Disciplinary Studies) at the Copenhagen School of Economics and Social Sciences, on the theme "Technology and Society". About 60 ongoing (or planned) projects were represented (1). The Social Science Research Council has since advanced the subject of "Technology and its consequences" as one among the priority research areas.

Also The Danish Council of Research Planning (Planlægnigsrådet) has designated technology as a major investigation field. This Council, in which all research councils are represented, has brought financial support to a study on The Strategies of National European Unions confronted to the Social Consequences of New Technology. Its purpose aims at developing technology assessment methods which take into account the specific "contingencies" of a "co-determined technological development" (such as the Scandinavian model for the use of information technology stipulates it) (see above). This research project is carried out at the Institute of Organization of Work and Sociology , Copenhagen School of Economics (1981-84) (2).

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A strong "technological awareness" has obviously developed in Scandinavia and the demand of an alternative to the "laissez-faire technology" has been expressed by unions, political parties and by the still more present "social movements". The non-existence of nuclear-power-stations in Denmark and the "no" from the Swedish referendum on a fu -

(1) SSF, Teknologi og Samfund, Center for tværfaglige studier, School of Economics and Social Sciences, 1980.

(2) A.Hingel, "Fagbevægelsen i Europa overfor ny teknology: oplæg til forskningsprojekt, The council of research planning, Copenhagen, 1980; A.Hingel, Tysk fagbevægelse og ny teknologi, Institute of organization and work sociology, Copenhagen School of Economics and Social Sciences, 1982.

ture extension on nuclear power are clear signs of such a development. Further, this "technological awareness" is constantly maintained and enriched by the numerous Scandinavian and international studies on the effects of technological development on employment, qualifications and work environment. In general, the results of these studies, are widely diffused.

This whole social development is reflected in the choice of the research objects, research methods as well as of the research partners. One observes a certain tendency to complement the more traditional studies on consequences of new technology, with studies taking into account "newer" consequence areas such as democracy, personal integrity, cultural values, inequalities , living conditions for the disabled etc. There exists thus within research, a definite inclination to present alternatives to the development of the "laissez-faire" technology. There is a clear impulse for searching a "Scandinavian model" as regards the future information society. The majority of earlier mentioned projects entailed such alternatives, in so far as they were orientated towards a co-operative development of new forms of work organizations and system developments, or new types of technology. Other research projects and experiences can briefly be mentioned :

- A study on information needs among citizens suffering from a lack of information and resources, has been undertaken in connection with a project at the Agency of Telecommunication on " a policy orientated technology assessment of new electronic medias in mass and long distance communication in the 80's". One of the aims of this study was to investigate the positive and negative effects of new electronic medias, like the tele-data system, on the situation of economically and socially deprived people. Broadly speaking, one of the conclusions showed that there was a greater need for direct social contact than for new medias. It stated that:

"if one wishes to improve the situation of deprived citizens, there will hardly be a need for new electronic medias, anyway not on a short term basis. Even if new medias are perceived according to consumers' interests, it will only be as an element in a long term strategy which the deprived citizens will be part of and which will improve their situation" (1).

In the same way as Sweden,Finland and many other European countries, Denmark has started up experiments on tele-data, on a limited scale (1982) . The results from these experiences are not available yet.

- Experiments with "computer resource centers" -so called neighbourhood centers (grannskapscentraler)- have been initiated in Sweden. Two of them exist already in Gällivade and in the suburb of Stockholm (Nykvarn); another is about to be realized in Kiruna (2). These centers lodge a certain number of workers (40-50) and "provide them with office facilities and terminal connections linked up with the organization in which they are employed". The center offers thus an intermediary situation which lies between terminal work at home and work far from home, near the employer. These centers are also an innovative element in the governmental schemes for promoting employment in highly depressed regions. This type of "collective solutions" could be part of a strategy aiming at creating "an infrastructure of local information environments, so that work, family life and community life can be better combined and integrated in the future" (3).

- A number of development-projects for new technology which satisfy demands for better working conditions have been carried out in Sweden, mostly under the form of a collabo-

(1) LTP-tele, op.cit.

(2) Datateknik, nr.3, 1982; prop. 81/82: 123, op.cit.,Annex 1,p.37.

(3) B.Hedberg, M.Mehlmann, "Computer power to the people: Computer resource centers or home terminals ? Two scenarios", Arbetslivcentrum, Stockholm, 1981.

tion between unions and industry. The Central Organization of Salaried Employees (TCO) has for example launched a study which deals with union orientated technological development in office-work. TCO strives thus to develop a new type of visual display screen which should be competitive on the international market, but which also eliminates the ergonomic problems which can be found with this sort of work (1).

- Another technological development project in Sweden is the "DASIS-project", where users, producers and buyers are gathering their efforts in order to build up a data-system for the treatment of case-records in hospitals (2).

