

THE INTERNAL INDUSTRIAL ENVIRONMENT

Analysis of the problems and trends in governmental action.

A Summary Report to the OECD

by

Jan Kronlund

Research Report No. 48



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1. Introduction: Scope of the report

The OECD Joint Working Party on the Internal Industrial Environment decided at its second meeting (9th - 11th May, 1973) to systematically gather more information concerning trends, problems, experiences and actions affecting the quality of working life. Information specifically centred around workers' motivation and satisfaction, the roles of governments and the social patterns, and orientation towards pertinent new social policies was desired.

On this basis, 12 member countries submitted national reports to the OECD: Australia, Belgium, Canada, Denmark, France, Germany, Netherlands, Spain, Sweden, Switzerland, Turkey and the United States. Member countries were not asked to initiate new research for this purpose but rather to try to discern trends from existing statistical data, problems reported by trade unions and employers' associations, research work undertaken by governmental agencies and universities, and the experiences of trade unions, employers and Ministries of Labour.

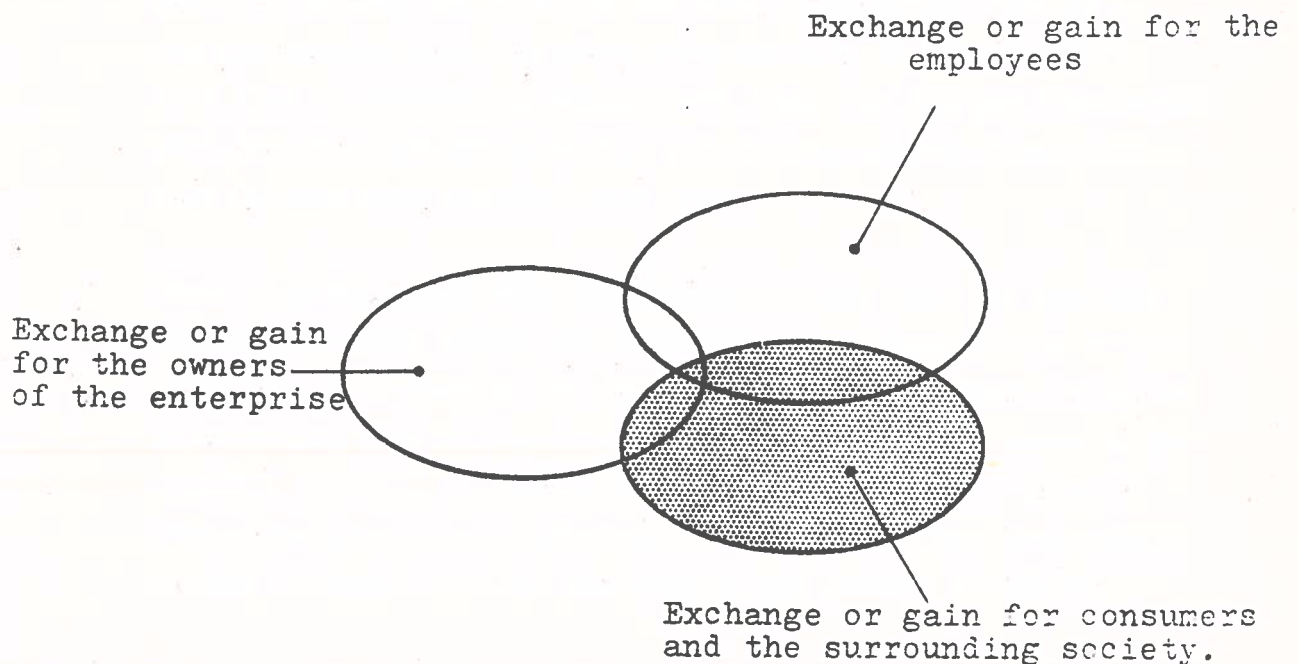
Attention was to be focused principally on factors adversely affecting the quality of working life and the role of governments in alleviating them (see memorandum on the second meeting of the Joint Working Party and Proposals for Further Action. (DIE/IND/74.19, MS/S/74.1)). In their responses, while the 12 countries report having some problems in common, they also reveal significant differences, largely because of variance in economic development and conditions.

Both the problems experienced in respect of the internal industrial environment and the quality of working life are largely dependent on the wider aspects of each society, its political system and aims and the way it deals with conflicts between social and economic goals. Different societies will have differ-

ent priorities regarding economic growth, price stability, full employment, equalitarian income distribution and equality in social and cultural opportunities. As long as societies are different there will necessarily be variation in the identification of problems; the analysis of their causes and the responses made to those problems. It is in this setting of variety that the country reports need to be interpreted.

It follows that any discussion of common traits in development and problems concerning the internal industrial environment must be made carefully. Problems may look much alike technically in reports of this kind, yet have very different political dimensions.

To a large extent this is true even within a particular country. As long as there are social partners with some interests in common, others in conflict at the workplace, governmental reports will very much reflect compromises of a more or less temporary character. Insofar as governments are regarded as representing an amalgam of social interests, reflecting the wishes of the majority of members of the society, they will express a sort of third standpoint. What has been suggested so far can be illustrated in this very simple way:



The figure tries to illustrate the fact that some changes in the working environment, the production process and the organisation of work represent a positive exchange for employers (the owners of the enterprise) as well as for employees and consumers (the surrounding society), while other changes may give positive exchange only to one of the social partners involved.

The amount of exchange common to the social partners is a function of the role played in society by the undertaking and the owners, as well as how the total benefit from production is distributed in society and the political environment of the enterprise.

The bigger the overlap between the three circles in the simple figure, the more common interests, common views on problems and thus "realism" can be expected in a governmental report. The amount of overlap is a question of political values and will thus shift over time as well as reflecting political changes.

It must be remembered that interests of different social origin may be settled in a compromise in such a way that, for example, a work environment reform will be overridden by organisational changes aimed at improving profitability. Investments in making machinery safe may be paid for by speeding up production, thereby possibly causing new problems and even introducing risks of a new and unknown kind. An often reported case is when physical work load is replaced by mental work load. The fatigue from mental work load has another character and follows another time-curve than fatigue from physical work load.

These arguments have been put forward to show that the problems behind the rather simple and straightforward formulations in this report are of a complex and varying character. Further, it should be mentioned that the variance in the amount of data given in the national reports, is considerable. The data varies in terms of comprehensiveness and depth from country to country. Some reports include in-depth critical analyses of the present situation,

trying to identify problems and establish their causes. Others merely present an overview of the present situation, without delving into basic problems. Some countries have incorporated many statistics concerning conditions such as accidents, absenteeism and turnover, while others provide statistics only on a single phenomenon, such as industrial disputes. Still others include no statistics at all. ¹⁾

¹⁾ This is not a criticism of the reports since the OECD outline for them left considerable freedom to respondents. Thus, for example, respondents were invited to include as much information and statistics on health and safety as they wished.

2. Some effects of, and factors underlying, economic growth.

The 1950s and 60s were economically good decades in pretty well all OECD-countries. Economic growth was rapid and the achievement of the welfare state appeared in sight and even within reach.

But it seems that a price had to be paid for this success, a price which has not been fully apparent until the last few years. Ecological problems like polluted air and water have multiplied as a function of industrial expansion. The production of "waste products" is another side of mass production, giving rise to consumer discontent and accordingly organisations to take care of consumer interests and exercise control over products. In connection with the internal industrial environment it is evident that there have been strong reactions during the last few years against bad working environments, fragmentation of tasks, creation of monotonous jobs, etc. Thus the problems presented in this report have a broader background; they reflect general economic and social problems as well as problems specific to the work place and industry.

First of all economic development during the last decades has meant a general increase in the number of people in the employment market. Participation rates have been rising (specifically reported from Canada and Sweden).

Rising participation rates may be good things in themselves but in combination with certain trends in the economy high participation may cause problems. The concentration of capital and production in industrial centres and bigger production units has led governments to formulate active manpower policies to make the work force more mobile. Such policies may include the education of the labour force to make it a better fit with the needs of industry. They may include economic support to people who have to move from economic peripheries in the countries to industrial centres.

At the same time there are structural changes going on in industry. Production has grown more capital intensive, the demand for labour shifting over time and industrial sector. The changing structure of industry has at least two sides: changes in geographical location and changes in demand for labour - in terms of numbers as well as skills. Structural unemployment has been a new and rising problem in many countries. In a situation with deep-rooted structural changes of the kind here referred to, the rising participation-rate will mean more problems with unemployment caused by these structural changes.

This is one example of the type of two-sidedness that is typical for the development: a phenomenon like rising participation rate is from one point of view a positive change but together with other trends it may accelerate problems at the same time.

Another example is the reaction during recent years towards job mobility programmes in some countries, like France, the Netherlands, Great Britain, etc. Strikes to keep the jobs, occupation of workplaces to keep a company or a production unit operative in the locality are forms of industrial action which may have broad social implications. In the French report they are interpreted this way: "The current strikes to preserve firms in economic difficulties and workers' refusal to change their place of residence mean that employment policy must be reviewed not only in terms of workers' mobility but also the mobility of the enterprise".

