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DEMOCRATIZATION OF THE WORLDS OF LIFE AND WORK. THE "SOTECH-PROGRAM" (1) OF NORTH RHINE-WESTPHALIA

1. The NRW-Program "Man and Technology - Towards a Socially Compatible Implementation of Technologies" (SoTech-Program)

In 1985 the state government of North Rhine-Westphalia (NRW) launched its "Initiative on Future Technologies". The economic and ecological renewal of NRW has been supported by technology policies that are broadly based and socially flanked. The initiative was funded with a budget of DM 400 million and consisted of four major parts:

- The program "Future Technologies" focused on specific technologies related to special needs of NRW: environmental technologies, microelectronics, measurement and control engineering, information and communication technologies, biotechnology, humanization technologies, and technologies concerning the production and testing of materials.
- Support of technology transfer for small and middle-sized firms.
- Technology oriented research policies in the eight areas mentioned above.
- The state program "Man and Technology - Towards a Socially Compatible Implementation of Technologies".

To give the reader an impression of the importance of the last part of the state initiative: Between 1985 and 1988 this part of the program was funded with about DM 60 million. Thus 15% of the total budget of the state initiative on future technologies were allocated to the program "Man and Technology - Towards a Socially Compatible Implementation of Technologies" (Heinemann, 1988: 4).

In the context of the SoTech-Program 109 projects were carried out which were concerned with either research on the implementation of these technologies or with the implementation itself. The goal was to enable those affected by the new technologies

- to get informed on new technologies,

- to use technologies in a responsible way both for other human beings and for nature;
- to develop alternative technologies;
- to find access points or ways for the participation of those affected by these technologies.

The SoTech-Program focused on microelectronics and on the new information and communication technologies. In order to assess both the risks involved in these technologies and their potential for social progress, research teams at different institutions received financial support. The teams came from a wide variety of institutions, such as universities and other research institutes, institutions concerned with (continuing) education, but also interest groups such as trade unions. Practically all sectors of society were represented by research teams usually consisting of two researchers working for a period of two years. The main emphasis of the program was on projects concerned with employment and labor in the secondary sector.

2.Growing structural problems in North Rhine-Westphalia

The "Initiative on Future Technologies" was launched by the government of NRW in view of the growing structural problems of this state. For a better understanding of these problems, it is important to know that NRW covers 13.7% of the total area of the Federal Republic. Its share of the total population of the FRG is 29.3% and its share of domestic GNP is 29.5%. The regions of NRW also differ considerably: The old industrial heart of Germany, the "Ruhr" area with its coal and steel industry, is part of NRW, but also the highly modern industrial and service centers along the Rhine, the brown coal district in the western part and the agricultural regions in the northern and eastern parts of the state. The economy of this differentiated area, which was put together in one state only after the Second World War, is currently undergoing a profound restructuralization process including both elements of deindustrialization and modernization.

While unused industrial capacities are dismantled and unprofitable production sites are abandoned, companies are at the same time modernizing and rationalizing their production. The activities concentrate on the introduction of new production technologies coupled with a diversification of established products. Thus it is true that the productive apparatus of large parts of the industry of the Ruhr area is not out of date; on the contrary, it is highly modern. Those companies which have for a long time shaped the structure of the Ruhr, have continuously modernized, automated and rationalized their old production capacities without, however, building up new growth potentials in this area with the help of product innovations. They became more diversified instead by taking over other firms in Germany and abroad. Due to the simultaneous processes of deindustrialization and modernization, the region now faces numerous social problems and new risks. However, opportunities have arisen to improve the working and living conditions. Some aspects of this change should be mentioned as an illustration:

- The restructuring process is coupled with a profound change in job

qualifications. For example, the profile of skills required from a blue-collar worker who was trained on his job in industries producing raw materials or production goods is increasingly becoming obsolete. The same holds for workers on the assembly line, where many production steps which had been "taylorized" in the past are undergoing automation resulting in completely new work patterns. The rationalization of office work provides another example of how new information and communication technologies induce change in the industrial and the service sector.

- The more those whose jobs are affected by this change are involved in the introduction of new machines and new forms of organization, the more successful their companies will cope with this process. Participation of employees in the introduction of new technologies helps to avoid costly errors and friction, enables firms to find more productive work arrangements and can increase the motivation and creativity of the work force. However, it seems generally true that neither management nor union representatives are able to enter non-hierarchical work-relationships, since almost all of them are still accustomed to the tightly regulated, hierarchical and highly specialized social relationships prevailing in the era of standardized and inflexible mass-production that is slowly coming to an end.