- In the project "Office 85", the intention was to integrate text processing equipment, computer terminals and telex terminals into one single technical unit. Behind the project was the conception of an "automized office", an office where the paper-flow is replaced by a data-flow. It started in 1976 and included Televerket, Volvo, Asea and Scandia. Products from Philips and Rank Xeros were used. But the experience has shown rather negative. The employees working with the system within the four firms complained about the following points: monotony at work, no deeper insight in the work process, an increasing job specialization, the lack of possibilities for co-operation between employees etc.(3). One of the outcomes of the experiment was the employees' (and unions') claim for a flexible system of office automation and the refusal of "global solutions". The Swedish firm Ericson Information System A/B is presently setting up an information system which should satisfy such demands of the home-market (4).

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(1) TCO-Tidningen, vol.35, nr.14, 1981.
(2) Metalarbetaren, nr.47, 1981
(3) Arbetsmiljö, nr.9, 1981
(4) Data, nr.4, 1982.

Extracts from the Principles and Directives for a "co-ordinated data-policy" (The Swedish Delegation for Data Questions: The Data Delegation)
(Regeringens Proposition, 1982, Samordnad datapolitik, Prop. 1981/82: 123, annex 1 p. 16-30)

PERSONAL INTEGRITY

1. The protection of the personal integrity in connection with data processing of information on individuals has to be preserved.

INTEGRITY AT THE WORKPLACE

2. The protection of the integrity of the employees at the workplace requires special attention. Measuring of work-performance by the use of data systems should not take place without the approval of the involved personnel and union organization.

THE CONTROL OF THE BODY OF DATA

3. The requirement and possibility of a long term regulation and intervention should be subject to investigation, so that it is possible to control or to limit the increase of the data registered body of information.

DISCLOSURE OF INFORMATION AND DATA SYSTEMS

4. Data systems in public services shall in the future be developed consistantly, so that they take into account the requirements of disclosure rules which secure public access to public activities stored in the data medium. Already existing data systems shall also fulfil the requirements of this law.

INFORMATION TO THE FELLOW CITIZENS

5. Public data systems which are used to provide the fellow citizens with information in various fields should be conceived so that the receiver obtains impartial, correct, necessary and understandable information. The information should reach the receiver when the need for it exists.

5. (cont.)
The public should be able to use the data system so that various groups of receivers get adjusted and understandable information. Special attention should be paid to the fact that many people have difficulties in reading and coping with bureaucratic language.

THE RIGHT TO EVALUATE TECHNIQUES

6. All citizens should have the right to information and knowledge about the risks and opportunities of the information society. Thereby many people will have the possibility of taking part in the assessment of data technique in present (or future) use.

THE POLITICAL DECISION PROCESS

7. The data technique should be used in order to increase the citizens' understanding of the political decision process and thereby improve their possibilty for partipation.

EQUALITY

8. The data technique should be used in such a way that equality between women and men is encouraged at work, at home and in society in general. (...)

HANDICAPPED

9. The data technique should be used in such a way that their disponibilities to work as well as the societal services offered to them are bettered.

PAYMENT SYSTEM

10. New techniques should, within the service sector, not be used in such a way that essential consumer interests or integrity are neglected.

11. Economic, social and other societal consequences should be examined before an electronic payment system is introduced on a large scale.

NEW MEDIAS

12. New medias based on data techniques should be conceived in such a way that they promote a shared community feeling.

13. New medias should be used in order to improve the access and plurality of information for large groups.

14. (...)

15. (...)

16. (...)

17. (...)

DATA TECHNIQUE / A SUPPORTING TECHNIQUE

18. In firms and public services the data technique should be used as a supporting technique for employees in the realization of their tasks. These employees should be given special training about data systems. Further, one should aim at a situation where they have the responsability of the development and the use of the data system which they utilize.

INNOVATION CAPACITY OF ORGANIZATIONS

19. The data system should be conceived in such a way, that it concretely, on the short and long term basis, supports the innovation capacity, the development of competence and the capacity of change in the organization.

SECURITY AND VULNERABILITY

20. (...) At the generation shift of computers and data systems, one should envisage less vulnerable solutions, often decentralized, which are, under certain conditions, brought about by technical development.

21. A firm or a public service should conceive its data system and organize its functioning so that it does not generate strong dependence relationships on certain key-persons, within or outside the organization, as concerns the development and the use of the system.

SMALL AND MEDIUM SIZED FIRMS

22. The society should continue to stimulate small and medium sized firms to use data techniques adequately. Knowledge about the use, efficiency and consequences regarding data techniques should be diffused to them.

WORK CONTENT AND WORK ENVIRONMENT

23. (...) The data system should be conceived so that the users won't be subject to physical or mental inconveniences caused by deficiencies in the work environment e.g. for example in connection to work at display screens.

24. (...) As regards work satisfaction, it is in general positive that the employee can:
- perceive the relevance of his (or her) personal contribution to the product and the importance of the task for the total organizational activity
- vary methods and pace of work
- influence the sequence of work steps
- influence the amount of work and the moment for its execution
- influence the quality of ones own work
- control the results of ones own work.

(...)