Thus one of the important factors behind the rapid economic growth - the concentration of capital and creation of bigger and more economically effective production units in industrial centres - has created problems of a relatively new kind. These problems cannot be solved by traditional employment policies. Other ways and means including the active control and mobility of capital and enterprises must be developed. Some countries, like Sweden, have already tried an active economic incentive policy to have enterprises to move from the economic and industrial centres of the country to the peripheries. Another way is to have more participation from

workers and trade unions in decision-making in the big companies. An example is the mergers code of 1971 in the Netherlands, drawn up by the Social and Economic Council. It states that before a merger is decided upon the management of the enterprise has to consult the trade unions concerned about the merger plan, especially about the social and economic consequences for the workers. Whatever the efficiency of the methods practiced is, it can be said that this trend comes out clearly from the national reports: many governments are eagerly concerned with creating active policies to control capital movements on the basis of social criteria.

Other examples of problems coming up are given from some countries on the effects of the creation of industrial centres, including ecological as well as social problems. Ecological problems may be attacked by legislation, supervising bodies, different kinds of selective, economic support, etc, as reported from Spain. The social and housing problems experienced in connection with the creation of residential quarters in the neighbourhood of industrial centres are more difficult to deal with. The rising number of foreign workers in many countries (at least until recently) gives rise for instance to different types of segregation in these areas. Problems of this kind then have been accentuated in countries with high immigration like Germany, the Netherlands and France.

Effects of the concentration of capital and production on the employment market and employment structure have been observed in most reporting countries. One example is movement between economic sectors. In earlier years a move from the primary sector (agriculture, forestry) to the secondary (industry) was observed. During recent years there has been a movement from both the primary and the secondary to the tertiary sector (services). This change - often called the creation of "the post-industrial society" - can be illustrated by the following figures from Canada: during the period 1961-1973 there was an 8 per cent rise in employment in the tertiary sector accompanied by a decrease in the primary and a stagnation in the secondary. In addition there was a shift from blue collar work to white collar work, the latter increasing from 38 per cent in 1961 to 46 per cent in 1971.

Employment in industry is stagnating or in some instances even diminishing. The main cause behind this trend is technological changes in industry, among other things leading towards a more capital-intensive and less labour-demanding production. Levinson¹⁾ has estimated that about 60 per cent of the investments in production in big companies are spent on the development of less labour-demanding techniques, while only 40 per cent is spent on production-expanding arrangements. A rise in industrial production can thus be achieved in combination with a diminishing need for labour.

Other effects of the structural changes in industry have been registered in the employment market. There seems to be reason to talk about a fragmentation of the labour market at least in two respects. First there may be unemployment in one area of the economy while there may be underemployment in another. This has often been attacked through retraining programmes and the earlier mentioned job mobility programmes. Education and training have generally been seen as a constructive response to employment.

The change to automated production has also emphasized the importance of education and training in the labour force. And this is the point where the second type of fragmentation of the labour market can be seen: broadly the labour market has been divided into two parts - one for skilled workers on the one hand and one for unskilled labour on the other. At the same time as there is unemployment for skilled workers and educated labour there may be a need for unskilled labour. Countries like the Netherlands and France report on this situation. French labour statistics show a change in the proportion of skilled and unskilled workers in the labour force. The percentage of skilled workers diminished from 48.9 per cent in 1954 to 37.7 per cent in 1968, while the percentage of unskilled workers increased from 19.6 per cent in 1954 to 22.4 per cent in 1968.²⁾

1) Levinson, C., Capital Inflation and the Multinationals. Geo. Allen and Unwin, London 1971.

2) Figures from a paper by Michel le Tron at the Regional Trade Union Seminar, (The Quality of Life at the Workplace), OECD, Vienna 21st-24th May, 1974.

Higher living standards and better education have made it a problem to recruit unskilled labour inside the highly developed industrialised countries. The need for more unskilled labour has then at least until recently been met through recruitment of foreign workers from less developed countries. The following figures from the Netherlands give an indication of the problem: the net immigration of workers, mainly from developing countries, rose from 28,000 in the period 1954-1959 to 54,000 in the period 1969-1973. (These figures do not include workers from countries within the EEC). Similar trends have been reported from France, Switzerland and Sweden.

The immigrant workers are found in jobs that are unattractive to the native workers, jobs that are relatively low paid, having low status, the working environment regarded as bad, etc.

During the last few years there has been a change, as government action to limit excessive immigration has been taken in a lot of countries. The social costs seem to have been bigger than the economic gain from the mass immigration and by the end of 1973, this has led many governments to adopt restrictive policies. This trend seems to have been rather general and firm, as reported by the OECD SOPEMI experts. ¹⁾ To sum up: when we are dealing with problems relating to the internal industrial environment, we are concerned with one aspect of the quality of working life, which must be looked upon against the full background. The general frame of reference is work in society, how it is regarded and what more room there is for reforms of different kinds. This is said once again to stress the fact that the questions we deal with are political, in a sense, that there are divergent interests expressed by the social partners, in many instances, and that matters will be settled differently in different countries.

¹⁾ Continuous Reporting System on Migration (SOPEMI), Report 1974, OECD, Paris.

3. Conditions of Work: Internal Industrial Environment

a) Health and Safety

Health and safety in industry are subject to specific legislation in all reporting countries. In most countries these kinds of laws were first enacted long ago, often in the last century. The overall objective of legal protection has been gradually broadened from accident prevention and protection against influences from the working environment that are injurious to health, towards ensuring workers' welfare and well being in a more comprehensive social sense. As an example the United States Act of 1970 may be cited: "So far as possible.... no employee will suffer diminished health, functional capacity or life expectancy as a result of his work experience". It is further reported from Switzerland that the government is extending the concept of health to cover "social health" as well. "The maintenance of social harmony is increasingly regarded as the basis of a healthy and balanced working environment".

Unfortunately this development in legislative action does not mean that the problems of physical health and safety at work are solved. The situation in real working life has not advanced very much towards the goals and aims of the legislators, the problems of accidents and safety still being a main concern in the everyday operation of industry. In the United States, 8,000 workers are killed each year in accidents in industry, and more than 6 million people suffer from the effects of injuries at work and occupational diseases. The proportions are similar in other countries. The Swedish statistics show that 300 workers are killed each year and 2,000 severely handicapped in a total of 120,000 injuries a year in industry.

The problem of physical health and safety at work is a big one in itself; another fact seems even more discouraging. In spite of a diminishing amount of working hours spent on hazardous work - an effect of the above-mentioned technical development - occupational

diseases and physical accidents show very few signs of disappearance from work. On the contrary, accident rates and numbers of occupational diseases has remained remarkably constant over the last ten years. This is the case in Sweden, France, Canada and Turkey. Countries like the United States, Germany and Switzerland have had diminishing total numbers of accidents, while the numbers of fatal and severe accidents have remained unchanged or even risen.

It should be remembered too that this type of statistic is not very reliable; that there are many biases leading to underestimation of the severity of the problem. The definition of occupational diseases is for example in many countries dependent on the social security system, what diseases are accepted as "occupational" in origin etc. The Swedish government has set up a special investigation of this problem, to make recommendations for legislation about the type of statistics that should be kept and the calculations to be done.

The problem is to find measures and computations that give information of a comprehensive and practical kind, statistics which show what actions should be taken as well as the effect of different changes in the working environment.

What are the costs of accidents and diseases in industry? The costs to the individual can naturally never be fully estimated. The above cited passage from the American law shows that this should not be necessary. It is evident for human and social reasons that accidents and diseases should be reduced.

But the economic reality is something else. Economic incentives are of primary importance to managements of business enterprises and there is, comparatively, a lack of economic incentives regarding accident-prevention. The costs of accidents, occupational illnesses and wearing out of people in industry are to a large extent

increasingly borne by society in general, according to the kind of social security systems introduced in most countries. These costs are evidently big, an estimate made by the Swiss National Security Agency (CNA) shows that these costs equal 1/8th of the gross national product in Switzerland.

Naturally there are costs to the enterprises too, the reducing of which is an economic incentive to preventive action. In some cases costs for recruiting and training new labour become high enough to motivate specific action in terms of a better working environment. In other cases labour may be a scarce resource and production losses caused by turnover and accidents at work big enough to motivate rehabilitative action concerning the working environment. But generally speaking, the lack of economic incentive seems clearly to be a factor behind the slow pace and meagre results in improving accident prevention in industry.

But there seem to be two major new variables which are making the reduction of accidents and occupational illnesses especially difficult.

First, mainly with occupational diseases, there has been the introduction of new materials and substances creating an increase in the risks for occupational cancers, allergies and the like. The introduction of new chemicals in industry introduces new risks and hazards in the working environment of which very little is known. The size of the problems in question is shown by the fact that in the United States more than 13,000 toxic substances are known to be used in industry, while less than 5 per cent of these are regulated according to federal standards. The latency period for such diseases as cancer make it difficult to regulate such substances. The newly discovered carcinogenic effect of vinyl chloride is a reminder of the seriousness and complexity of the problem.