- The increasing use of information and communication technologies in firms and private households brings about change in the traditional separation between work and leisure and in well-established patterns of specialization and social control both within the factory and inside the reproductive sector. Several questions are being raised: Who benefits from more flexible work schedules? Will the amount of work being done at home with the help of new information technologies increase? To what extent will telework become accepted? Will the division of labor between the sexes change due to the new technologies? What will be the impact of system networks on individual liberties? The answers to these questions are not only determined by the kind of technology that is applied. They will be found in social and political conflicts, and they have repercussions for the productivity of society as a whole and for its quality of life.

The simultaneous processes of deindustrialization and modernization create social tensions and shifts in the distribution of power. The ability of trade unions to organize and intervene is likely to decline; the relationship between trade unions and social-democratic parties is about to change and the new social movements as well as the growing number of floating voters point to the loosening ties between catch-all parties and the electorate. These facts provide the economic and political background which gave rise to the SoTech-Program and which should be used as a yardstick for its evaluation.

The development of a program which tries to introduce social criteria into the implementation of new technologies was based on the intention of the state government of NRW to react to and to channel political demands for a socially inspired technology policy. The question as to whether the policies devised by the experts of the state bureaucracy met these political goals cannot be answered in this context. However, it should be mentioned that a policy program formulated by a state bureaucracy creates its own momentum. The SoTech-Program, too, has developed into a much more multifaceted approach than was to be expected at its political inception.

3. The main ideas of the program

The Program "Man and Technology - Towards a Socially Compatible Implementation of Technologies" was based on a simple idea: The configuration and organization of technological systems is always the result of a complex social process shaped by economic, technological, social, political, regional and cultural factors. This is particularly true for production systems, for infrastructure and network technologies. Technologies such as microelectronics or the new information and communication technologies are malleable in so far as their application and implementation is extremely variable due to the involvement of many different actors. The program was designed to influence this process of technology implementation in order to ensure that the application of these technologies takes into account legitimate individual and collective interests and constitutional norms such as the welfare state provision in the Basic Law of the Federal Republic of Germany.

These remarks should preclude the misunderstanding that technology cannot be shaped in a socially compatible way. Only a very rudimentary understanding of technology assumes that technology is not malleable. This holds true only if technology is reduced to a method used to solve a specific problem. In such a case one refers to an abstract principle that, for logical reasons alone, cannot be varied and therefore shaped. But if abstract technical principles such as technologies are employed, this implies malleability. Several levels of malleability can be discerned, such as:

- the definition of the problem to be solved with the help of a specific technology;
- the development and selection of different solutions;
- the optimization of the selected solution with respect to different conditions of realization (e.g. production costs or risk potentials);
- the construction and development of a specimen or pilot construction;
- the specification of the conditions of application;
- the improvement of a particular product and the production process;
- the organization of production and marketing;
- the exclusion and delimitation of unintended consequences and risks with the help of technological, social and legal regulations;
- the disposal of the pollution created by technological systems.

Technologies are shaped on each of these levels, and whenever such

shaping takes place, social criteria are applied either implicitly or explicitly. The process of development, construction and production is a social one since it involves labor. The same is true for the distribution of goods and for their use.

Once it has been acknowledged that the process of technology production and application is a social one, then the meaning of the concept "socially compatible implementation of technologies" becomes evident. The concept refers to:

1. the processes of production and distribution and
2. the processes of usage and application

and it aims at:

1. a "human-oriented" structuring of the interface between technical systems and human beings and
2. the social acceptance, acceptability and controllability of technological systems (cf. Simonis, 1988a, 1988b).

In the areas of production and application, technology is always shaped by social factors. A political program, which aims at readjusting this process so as to make it socially compatible, intervenes in ongoing processes that are social in any case. Thus two important questions arise: What are the criteria of social compatibility on which the government should base its policies? And: How can these criteria be justified as a guide line for public policies?

Defining objective standards for social compatibility will hardly succeed. While it is true that the criteria can be put in perspective by relating them to other standards or value hierarchies, a widely applicable system of criteria based on a broad consensus would still be far out of reach. The SoTech-Program tries to find a way around this problem of legitimation. On the one hand it gives social and political actors a chance to discuss these criteria and to decide for themselves; on the other hand it supports activities and experiments aimed at stimulating social innovations which are necessary to cope with technological change.