DEVELOPMENT OF COMPETENCE, INFLUENCE AND CO-DETERMINATION

25. (...) The data system should be conceived so that it stimulates the users to learn stepwise and to develop at work.

26. The users of data systems should be offered an education by the employer before the starting up of the system development or in connection with early phases of this development. The education should strive to provide the users with the possibility to exert influence by understanding the consequences of the change, by taking part in the development activity, by evaluating the suggested changes and later on by working more efficiently with the use of the forthcoming system.

27. Users influence on data systems

Users should have a genuine influence on the development and use of data systems.
If the question is the development of a large scale data system which includes large groups of users..., one should try to split the data system into smaller independent parts (subsystems) which more limited groups of users are able to influence...

28. Co-determination

The personnel affected by a data system and its union organizations in a firm or institution should have co-determination rights on issues related to the development and use of data systems...

DEVELOPMENT AND INTRODUCTION OF DATA-SYSTEMS

29. The knowledge base of data technicians

Data technicians should possess knowledge on data technical questions as well as on questions on usage and consequences (...).

30. Co-operation between data technicians and users

(...) It should be strived for that a (...) project organization of users gets the responsability of the development project while data technicians execute the work according to the users' instructions. Work methods and work techniques should be selected (or developed) in such a way that it permits the users themselves to execute an increasing part of the system development, whereas the data technician should to a greater extent fulfil the functions of a method-expert, an adviser and take care of the more complex parts of the system development..

31. The separation of development and introduction into stages

In order to increase the influence of users over the development of data systems and the possibilities of decision

makers to influence and control the development as to economics and time, one should decide to promote and introduce a system in several stages, where each stage represents a limited ambition of change...

32. Decisions on investments in data systems

In order to facilitate the choice related to an investment decision, the following requirements are demanded:

- the various participants in the system investment have to be given the possibilities of specifying their demands (...)
- the system investment should involve a number of successive decisions
- the evaluations of how various aims are reached have to be presented in connection to the decisions (...)

THE DATA - AND ELECTRONIC INDUSTRY

33. Its is important to develop a strong and vigorous Swedish electronic industry in order:

- to set the ground for the independence of Sweden
- to better the possibilities of access to products and services adapted to Swedish conditions for technology using firms and institutions
- to increase the transfer of knowledge from the electronic industry to technology-using firms and institutions.

SOCIETAL CONTROL

34. All information in registers ought not, as a general principle, to be used for other ends than the ones which it is presupposed to serve.

35. It ought to be possible to use information in the various registers with the aim of control i.e. in the fight against economic criminality in cases where this is considered to be an effective method. A decrease of personal integrity among broad groups of citizens should not be induced by this. (...)

36. The public ought beforehand to be given information on measures of control, on reasons and purposes of control and on sanctions in case of violations etc.

37. Considerations on the total amount of registered information ought to be taken into account in discussions related to the collecting of new information in registers.
A successive growth of the amount of registered information by a set of independent decisions can cause a negative impact on the personal integrity.

EMPLOYMENT

38. Changes in the labour market induced by an increasing use of information technology ought to be stimulated in the case where this can take place under socially acceptable conditions, and in the case where it contributes to a long term increase in employment in society.
The societal aim of full employment should therefore not be jeopardized in the long term by an increased use of information technology in industry and administration.

39. (...)

40. Broad schemes of personnel education ought to be undertaken by firms and public institutions in order to improve the conditions for the necessary change in working life due to the increasing use of information technology.

41. Employees ought not to be confronted with deteriorated working tasks as a result from the introduction and use of data systems.

REGIONAL DEVELOPMENT

42. Information technology and data communication systems ought to be utilized in such a way that they encourage regional development and offers an improved industrial viability and a broader supply of jobs to various regions.

43. The capacities of information technology and the knowledge ought to be spread out. This decentralization ought to

take such a form that it improves the content of work, users' influence, efficiency, and that it diminishes the vulnerability of the system.

DATA CRIMINALITY

44. Studies on data criminality ought to be carried out in order to elucidate possible consequences and needs for measures.

VULNERABILITY

45. The ongoing studies on the question of vulnerability must have the aim of restauring as much as possible the power of resistance against disorder which the society possessed before the introduction of information technology.

DATA TRANSFER ACROSS NATIONAL BOARDERS

46. (...) The need and desirability of different methods of supervision of data flow (across Swedish borders)ought to be evaluated...The aim should be to reach an international agreement in this field.

INFORMATION SOCIETY

47. A holistic view on information technology

In order to ensure the positive potentials of information technology for society and avoid problems of use and locked situations due to the technology, it is necessary that we - as far as possible - consider the technique in its totality, its use and consequences for human beings, organizations and society.

DEVELOPMENT OF INFORMATION SOCIETY

48. (...)

49. An intensification of studies on the consequences of a future information society ought to take place. It is important to fight in time against a development which

leads to an increased isolation in personal spheres, and to take care that social contacts are encouraged in the future information society.

RESEARCH AND DEVELOPMENT

50. Research as well as education in the field of information technology shall be characterized by a balance between aspects concerning the technique, its use and its consequences.

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