Second, it would seem that previously unknown stresses appear at very much the same rate as old ones disappear. The rising productivity during the 1950s and 60s was not solely due to technical rationalisations, but was to some extent founded on individual speeding up and rising work intensity. The classical trend otherwise is for physical effort to be replaced by mental exertion. A specific case of this change is exemplified in the French national report by the rising amount of shift-work, another consequence for the more capital-intensive automated production forms. Mental work load introduces a new function on the fatigue-curve, as shown by ergonomists like Hashimoto (Japan) or Grandjean (Switzerland). There is some evidence suggesting shiftwork as one cause of psychosomatic illnesses such as gastric ulcer, chronic headaches, etc.

b) Physical conditions at the workplace: What to do?

First it must be stated that conditions of work have been improved in many respects since the beginning of this century. This report is talking about the problems without mentioning the advantages of the present situation. But this has to do with the objectives of the Working Party, which are to look into remaining problems, trying to find solutions or better ways to faster changes and reforms. And naturally it still is remarkable that there are such big problems of health and safety today in industry, as most countries have built up national supervisory structures and local inspectorates to control workplaces and advise enterprises on safety problems.

New problems have come up when old ones have disappeared, as new production processes and methods have been introduced. In some cases, it seems fair to say that it is the new form or work organisation that has created the problems, for example as with monotony, boredom, fatigue, mental stresses and diseases, discussed later on in this report.

One example of such a new and rather neglected factor behind accidents and wearing out in industry is the mode of pay, the system

of remuneration. It is said in the Swedish report that the system of remuneration has to be taken into the concept of a safe and healthy working environment. A newly presented Swedish governmental investigation has concluded that a piece rate system can have the effect of raising the risk-taking and thus the number of accidents. It has even been suggested that this could be an area for legislation. But the Swedish report is not the only report on the matter. The report from Belgium gives another example of the conflict between higher pay and better safety at the work place. Workers are often better paid when working in a bad working environment. In fact risks and other factors in a bad working environment are factors in most evaluation systems used in wage-setting. In Belgium one such conflicting issue has been legislated upon: Earlier on, workers were given the choice between free protective clothing in a bad working environment or higher pay. Now a Royal Decree has placed an obligation on employers to give and maintain free protective clothing to all employees in need of such clothing. A pay system that gives a higher bonus for higher speed in a situation where the protective clothing is a hindrance to speed, of course, usually would run contrary to a decree like this. Bonus systems remunerate production but not safety. In many instances a conflict is thus created, which it is left to the worker to solve.

That the system of remuneration must be included in the concept of working environment seems to be a rather general remark when associated with experiments in group work etc, where a personally based piece rate system may be a critical factor and a hindrance. This will be dealt with later on in this report.

The conclusion is that job evaluation systems and systems for remuneration based on them may have the effect of spoiling investments in safety and thus conserving attitudes towards risks and risktaking.

Big survey studies concerning the experiences of the workers themselves clearly show that accident statistics commonly underestimate the problems. A Swedish survey from 1971 shows that 82 per cent of

workers in industry experience dangers to health in their daily work. A Danish parallel study from 1973 arrives at almost the same figures: only 25 per cent of the workers questioned felt healthy and free from symptoms in their work. The studies show that lifting and carrying heavy objects are still the most frequent form of industrial risk. The surveys in the United States were made in 1969 and 1973 by the Department of Labor. This gives the opportunity of comparisons over time. The surveys show a remarkable constancy over the period: conditions of work have not deteriorated, but neither have they shown many signs of improvement, at least in the eyes of the workers. Such a stability seems more typical than exceptional, according to the reports mentioned above. Estimates by the workers themselves show higher frequencies of risks at work than what is generally thought by experts in the field. This is true as well for statistics (accidents and occupational diseases): the working environment as a cause to diseases is underestimated. An annex to the Danish report gives the results of a special medical investigation which clearly shows that the real number of occupational diseases is bigger than what is shown in the statistics. As is said in the Danish report, a key problem is probably a low consciousness among doctors about the cause-effect factors in the working situation in industry.

This effect from the pay system emanates from the fact that the remuneration system is an effective instrument for behavioural control as well as for behavioural motivation: what is remunerated will be done effectively, the rest not.

Governmental action to ameliorate the internal industrial environment situation has taken many directions. One type of action, seen in many countries, has been to encourage initiatives by industry itself and co-operation between the social partners to deal with safety and health problems. The work of safety committees and safety officers in the undertaking is often supported by law. As an example in the type of legislation coming up the French report may be cited: "to foster a systematic and concerted improvement in working conditions and to provide better protection for workers' health: the

Act of 27th December, 1973 organising consultation structures at individual firm level in this field and creating a National Agency for the Improvement of Working Conditions, whose task is to step up information and research activities and to assist firms; the Decree of 1st April, 1974 strengthening the role of the health and safety committees; the Act of 5th July, 1972 increasing penalties for infringement of the law".

A further step in this direction has been taken in Sweden where a new Bill on measures for improvement of the working environment was passed in 1973. An important innovation in this Bill is a reinforcement of the local union safety officer. Such officers should be elected by the workers at all work places with five or more employees. Safety officers are entitled to take part in the planning of working premises, the purchase of machinery and the choice of working methods. In connection with the extension of production and building of new industries this prerogative is knit together with the question of building permits: the authorities will not grant a building permit until approval has been received from the safety officer or the local branch of the union. Safety officers will, too, have the right to order work to be stopped and to summon the Labour Inspectorate (the national enforcement authority) if they believe the life or health of employees to be immediately endangered or if an employer contravenes a ruling by the Inspectorate. Because of this extraordinary power position of the safety officer, the law states that the safety officer is to enjoy special security of employment.

This Swedish governmental initiative changes the power-positions of the two partners in industry in favour of the union side, it makes them more equal in the decision-procedure, as both parties are liable to sanctions. Another thing which this Bill affects is the procedure by which demands from the employees enter into the planning of new work places. It is an often cited fact that the earlier in the planning process ergonomic ¹⁾ considerations are

1) Ergonomics = Methods of designing work to suit man, adapting processes and machinery to man's physical and psychological characteristics.

taken into account, the better is the resulting working environment.

Another legislative initiative is shown by Germany, where a law was passed in 1968 requiring that no new machinery or equipment can be brought on the market until it has been shown that it does not contain any risks or hazards to the users. Unfortunately no substantial evidence of the effect of this law appears to be available.

Problems with incentives in connection with improving the working environment were mentioned earlier in this report. Few governmental initiatives have been taken in this sphere, but some actions are reported. Thus an Act was passed in Sweden in 1974 which required limited companies, economic associations and banks to set aside 20 per cent of their untaxed profits in 1974 to finance measures for the improvement of the working environment. This law is of a temporary character and was occasioned by the great rise in company profits in 1974. The money is to be used within five years and the use to which it is put must be approved by the employees through joint committees or safety committees. In a proposition from a working party under the Danish government it is proposed that a sort of inverted environment tax be introduced in industry. The tax should be based on the conditions at the work place: the better the environment, the less taxation. In this way it is thought that costs to society caused by industry may be brought back to their point of origin, as well as functioning as an incentive to investments in improvements of the working environment. This proposition has so far not led to any government action in the form of a Bill.

Besides the action mentioned here work is going on all the time, in almost every country to build up inspectorates and make them effective, to encourage research and education in the field, to keep safety levels up to date (a recent case is the setting of a noise level in many countries at 85 dbA) and the like.

c) Monotony and Boredom.

Problems of monotony and boredom in industrial work exist today in most industrialised countries. The origin of these problems is to be found in industrialism itself, in the very manner of production itself. During recent years these problems have become acute as the social and economic setting in society has changed. Industrialised production meant a rapid evolution of the productive forces in society. The rapid development built upon two main principles: division of labour and coordination of resources in a controlling hierarchy. The advantages of division of labour, of specialisation and of long run production were demonstrated by Adam Smith as early as the late 18th century. The principles were more systematically put together and given a "scientific" frame of reference by F.W. Taylor in the beginning of this century. "Scientific management" meant the full exploitation of the division of labour, in that repetitive task-organisation was combined with time and motion studies and selection of workers for the tasks for which they were physically best fitted. To create a common interest in this type of rationalization, Taylor recommended the use of a piece rate system, which gives the workers a part of the gain from the rise in productivity.

Scientific management never was the success Taylor hoped it would be. Although a lot of the basic principles were successfully applied and are still in use by managements, the holistic aspirations in Taylor's theories were soon showed to be false.

Elton Mayo and the people around the "human relations movement" in the 1920s and 30s showed among other things that the piece rate system did not function in the simple way Taylor thought. Workers built up their informal organisation and managed to keep control over the effects of the piece rate system, among other things setting limits in production and pay. The human relations movement registered a lot of harmful consequences of the production organisations used and suggested remedies such as democratic leadership.

But the problems remained, as division and further division of labour still appeared as viable ways to rapid production development.

The division of labour and creation of more and more repetitive tasks was already evident as a real problem in the 1950s, when job enrichment, job enlargement and job rotation began to be put forward as remedies. But the rotation between or enlargement of a number of repetitive tasks was evidently not the solution to the problem. Such steps changed neither the technology nor the work organisation. In some instances, as reported from the United States, these methods were introduced by individual firms in private industry to counteract dissatisfaction which might lead to unionisation.