The main ideas of the program "Man and Technology - Towards a Socially Compatible Implementation of Technologies" can be summarized as follows (cf. also Alemann, Schatz, 1987; RISP, 1988; Heinemann, 1988; Simonis, 1988b):

3.1 Structuring technology: A process of social innovation

The system of social institutions and regulations, which up to now guaranteed the social compatibility of new technologies with considerable success, seems less and less likely to cope with present and future requirements. New technologies are introduced at an increasing speed, while the depth with which they penetrate the ecological and social

environment grows at the same time (Gleich, 1988). With growing international competition and globalized production, there is an international race for technological innovations. The new technologies resulting from this globalized scientific-technological innovation system are not per se compatible with the natural or social environment. They have to be analyzed with regard to their social usefulness and to be adapted to the respective national or regional social conditions. As long as technological change occurred at a relatively slow speed, it was possible to rely on spontaneous social adaptation without entailing major social risks. With new technologies being introduced more rapidly and penetrating society more deeply, the risks involved in this "trial and error" procedure grow as does, concomitantly, the need for collective support. The dynamic and highly hazardous technological change requires social institutions that react dynamically in accordance with the technological change. One has to learn how to deal with new technologies; social infrastructures such as regulations and control mechanisms have to be developed; negative social consequences have to be limited and to be compensated for; opportunities to increase the scope for autonomous action and to improve the quality of life have to be seized upon. The SoTech-Program supports this process of social innovation and subjects it to a debate on the theme of socially compatible implementation of technology.

3.2 At the center of attention: Those affected by new technologies

The new dynamic of the scientific-technological innovation-system and the production of technological innovations, driven mainly by international competition and thus uncontrolled by society, have repercussions on all the other subsystems of society. Every employee has to face these technologies at his place of work; every citizen, old or young, whether at home, in his leisure time or in his role as citizen, has to deal with new technological products. Everybody is affected by this spread of new technologies occurring at an ever increasing speed, the impact being positive or negative with varying intensity. This broad and comprehensive impact constitutes one of the basic premises of the SoTech-Program. The program approaches its task of technology implementation by taking the perspective of those who are affected by new technologies and who are unable or only insufficiently capable of adapting to a changing technical environment without public or social support. The goal of the program is to improve the ability to use the new information and communication technologies without fear as a tool and to shape the application of these technologies according to one's own legitimate interests.

3.3 Structuring technologies through participation

Many social groups seriously lack the opportunities to acquire new technologies or to influence their development, implementation or application. Legal, political, economic, social and psychological barriers have to be overcome. That is why the SoTech-Program tries to enhance the opportunities for participation of those affected by the new technologies and to improve their ability and willingness to shape these technologies. In our economic system the impact of the state on the

implementation of technology is very restricted. However, it can interfere indirectly by creating opportunities for participation or by enhancing the ability of individuals to participate in the implementation of technology. Without excluding direct methods of state intervention, the SoTech-Program gives priority to indirect methods of control: With the help of information, education, qualification and advice, employees and consumers should be enabled to participate more vigorously in the social process of technology implementation.

3.4 Creating social experiments through research involving changes of reality

Social experiments constitute an important, but up to now little used instrument for technology implementation by state agencies. Specific forms of technology implementation and application could be tested as examples in such experiments. In the framework of the SoTech-Program, small groups of researchers were given the task to carry out experiments of technology implementation in cooperation with societal actors of their own choice, such as firms, municipal administrations or voluntary associations, and to report on their results. Research teams were selected who planned to test new methods of participatory software development, to design new models for training or to explore new forms of participation in the introduction of information and communication technologies in public administration. These project teams usually consisted of scientists from different disciplines, who accepted the task of carrying out applied research involving changes of reality.

3.5 Discursive technology assessment

The research involving reality changes is accompanied by numerous analyses which evaluate the social consequences of microelectronics and of the information and communication technologies. Since technology assessment always involves values and interests, one objective of the SoTech-Program was to support discussions in the social and political arena in which the consequences of the information and communication technologies are subjected to controversy between different interests by giving a voice to groups affected by these technologies who usually lack the ability to make themselves heard. Only if the political discourse on new technologies involves a broad range of different viewpoints, the unintended and negative external effects of new technologies can be discovered and the amount of convergence between different interests can be ascertained. If "acceptance gaps" exists with respect to particular new technologies, it is better to diagnose them as soon as possible in order to be able to adjust the development process accordingly. In a democratic risk-society, neither private firms nor the state can rely on new technologies being accepted by the population only because the state has ordered their implementation or firms have employed or offered them. Creating a viable and lasting consensus requires a decision-making process which takes different interests and values into account, i.e. a process of consensus-building on technology policies which allows different interests to be articulated and values to be asserted and accommodated.