It has been stressed before that some technological development has resulted in polarisation between skilled and unskilled labour. Blauner ¹⁾ and others have spoken of the effects of mechanisation and automation as if they would eliminate monotony and boredom where they were introduced. It is true that they can take over many monotonous tasks but many such tasks cannot be automated and even where tasks are automated the result may be that some, more highly qualified, workers have interesting jobs while others may be left with boring tasks requiring little or no formal training and education.

Rapid economic development has created the conditions necessary for rising standards of living, among other things implying better education and thus higher expectations vis-a-vis the content of work. This tendency in society in general means that the development within the work force goes contrary to the continuation of division of labour, polarisation in jobs between unqualified and qualified workers, monotony and boredom, the hierarchic, undemocratic decision procedures in industry, etc.

1) Blauner, R., *Alienation and Freedom*. Chicago & London 1964.

During recent years some new approaches to the solution of the problem of division of labour have been devised, notably what has sometimes been labelled "the socio-technical systems approach", sometimes "the humanisation of work". In a recent OECD Conference it was labelled "The New Organisational Ethic".¹⁾

These approaches have basic ideas in common, although there may be some differences in details. In the following no differences will be distinguished and the approaches will be put together under the heading "humanisation of work".

d) Humanisation of Work: Some tendencies in work redesign.

What will be presented here is not a body of precise knowledge nor a set of clearly defined actions. The label "humanisation of work" is used merely to cover some trends in actions taken to cure the problems of monotony and boredom.

Humanisation of work involves actions within the following areas:

1. Job design.
2. Decision-making.
3. Participation.

The idea behind the approach is that the technical and the social system of the enterprise should fit together in a joint optimisation, where criteria from both systems should be regarded as equally valid. The classical design process has been to start from technical characteristics and design the work organisation, the social system, accordingly.

Humanisation of work implies consideration as to what needs man has at work: social needs, needs for a meaningful task and an understanding of the work process, needs for development as a human being, needs for decision-making and creativity, etc. This type of criteria should be taken into consideration when the pro-

¹⁾ Work in a Changing Industrial Society. Final Report. OECD 1975.

duction process is designed, when functions are allocated to men or machines, when an industry is planned and the lay-out of the shop floor is decided.

The implications for the technology used are wide. A good example is the ongoing work aimed at breaking down the assembly line in car factories. Work groups constructed to work on the larger elements of the assembly, e.g. a group for the assembling of the engine. The work group may consist of four or five workers, who know all the types of jobs involved in assembling the engines including testing it. The workers themselves decide who is going to do what, if there should be rotation between tasks; how often the rotation should be done during working hours; and how many breaks should be taken and when.

The decentralisation of planning and control, the autonomous work groups, etc, give the system of production enough flexibility to let the experience of the workers play a greater part in the ongoing planning and in solving problems with bottlenecks in production flow. In this way continuous learning from mistakes is made possible, also, learning to learn, so that an ongoing learning process is created in the organisation. In this way organisational change becomes integrated into the organisation itself, the organisation acquires the characteristics of adaptability and self-adjustment.

This new type of organisation raises the demands on the physical working environment. As problem solving in teams is one feature of the new organisation, it is desirable for the noise levels to be reduced to a very low level. In some cases the decentralised decision-making has meant the integration of parts of the office with the shop floor (as in ASEA, Västerås, Sweden); the working environment then has to be considerably improved in many respects.

There are also substantial economic reasons for adopting the humanisation of work approach. Rapidly changing markets, the lack of unskilled workers, turnover and absenteeism as a consequence of

bad working environment and dull jobs has called for a change in the highly rigid and dependent organisations in industry. When markets are changing, the business cycle going up or down, it is absolutely essential to have a flexible production system.

This is especially true when social actions are being taken to improve security of employment. Work organisations must be flexible enough to permit a lower rate of production without stopping production totally and dismissing the workers.

Another economic advantage in this type of organisation is that fluctuations in absenteeism and turnover no longer affect the production system in a critical way, critical enough, that is, to stop the whole production system. As every worker knows the jobs of other comparable workers, production can always continue, although sometimes at a reduced rate. Factors such as these thus create an economic incentive for management efforts to humanise work.

Further, all experiments so far reported appear to have proved economically viable. This is mentioned explicitly in the reports from Sweden, the United States and the Netherlands. The reason for this may be found in the simple fact that increased productivity, or at least no drop in productivity, has been one of the premises of the majority of experiments. Experiments have been started only when there have been substantial indications showing the economic risk-taking to be very low. Other experiments have been stopped in the very beginning as problems of productivity have come up. What has been said here seems to be true as well for experiments with participation and industrial democracy, which will be treated in the next section.

On the other hand it should be noted that no substantial evidence is given in the reports regarding the effects of the experiments. In general it seems that there is a lack of follow-up and evaluation of experiments on humanisation of work. Evidence cited in the

national reports to the Working Party represents for the most part, merely views expressed by employers or unions involved, or by government officials.

This raises the problem of follow-up and evaluation of changes. What indicators should be used? What do such indicators mean? For instance, are absenteeism and turnover reliable indicators of job dissatisfaction? There are mixed causes for phenomena like absenteeism: it may very well be affected by job satisfaction, but it is also affected by changes in insurance systems, changes in the working environment, making the workplace "healthier" and thus reducing illnesses in general, changes in the distribution of material goods in society etc. The same goes for job satisfaction measures, and a general distrust of such measures is found in most country reports. "Job satisfaction is a vague concept, related to and affected by a whole variety of factors, inside and outside the working situation. The situation is no better if we turn to the widely used concept "quality of working life". It is hoped that OECD work on Social Indicators may assist in giving better definitions, specifically regarding "quality of working life". A clear definition and understanding of basic concepts is a prerequisite for better measurements and evaluation in this field.

Finally, another approach to the evaluation of organisational change should be mentioned and described. It is a method of evaluation developed by Professor R. Revans, of Brussels. His method is based on the exchange of personnel. A small experiment with this type of evaluation was made at shop floor level in an exchange programme, financed by the Ford Foundation. Six car workers were sent from Detroit automobile factories to the SAAB factory in Södertälje, Sweden. At SAAB a completed humanisation of work programme had resulted in a disassembling of the assembly line. The new organisation was assessed on the shop floor by "real experts" on this type of work, the American workers who came from conventional works in Detroit. The American workers stayed at SAAB, Sweden for about a month. They found the physical working conditions to

be really fine and the change in that respect worthwhile. On the other hand, in their view the new work arrangements had produced very little change in the total working situation. They considered the work pace and intensity of work to be much higher in this type of organisation than in a conventional car plant. Lastly they considered participation in decision-making to be very limited and of little significance for the workers.

This was a small experiment, which merely produced a subjective evaluation; it should not be interpreted as an evaluation of the humanisation of work approach. Still the results are quite consistent with comments in the 12 national reports of the Working Party. Humanisation of work may be a solution to some problems in industry, particularly those of an economic or ergonomic character. But it has little effect on the very quality of work itself. It looks as if some stresses have been removed but others have taken their place.

Still there is an urgent need for evaluation, which in turn calls for a solution to the problem of indicators and measurements.

e) Workers' Participation and Industrial Democracy.

The reconstruction of tasks and jobs often involves some steps in the direction of workers' involvement in decision-making and participation in planning etc. There is no sharp borderline then between experiments with "humanisation of work" and the development of some workers' participation programmes, very often set up as a step towards a more equal power distribution and a joint decision-making in general between management and the workers (often labelled "Industrial Democracy").

Most experiments with direct participation by workers seem to have been of a very limited character, encompassing only some rather simple planning functions at the shop floor level. Most countries seem to have statutory (or collectively bargaining) forms of representative consultative machinery to facilitate

participation in decision-making at higher levels in enterprises. This consultative role of the employees may be broadened and linked with the direct decision-making on the shop floor as mentioned above. A formal set up for integrated "joint decision-making" may then look like this: In a committee at plant level the workers are represented and take part in formulating decisions about production plans in a consultative role, the ultimate decision-power still being with management. These plans are set up and discussed on a monthly basis. The plans are sent down to the work group level, on which there is a joint meeting, weekly between representatives of the workers and the supervisors. On this level the more detailed planning is made. Finally, the working group gets its daily programme, within which it decides who does what, eventual rotation between jobs, breaks etc.

As this example indicates, there are many levels of participation and the amount of participation varies in this respect from case to case. Other variables in participation are scope, purpose, organisation and participants. Scope deals with the segment of enterprise decisions to which the participation applies (employment, finance, marketing, research and development, production etc). Purpose varies between motivation as the objective of participation, and power-accumulation, and problem-solving. Organisation refers to whether the participation is structured or not, informal or formal.

As in the case of "humanisation of work" there is little agreement about the very meaning of participation, let alone about indicators of effects and the evaluation of these effects.

This has to do with the fact that the question of participation touches upon - one might say is bound up with - the general political and economic nature of the society. There are elements of ideology in concepts like participation and industrial democracy. Accordingly there are differences in scope, level, purpose, organisation and participants, dependent for instance, on who took the initiative for the organisational change. Most task-based partici-

pation experiments reported in the national reports seem to have been started by the employers. The intention has been to get a better fit between production processes and work organisation, going from one man - one job to sophisticated process operation and work flows. As explicitly stated in the United States report, the aim may have been to counteract tendencies towards unionisation. In many instances the experiments with participation have been a variant of cooptation, that is an attempt to integrate the union, work-place, representatives or workers in general into the pursuit of enterprise goals. The fact that the initiative for these participative innovations has come from management and that they have had specific functional purposes may be one of the causes the great variance in results. It is true that the changes in some cases implied more meaningful work and better work relationships for the workers involved, the effects on working climate, absenteeism and productivity being favourable. But in other cases experiments failed, never got off the ground or were stopped. As far as can be understood from the national reports, and from other evidence, these failures are bound up with a whole range of problems coming up as an effect of the experiments themselves. As is said in the report from the Netherlands:

"Real job enlargement on the shop floor appeared to undermine the tasks of lower bosses, so that anxiety and boycotts on their part could become real obstacles. If such obstacles were overcome, then resistance could come up at higher hierarchical levels, because of the fact that different styles of working engendered tensions there. In other words: real innovations in work organisation make their effect felt and cannot fail to put into doubt established norms and procedures in respect of work, assignment of tasks, work relationships, responsibility, authority and hierarchy. In view of these and other difficulties it is not amazing that both the continuity and the spreading of the experiments have often proved problematic."

With these facts in mind it seems less astonishing that all experiments so far reported seem to have been economically viable: other experiments have been stopped and never reported.

In other cases the initiative for innovation has come from joint committees. This has been the case in many experiments in Scandinavia. The outcome of these innovations does not seem to have been very different from that of those introduced unilaterally by management. Some have failed and some have succeeded. The stress in experiments of this kind has very much been on "learning", that is the creation of a learning potential in the firm, a capacity to learn from experience and change the organisation according to changes in the environment. In many cases the change agent has come from outside the firm, from a joint central committee on participation or the like. The change agent has very much stressed the necessity of a flexible and open organisation, where work roles are defined and redefined, the organisational change being a stepwise learning process.

Scandinavian experience - especially in Sweden - has led to growing frustration with task-based experiments in participation, on the ground that they leave the power distribution in the industrial organisation relatively unchanged. Once again we are back into political issues. For labour movements inside the socialist tradition the change in power distribution, especially in economic decision areas, is a main concern. Most experiments in participation, as in humanisation of work, assume a consensus about economic goals in industry and society. Real change must be based on formal and legal changes in the basis of present industrial organisation. If experiments do not offset the role of economic and technical criteria in industrial decision-making, then they have adopted a dangerously "micro" perspective. The micro view limits work transformation to improvements in the individual work situation and neglects the fundamental problems of capitalistic society: the division of labour in creative, decision-making work on the one hand and the monotonous, physical work according to pre-set methods and detailed regulations on the other.

In Sweden recent and pending legislation has marked a new approach in the field. It is thought that legislation concerning the decision-power itself is needed to bring about real changes towards industrial democracy. Legislation should provide a formal framework for organisational change. The legislation deals, for instance, with the classical management prerogatives and aims to change them, thus giving more than advisory capacity to the workers and their unions. This move can be viewed, together with Swedish legislation on health and safety at the work-place (see p. 16 above), which too is aimed at giving more power to the unions and the safety officers elected officers by the workers themselves.

How should the effects of this diversity of approaches to workers' participation in decision-making and management etc, be evaluated? This is extremely difficult to answer as criteria will differ according to the political viewpoint. To give an example, the Canadian report (paragraph 98ff) raises the question of the effects on the total economy of a nation from the introduction of industrial democracy in a more "Scandinavian" sense. However, few if any comments on this matter are to be found in the national reports. This reflects the state of knowledge in the field: experiments are rarely run by governmental bodies or evaluated at that level. A governmental evaluation must take into account the costs to society in a broader sense. Thus a lot of political value-questions, some to be found in the second section of this report, must be solved. Is industrial democracy a political value of its own, in its own right? How should the social benefits of the introduction of industrial democracy be calculated on a governmental level? What is involved in the concept of costs? etc, etc.

Once again, the reports show great variations in the appreciation of industrial democracy. The report from Canada expresses no interest in industrial democracy at all, mainly for two reasons. First there is a prevalent belief in Canada among all sections of the population that industrial democracy of the type discussed in Europe would erode the foundations of the free enterprise system, a system which is wanted and preferred by organised labour as well as by management. Secondly, it is explicitly stated in the

report that with some exceptions, the Canadian trade unions seem to be less politically radical than their European counterparts. This should be contrasted with the situation in Sweden where the trade union movement is discussing a system for workers to share in ownership, through funds, aimed at changing the whole economic system, tantamount to a replacement of the free enterprise system.

The conclusion seems obvious: workers' participation covers a whole range of problems and interests. There are differences in experiments undertaken dependent on different purposes, scopes, political climate and ideological concern. The problems involved will appear differently according to social interest in the matter. Governmental action will have regard to political ideology. It seems fair, however, to talk about there being three lines of thought in government policy consideration today:

1. Legislate employees onto the decision-making bodies within the enterprise. One example is legislation about employee representation on company boards, reported among others from Germany, Turkey and Sweden.
2. Strengthen, through legislation, the power position of trade unions. Examples are the Swedish proposals for new legislation, which more or less completely remove the classical management prerogatives.
3. Leave the question to the two sides of industry, implying no government action at all, apart from encouragement of discussions and negotiations.

It should be further noted that there exists at least one point of agreement between the nations when talking about government action in this field: namely that legislative action in the field of industrial democracy or workers' participation must not disrupt the right of free negotiation between the social partners.

FORSKNINGSRAPPORTER/RESEARCH REPORTS

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TRAINING AND EDUCATION
IN OCCUPATIONAL SAFETY AND HEALTH
IN SWEDEN

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TRAINING AND EDUCATION IN OCCUPATIONAL SAFETY AND HEALTH
IN SWEDEN

The following summary covers the training and educational activities of occupational safety and health in Sweden: in the secondary school, at the universities, within the trade unions, the factories and at the governmental authorities. The summary is made up by samples of the most important training and educational activities, and goes into detail only when dealing with the training of the occupational safety and health specialists.

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UPPER SECONDARY SCHOOL INSTRUCTION IN MATTERS CONCERNING
THE WORK ENVIRONMENT

In the technical lines of upper secondary school, matters concerning the work environment are covered in a special subject, ergonomics. This subject was introduced in the technical lines of upper secondary school about ten years ago. The term ergonomics is used here in its broadest sense and includes force and information ergonomics, industrial hygiene, safety techniques etc. Altogether the teaching of ergonomics comprises 60 hours in all technical lines of upper secondary school. For some years now, ergonomics has also been taught in the agriculture and forestry line of upper secondary school.

Satisfactory arrangements have yet to be achieved with regard to the training of ergonomics teachers. No suitable basic course of teacher training is at present available in the context of the work environment. Various teacher categories - engineers, biologists, physical education teachers, behavioural and social scientists - have claimed to be best fitted to serve as ergonomics teachers. One or more of these groups may perhaps be said to have a suitable training background for teaching on the subject of the work environment, given suitable subsequent training. In-service training has been arranged for almost 200 teachers from various categories on behalf of the National Board of Education and in association with the National Institute of Occupational Health. This training, however, has been insufficient in scope and differentiation.

The National Board of Education, in consultation with the employer and trade union organizations, the National Board of Occupational Safety and Health and others, has compiled a special curricular supplement concerning instruction in matters

relating to the work environment, the aim being to strengthen the position of such matters in the theoretical (i.e. not directly vocational) lines of upper secondary school within the framework of such timetable subjects as social science, biology etc. The conduct of this teaching can be expected to run into considerable difficulties, owing to the congestion involved by other material which has to be taught to the pupils, the shortcomings of in-service teacher training on the occupational environment and problems of co-ordination regarding teaching materials and the planning of instruction.

WORK SCIENCE STUDIES AT UNIVERSITIES AND COLLEGES

During the past five years, particular attention has been paid in Sweden to questions concerning work science education and research and the role of universities in this connection. Various inquiries were carried out in 1973-75 by consultation groups at the Chancellor's Office of Universities and Colleges and the different faculties. The reports presented proposed a build up of the resources and organization of work science studies and research at universities and colleges. Work science being pre-eminently an interdisciplinary subject, it was considered inappropriate for a specific institution or faculty to be established at the universities or for "work science" to be introduced as a new research and teaching subject in its own right.

Concerning basic medical training, it was observed that elements of training relating to matters of work science were already quite extensively represented in the teaching of both theoretical and clinical subjects. For example, in anatomical studies the science of functional anatomy touches on ergonomics, while internal medicine and clinical physiology include analyses of the work situation of patients in the description of a large number of case histories. The following aspects of work science were recommended for inclusion in basic medical education in order to strengthen and systematize instruction

on the subject:

- 1) Environmental factors capable of affecting the individual, their effect and prevention of the same
 - work involving physical exertion
 - exposure to substances of various kinds
 - physical agents
 - mental factors
- 2) The functioning of working life.