3.6 The interrelation between reproduction and the working world

The SoTech-Program focuses on microelectronics and its applications, i.e. on information and communication technologies. An important characteristic of technologies based on microelectronics is their broad spectrum of applicability and impact. All spheres of the working world as well as reproduction in a broader and a narrower sense are affected. There are interrelationships such as changes in the working world that influence the conditions and forms of reproduction; new life styles in the private sphere and changing patterns of relationships between the state and its citizens react upon the qualifications of employees and their work situation. As examples one could point to shorter and more flexible work schedules or to the informatization of private households, which at the same time lead to modifications in the production and use of services. There is no historical precedent for a public program of technology implementation which examines these socials changes in order to be able to structure them.

3.7 Contributions to the modernization of regions

The consequences of the restructuring of society and economy vary considerably between different regions within North Rhine-Westphalia. Centers of growth are located next to impoverished crisis areas, which only recently formed the heart of the German industrial structure. As far as this spatial process of differentiation between socio-economic structures is concerned, politics has more or less failed. Neither could the deindustrialization-process of whole regions be effectively contained up to now, nor could the impoverishment of city districts with a high percentage of foreign inhabitants or with high rates of unemployment be prevented. That is why new forms of policy-making are necessary to ameliorate the negative local and regional consequences of economic and technological change and to support modernization processes which have a broad impact. As part of the SoTech-Program, new cooperative procedures for regionally oriented policies aimed at improving local economic conditions were analyzed, developed and put to a test. Several projects dealt with approaches to improve the cooperation between actors in the local field who try to shape the regional development of technologies.

3.8 Communicating and implementing the project findings

Similar to other public programs which analyze the impact of new social problems and contribute examples of solutions of such problems, the SoTech-Program also faces an "implementation gap": Its findings, which are based on intervention research, have to be applied in practical social life. The SoTech-Program used a variety of strategies to reduce this implementation gap:

- Each project team was required to cooperate closely with its target groups, to mobilize them to get involved in activities aimed at structuring new technologies, and to report on their experiences. Apart from that, each project organized its own workshops to communicate the project findings to a larger audience. Thus in 1987

and 1988, 250 workshops were held. Conferences which dealt with broader topics and professional meetings have to be added to this number.

- The Department of Labor, Health and Social Affairs of NRW has opened an office whose task is the communication of the project findings to the public. This public relations office gives not only information to the mass media; it initiated several activities such as organizing professional meetings or competitions, informing local publics, and publishing of brochures and other material. The institution in charge of carrying out this research enterprise, the Rhein-Ruhr-Institute for Social Research in Duisburg, publishes a newsletter on behalf of the Department of Labor, Health and Social Affairs, which presents the different projects of this program. The reports on the various projects are published as monographs in different publication series.

- While the projects were still being carried out and in some cases after the projects had been completed, the institution in charge of the whole project, the Rhein-Ruhr-Institute for Social Research in Duisburg, began to develop policy recommendations for the Department of Labor, Health and Social Affairs. This was done in close cooperation with the research teams. The rationale behind this approach was, on the one hand, to encourage and motivate the societal actors participating in the SoTech-Program (firms, consultation agencies, associations and trade unions, universities, institutions involved in education and continuing education) to apply and to disseminate their project findings without further outside support; and, on the other hand, to encourage state agencies to start initiatives in their own fields so as to cover a broad spectrum of different policies such as social, labor or health policies or support for new technologies or media policies.

4. Conclusion

Policies aiming at social innovations cannot be imposed upon a society administratively. They require the active involvement of all societal groups which have to reach an understanding through discourse. The SoTech-Program of the state government of North Rhine-Westphalia stimulated such an innovation policy in a variety of ways. Information and communication technologies can be structured in such a way that they are open for future revision. That is exactly why the SoTech-Program did not concentrate on recommendations for regulative instruments. The SoTech-Program did not end with a catalogue of regulations and legislative proposals (Alemann et al., 1889), for state intervention into the private sphere of individual citizens or into the social relationships existing in firms and factories would hinder the development of responsible, decentralized and flexible modes of application of a

technology that can be used in such a variety of different environments. Recommendations for state intervention would, moreover, have violated the basic premises of the SoTech-Program. A socially compatible implementation of technologies cannot succeed through the imposition of guide lines. As the research carried out under the SoTech-Program amply demonstrates, its success depends on persons competent enough to implement these technologies and on institutions and organizations flexible enough to move to new conceptions. Finally, a socially responsible implementation of technologies rests upon the SoTech-Network which was developed in the course of this program.

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