Hitherto there has been a very limited supply of research physicians in labour science. This shortage of competent researchers inhibits developments because it also implies a shortage of competent tutors. Measures must therefore be taken to stimulate recruitment. For example, clinical research appointments must be established, as well as special research assistant appointments in work science. A measure of this kind was taken recently with the promotion of occupational medicine to a medical speciality in its own right. Various research training courses have been started in recent years in the work science context (industrial physiology, industrial toxicology, occupational medicine etc), but they are still too few in number in relation to existing needs and interests.

Engineers play a vital role in the creation of jobs, work environments and health hazards. They must therefore be equipped with knowledge concerning man as a biological and social being and concerning the way in which technology must be adapted to human needs and aptitudes. A target has been set whereby some 4 per cent of the duration of all education programmes in technical faculties should be devoted to aspects of work science. Today such aspects are included to various extents in a number of subjects of an applied nature. In most educational programmes their scope falls considerably short of the above stated target. Mechanical engineering can generally be said to include the largest proportion of labour science at present.

Of course, the congestion of subjects on the timetable is an impediment to the introduction of aspects of work science in teaching. As a means of getting closer to the 4 per cent target, it is not uncommon for new "work science labels" to be put on old teaching which bears little or no relation to the subject.

The most recently established of Sweden's colleges of technology, in Luleå, started by including a compulsory element, roughly 10 per cent, of non-technical subjects in its engineering studies. Most of this compulsory element comprised aspects of work science. Students taking mechanical engineering and geotechnology are also at liberty during their final year to choose a work science speciality from among the following: physical factors in the environment, organization theory (the social psychology of working life), mining machinery (man-machine systems in underground environments), technical psychology. This final year, moreover, is preceded by two terms of industrial practice aimed at putting the technology student in a better position to assimilate the work science instruction received during his fourth year.

Work science studies in social science faculties differ in character from the corresponding studies at technical and medical faculties. This is because many of the subjects taught at social science faculties occupy a central position in work science studies and research (this applies particularly to psychology and sociology) and also because certain subjects have less of an applied character than subjects taught by other faculties. At a later stage, social science studies include a number of work science courses, e.g. organization psychology and personnel administration, the psychology and physiology of working life, industrial sociology.

A study group set up with reference to this faculty area has proposed the following general measures for the reinforcement of labour science studies.

- 1) The clear presentation and ready availability of existing work science courses.
- 2) A wider range of education opportunities based on work science research.
- 3) Openness towards problems defined in working life, and the ad hoc creation of educational opportunities relating to the solution of such problems.

SAFETY AND HEALTH EDUCATION FOR SAFETY DELEGATES AND SUPERVISORS

The most extensive training in Sweden in matters relating to workers' protection and the occupational environment takes place within companies and under the auspices of trade unions in connection with the training of safety delegates, supervisors and employees generally. Safety and health education for safety delegates and supervisors has existed since 1942, as long as these questions have been regulated between the employer and trade union organizations.

A major campaign of basic training for safety delegates and supervisors in matters concerning work safety and work environment was prepared in 1973 and 1974. In its introductory stage this campaign involved the compilation of study material entitled "A Better Working Environment" for use in the basic training. The study material was produced by the Joint Industrial Safety Council, which was assisted by a working group of representatives of employers' associations and trade unions, the National Board of Occupational Safety and Health and other bodies.

"A Better Work Environment" was compiled on the assumption that it would be primarily used by "study circles" and it was made to include practical exercises in the form of work place inspections. The material deals with the following subjects: occupational safety and health services, ergonomics,

noise, lighting, chemical health hazards, job satisfaction, the origins and prevention of accidents, safety legislation etc. A course based on "A Better Work Environment" can be completed in 30 to 40 hours. The material is intended for use in the training of safety delegates and supervisors in all sectors of commerce and industry. It has been given a certain amount of flexibility, so that emphasis can be laid on different parts, depending on those aspects of the work environment which the participants are most anxious to deal with. In addition, special adaptations have been made to the material so as to bring it more closely in line with conditions applying in particular sectors.

Safety education must aim at being a powerful force in favour of change. To this end studies must be held in direct connection with the work place and the working environment. The studies should be planned in the safety committee or if the firm is not big enough to have a committee, directly between the employer and the trade union organization within the firm or together with the safety delegates. In these discussions it is decided who is to participate, which form the studies ought preferably to be given, if leaders are to be trained and how long the course is going to take. The question of when the studies are going to take place is also dealt with. In the study material "A Better Work Environment" the practical exercises are not only to find the risks in the environment but also to suggest solutions and consider the consequences these might have on technology, economics, administration and personnel.

Developing a better work environment requires team work. The studies can also be done as a team work. The so-called study circle has been used for a long time in adult education in Sweden and is a pedagogical method well suited for safety and health education for safety delegates and supervisors.

A study circle

- . demands a minimum of specialists
- . makes everybody in the group active
- . the participants can decide on speed, order of the different matters to be studied, etc
- . demands and facilitates team work

In cases where working conditions, geographical problems, the size of the firm and so on make it impossible to use the study circle, other forms of study can be based on "A Better Work Environment". Conventional teaching, for instance.

The following table gives a rough estimate of the total costs of the education based upon the study material "A Better Work Environment" during the period between August 1974 and May 1977:

Estimated number of participants:	200.000	
(240.000 study materials sold)		
Material costs	15.000.000	Sw crowns
Costs for circle leaders	10.000.000	
Study grants	52.000.000	
Loss of production	325.000.000	
	<hr/>	
	402.000.000	Sw crowns, i.e.
	96 million	Can dollars

The heaviest part of the costs is borne by industry/the employers, who have to cover the loss of production. The second heaviest part is carried by the Swedish Work Environment Fund, which has paid most of the costs of material, training of study circle leaders, etc.

As a continuation of the basic training based on "A Better Work Environment", the Joint Industrial Safety Council is now preparing further training for safety delegates and supervisors by compiling further training material on Noise, Lighting, Chemical health hazards, Ergonomics, Planning and projecting in the working environment, and other subjects.

SPECIALIST TRAINING AT THE NATIONAL BOARD OF OCCUPATIONAL
SAFETY AND HEALTH

The postgraduate training of industrial physicians, industrial nurses and industrial safety and hygiene engineers started in Sweden 20-30 years ago. The training was systematized, co-ordinated and further expanded when the National Institute of Occupational Health was created 10 years ago and took over responsibility for it. The Institute merged with the National Board of Occupational Safety and Health in 1972, and the Board has since then been the sponsor of the specialist training courses concerned. As previously, course management and most of the teaching staff are recruited from the Institute.

About ten years ago, it was estimated that a fully operational occupational health service in Sweden would demand the following numbers of full time specialists:

- 1 500 safety and hygiene engineers (+ 1 500 other technicians)
- 1 500 industrial physicians
- 2 300 industrial nurses.

On this basis and in view of the small number of specialists who had been trained and the anticipated expansion rate of industrial health services, the Riksdag (the Swedish Parliament) resolved in 1971 on the following annual training quotas for the period between 1971 and 1976:

- 50 safety and hygiene engineers
- 45 industrial physicians
- 60 industrial nurses.

Only two years after the passing of this resolution, however, annual training activities totalled

- 100 safety and hygiene engineers
- 90 industrial physicians
- 140 industrial nurses.

In other words, occupational health services are expanding much faster than the State and the Riksdag predicted at the beginning of the 1970s. The rapid development of specialist training for occupational health services in Sweden can also be illustrated in terms of the total volume of the training activities run by the National Board of Occupational Safety and Health; Appendix I.

The following have been trained so far:

about 620 safety and hygiene engineers
675 industrial physicians
940 industrial nurses.

A new Government Commission on Occupational Health Services was appointed last year and should be presenting new figures in a year or so concerning the need for specialists in occupational health services.

Until two years ago, specialist training courses for occupational health service officers were attended almost exclusively by practising safety and hygiene engineers, industrial physicians and industrial nurses with previous experience of occupational health service work. As from 1975/76, certain places on training courses have been reserved for persons not yet employed in occupational health services, and the training undergone by these persons includes, in addition to the theoretical portion, a period of supervised practical service at an occupational health service unit. The inclusion of a period of practical service in the training course has been made possible among other things by the award of grants from the Work Environment Fund to finance the payment of training allowances to participants not already employed in occupational health services. In this way the host enterprise is spared having to meet the trainee's wage costs during the period of practical training. The size of allowances has been determined in such a way that they are to correspond to "going rates", i.e. the pay which the trainee could be expected to receive if he or she were to work as an engineer, physician

or nurse instead of taking part in the training course. At present the amounts payable are as follows:

trainee safety and hygiene engineer:

1 120 Canada dollars/month

industrial physician:

2 450 " " "

industrial nurse:

870 " " "

These payments are taxable.

Thus the training courses are of two kinds; one kind for practising safety and hygiene engineers, industrial physicians and industrial nurses:

2 2 2 2 2 2 2 = 14 weeks' theoretical instruction (training of practising safety and hygiene engineers)

and another kind for the training of safety and hygiene engineers, industrial physicians and industrial nurses who are not yet practising in these capacities:

12 wks ----- 3 wks = 15 weeks' theoretical instruction and 6 months' practical service (training of prospective safety and hygiene engineers)
6 months

At this moment the following are taking part in specially arranged practical service at various occupational health service units in different parts of Sweden:

37 trainee safety and hygiene engineers

7 trainee industrial physicians

39 trainee industrial nurses.

Details concerning the aims, duration and forms of instruction and examination etc. of the various courses of training will be found in Apps. II-IV.

During the past few years the number of applicants for the industrial physician training courses run by the Board has been well up to the number of places available, i.e. 90 per annum. The number of applicants for the nurses' training courses has exceeded the number of places available. The following situation applied when the last admissions were made:

	applicants	places available
training course for practising industrial nurses (1977/78)	301	144
training course for prospective industrial nurses (1976/77)	55	45

The number of applicants for the safety and hygiene engineer training courses has risen from year to year:

	applicants	places available
1971	84	50
1972	196	50
1973	324	100
1974	423	100
1975	546	100
1976	767	100
1977	838	100

A closer analysis of the applicants for safety and hygiene engineer training during the past two years reveals the following:

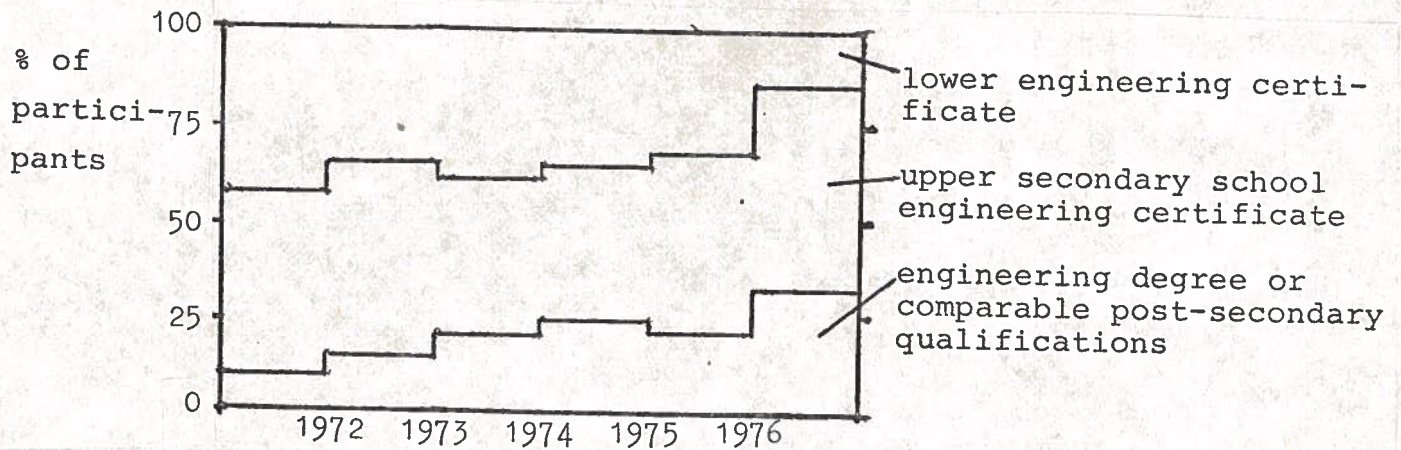
	practising safety and hygiene engineers		prospective safety and hygiene engineers	
	applicants	places	applicants	places
1976	133	50	634	50
1977	116	50	722	50

The following would seem the likeliest explanation for the large number of applicants for safety and hygiene engineer training:

- Great interest in work environment questions on the part of engineers. Interesting job opportunities.

- . Favourable financial terms attaching to the training
- . Safety and hygiene engineer training is at present the most advanced form of training available to engineers in Sweden in the work environment sector.

The basic technical training previously undergone by participants in the safety and hygiene engineer training course has varied as per the following:

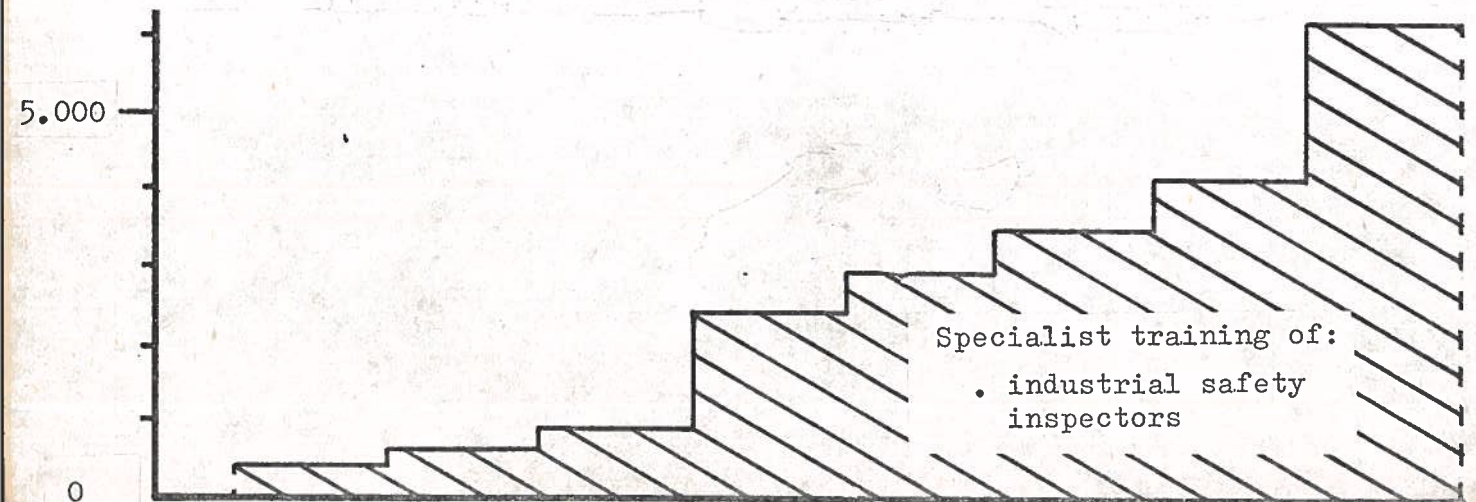
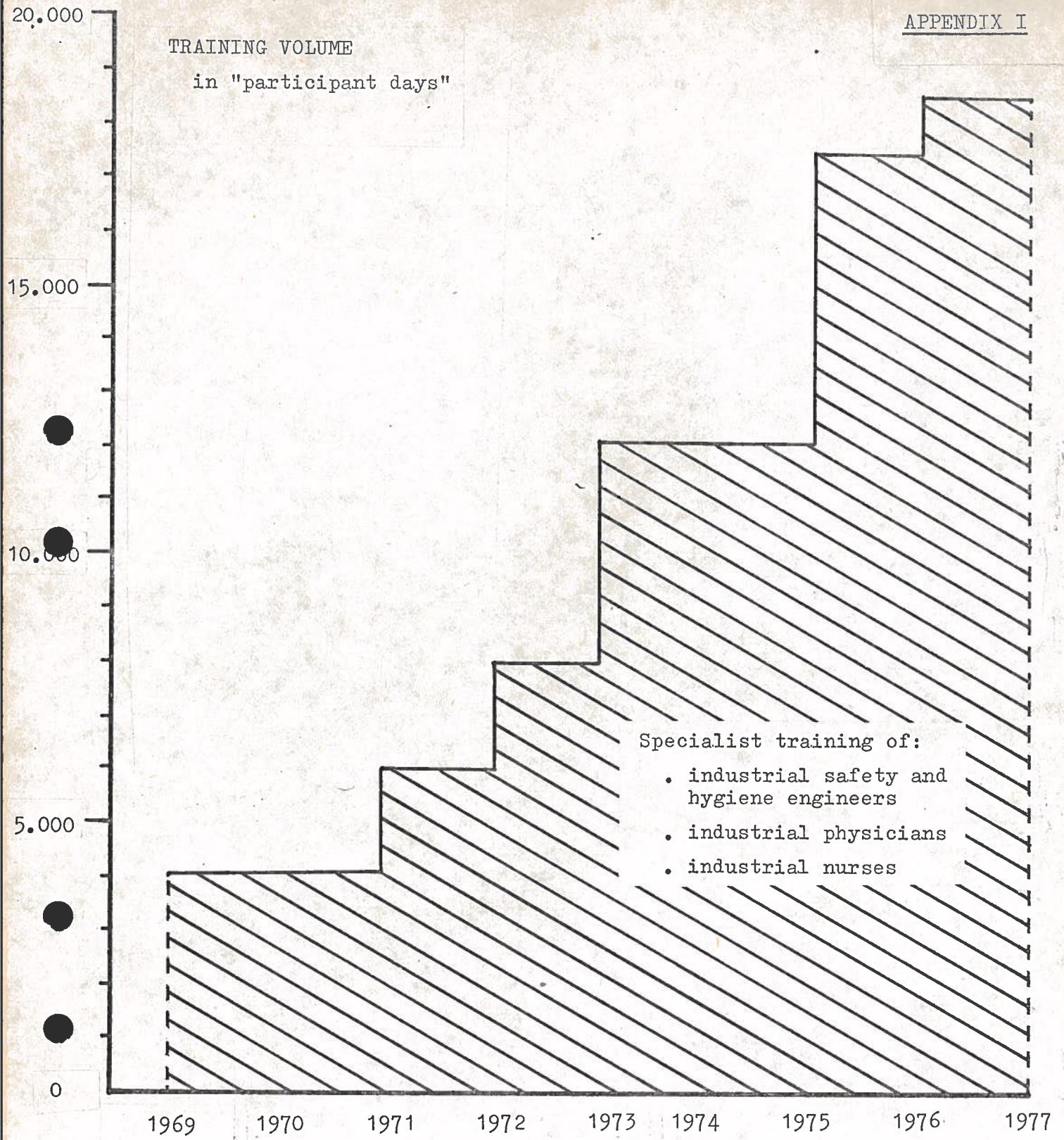


In 1974 the National Board of Occupational Health and Safety arranged for the first time two "occupational safety and health contact days" for persons who had previously attended the above mentioned courses for occupational health service personnel. Two hundred people took part. Last week, April 27-28, contact days of this kind were arranged for the fourth time in succession. This time 1 000 people took part. In addition certain further training courses are arranged every year for smaller groups: industrial hygienic dust sampling, industrial hygienic gas and solvent sampling, technical acoustics, assessment of warm work places, epidemiology for industrial physicians, occupational ophthalmology etc. Most of the courses last for 3-6 days and involve groups of 15-40 participants. During the coming year a number of one-day courses will be added in various subject areas.

Between 1968 and 1973 the National Institute of Occupational Health held an annual ergonomics course for "technical planners", i.e. production and work study engineers, machine designers, industrial designers, architects etc. Owing to the dynamic expansion of training activities for safety and hygiene engineers, industrial physicians and industrial nurses, scope has not been available in the past few years for additional ergonomics courses, even though enterprise and individual persons have shown great interest in this quarter. This target group is not immediately concerned with occupational health services but is nonetheless very important in connection with occupational safety and health and the working environment, because these people, through the measure they take at the planning and design stage, influence the work and working environment of others.

In 1975/76 the National Board of Occupational Safety and Health arranged a special five week course on work safety for senior safety delegates, regional safety delegates and some trade union representatives in work environment questions. Although they have not received any more extensive basic education in the technical or medical field these representatives have to communicate in work safety and health questions with the occupational safety and health specialists, company management, etc. To provide a basis for other, advanced courses on work safety and health for workers' representatives, a thorough evaluation of the experiences of the course was undertaken and presented in a written report.

TRAINING VOLUME
in "participant days"



SPECIALIST TRAINING OF INDUSTRIAL PHYSICIANS; SYLLABUS

Purpose

The purpose of the theoretical instruction is to communicate knowledge concerning the human aspect of working life and the special health hazards entailed by working life. It is also aimed at supplying information concerning the ability of medical care, personnel administration and organizational and technical measures to achieve the best possible working environment and the best possible opportunities of mutual adjustment between man and his working environment.

Practical service in occupational health is designed to give insight and skills essential to the work of an industrial physician.

Duration and design; numbers of courses and participants

The theoretical portion of the training comprises eight weeks' full time studies at the National Board of Occupational Safety and Health in Stockholm. These eight weeks are divided into six one-week periods and one two-week period, spread out over a full year.

Practical service with an occupational health service unit lasts for six months.

Every year two courses are held which are attended by 40-45 persons each. At the commencement of this training, most of the participants are already employed as industrial physicians and therefore do not need to complete the special period of practical service otherwise included in the training course.

Subject content

The subject content of the theoretical part of the training is as follows.

<u>Course week</u>	<u>Content</u>
1	The organization of occupational health services and their place in the firm and in society Occupational medicine and hygiene
2	Occupational medicine and hygiene, cont.
3	Laws and regulations, opposite numbers and forms of co-operation

<u>Course week</u>	<u>Content</u>
4	Ergonomic work place assessment and design
5	Psychosocial questions in the work environment
6	Job placement, rehabilitation and epidemiology
7+8	Alternative programmes concerning, for example, occupational health services in State enterprises, occupational health service centres; problems concerning the working environment in the engineering industry, chemical industry, forestry and agriculture etc. The programmes are drawn up to suit the special interests and backgrounds of the participants.

Most of the period of practical service is devoted to practical occupational health service, but time is also allotted for the study of organizational and administrative questions and other questions relevant to the work of occupational health services. The trainee is tutored by the responsible physician at the company concerned.

Forms of instruction and examination

Instruction takes the form of lectures, group discussions, applied exercises and private study. Trainees passing a written test and -where appropriate- completing their period of practical service are awarded an industrial physician training diploma.

SPECIALIST TRAINING OF INDUSTRIAL NURSES; SYLLABUSPurpose

The theoretical instruction is designed to convey a knowledge of the health hazards and accident risks of working life together with a knowledge of medical and technical measures for their prevention. It is also designed to convey a knowledge of human aptitudes and limitations in terms of medical science, industrial physiology and industrial psychology, as well as an understanding of the application of these disciplines in the adjustment of the environment to man and the placement of employees in suitable surroundings. Finally, the instruction must convey a certain proficiency in the communication of health information.

Duration and design; numbers of courses and participants

In the case of nurses who are not employed as industrial nurses at the commencement of the training, the theoretical portion comprises eight weeks' full time studies at the National Board of Occupational Safety and Health in Stockholm. These eight weeks are divided into two periods of six weeks and a fortnight respectively. Between the two periods comes a three-month period of practical service with an occupational health service unit.

The training undergone by practising industrial nurses comprises eight weeks' theoretical instruction divided into 2-3 periods of 2-4 weeks each, spread out over between six and ten months.

At present three training courses are arranged every year for practising industrial nurses, and each of them is attended by 45-48 persons. One course is arranged every year for nurses who are not practising industrial nurses at the commencement of their training.

Subject content

The theoretical portion of the training has the following subject content.

Occupational health service	50 hours
Ergonomics	50
Work safety	15
Occupational medicine and hygiene	50
Industrial psychology and social medicine	45
<u>Miscellaneous activities</u>	<u>15</u>

225 hours.

The overwhelmingly greater part of the period of practical service is devoted to practical occupational health service. The practical service is performed under supervision at an occupational health service unit. The trainees also prepare -mainly during their period of practical service- a special paper on a subject relating to occupational health services.

Forms of instruction and examination

The training includes instruction in theoretical subjects, group work, field visits, private study etc. After the trainees have passed a written test, presented the special assignment mentioned above and -where appropriate- completed their period of practice in occupational health services, they are awarded a diploma certifying their completion of the course of training for industrial nurses.

SPECIALIST TRAINING OF INDUSTRIAL SAFETY AND HYGIENE
ENGINEERS; SYLLABUS

Purpose

The purpose of the theoretical instruction is to furnish knowledge concerning the hazards of working life and the way in which they can be measured and evaluated, and also concerning the technical adjustment of work, work processes and work environment in order to achieve positive working conditions.

The purpose of the period of practice in occupational health services is to give the trainee such insight and skills as are material to the work of an industrial safety and hygiene engineer.

Duration and design; number of courses and participants

In the case of engineers who at the commencement of the training are not yet practising safety and hygiene engineers, the theoretical portion of the course comprises 15 weeks' full time studies at the National Board of Occupational Safety and Health in Stockholm. These 15 weeks are divided into two periods of 12 and 3 weeks respectively. A six-month spell of practice in occupational health services comes between the two periods.

In the case of practising safety and hygiene engineers the training comprises 14 weeks' theoretical instruction. These 14 weeks are divided into 7 periods of 2 weeks each, spread out over a full year.

At present one course is arranged every year for practising safety and hygiene engineers and another for engineers who are not yet practising safety and hygiene engineers. Each course is attended by 45-50 engineers.

Subject content

The theoretical portion of the training has the following subject content:

- | | |
|---------------------------------------|----------|
| 1) Ergonomics | 45 hours |
| 2) Industrial hygiene | 155 |
| Chemical health hazards | |
| Ventilation and heating
technology | |
| Vision and lighting | |
| Radiation protection | |
| Acoustics and noise control | |

3) Work safety Legislation, insurance and collective agreements Safety engineering	70 hours
4) Environmental hygiene	20
5) Methods of investigation and information (including a certain amount of time reserved for the presentation of a special assignment)	35
6) The organization of occupational health services	15
7) <u>Miscellaneous activities</u>	<u>25</u>
	365 hours.

The overwhelmingly greater part of the period of practical service is devoted to practical occupational health service work. Time is also spent, however, on studying organizational, administrative and other questions with a bearing on work in the technical sector of occupational health services. The trainee is tutored by the senior safety and hygiene engineer of the firm or administrative authority concerned.

Forms of instruction and examination

Instruction comprises sub-courses (followed by written tests) and general subjects, and it takes the form of lectures, demonstrations and exercises, group discussions etc. The special assignment included in the training course is primarily a form of instruction and examination. In the second instance the special assignment can contribute towards the solution of an acute problem at the trainee's firm or within the firm where he does his practical training. Trainees passing all the written tests, completing their special assignment and -where appropriate- completing their practical training in occupational health services receive a diploma certifying their completion of the industrial safety and hygiene engineer training course.