How many basic choices do we really make? How many are difficult?

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I have been asked to write about some of the choices I have had to make as a scientist - choices relating to social responsibility. This is a very dangerous task, since it may easily become a tale of a battle between evil and good, with oneself as the hero. In fact, I do not know how to avoid that trap: there have been battles with very much to lose, and one had to mobilize a strong belief in the cause one was fighting for.

Some people believe that scientists lead a noble life, aloof and relieved from conflicts, escaping annoying decisions, only guided by the quest for new discoveries and truths, so different from the tumultuous and hazardous existence of a businessman. Other people, like myself, would rather state that being engulfed in the research and development jungle, one is sometimes longing for the peace and safety of the marketplace. This is only a general remark, and my paper will not live up to any expectations raised by it.

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Informatics (computer science) and Operational Research (OR) emerged as sciences in the wake of the last world war. I started at the University of Oslo in 1945, with computing in 1948, programming around 1950, and with Operational Research in 1952. I got my cand real.-degree in Mathematics in 1956, having worked (mostly full time) at the Norwegian Defense Research Establishment (NDRE) since 1948. From 1956 on I had the task of building up the use of OR in the Norwegian Defense. I was active politically from 1945 on in the non-socialist but left-oriented party "Venstre" ("The Left", corresponding to e.g. the left wing of the British Liberals).

For me informatics and OR have always been closely related, and I tend to see many tasks in informatics from the perspective of OR. I left OR in the mid-1960s, however, mainly because the OR community in my opinion became too obsessed with optimization and too little with decision support, and because it failed to realize that a thorough knowledge and mastery of the computer is a necessary part of competence in OR.

A main and, at the time, largely undebated assumption in the development of the post-war culture was that "technological progress happens, it is politically neutral - and good!". (The concern about atomic weapons was one of the exceptions.) In Operational Research, however, the situation was somewhat different: The task was to find the best use of men and equipment, dependent upon a stated set of objectives. If the objectives were modified, the "best use" changed. Also, the development of new equipment had to be fine tuned to a proper understanding of the objectives of the decision-makers. And those objectives could be highly political, particularly in the military field. The application of OR techniques to conflicts between interest groups within organizations was an idea dear to an OR researcher.

Our OR work turned out to be quite successful, and that created an unexpected

conflict. I wanted OR to be a science and our work to be research, providing support for decisions made by those having the responsibility for the activities we analyzed. I discovered that many in the military establishment were only too happy to have the researchers point out "the correct solution" to some of the hot issues, and that my Director at the NDRE was only too happy to see a development that gave more power to his institute. I tried to counter this by being very careful in pointing out which conclusions could be validly drawn from our work and also the factors that we had not taken into account. I felt that unless we did, both OR and the decision structures would be undermined.
The military people appreciated this attitude after some clarifying discussions. The conflict with the Director developed further, and as a consequence I left the NDRE in 1960 to build up the Norwegian Computing Center as a research institute in computing and OR.

The conflict also made me aware of corresponding problems in keeping democratic control in the planning processes in Norwegian politics, both at the local and at the national level. As a result, a debate was initiated among planners about our professional role, and I once more went into party politics. (At the time when Simula was finished, I was the chair of my party's Strategy Committee. Soon after I became a member of the 5-person top leader group of the party whose parliamentary group then participated in the Norwegian coalition government.)

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When the first version of Simula, Simula I, was made available in the spring of 1965, it was immediately used in a series of jobs in Norway and, even more, in Sweden. It was of course fascinating to see the tool we had developed being put to practical use and influencing the design of organizations and production facilities.

It was evident that the Simula-based analyses were going to have a strong influence on the working conditions of the employees: job content, work intensity and rhythm, social cooperation patterns were typical examples. The impacts clearly tended to be negative. Not surprising, since the analyses were founded upon a Tayloristic view of management.

My own sympathies were with the employees, and the question was unavoidable: Should I continue to support the propagation of a tool that to a large extent was used against those I wanted to show my solidarity?
As I have told, it was not at all a new experience for me that research had implications in politics. But these had mainly been consequences from one world into another, relating to commonly hailed democratic ideals. I was active in the research world and in the political world, but they were separate.

Now matters were different: The demand I had to make was that analyses should be made as in Operational Research. The "best use" of labor and equipment ought to be evaluated both from the objectives of management and from the objectives of the employees, taking into account that these objectives normally were at least partially conflicting. The alternative "best" solutions should then, in my opinion, be communicated to both management and labor.
I realized of course that this demand would not be accepted by the users controlling

the resources for the applications of Simula in business and production planning. When I tried to state my views, I was not taken seriously, as expected. The question then became: May more realistic alternatives be created?

I could not disinvent Simula, and I also believe that computers enrich the set of feasible social structures. I did not believe that I could find "a general solution". In the beginning of 1967 I decided to contact the Trade Unions and propose the building up of competence in information technology within their ranks.

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As it happened, the Trade Union School at the same time had decided to ask me to lecture at a course named: "The Trade Unions Facing the Future". The lecture was followed by many more, and it was quickly understood that it was necessary for the unions to develop an information technology policy. A discussion group was formed, and it is interesting to note that a large fraction of the young trade unionists in the group are among the top leaders of the Norwegian Trade Unions today.

Politically, the end of the 1960s were also for me quite eventful. I started doubting my engagement in traditional party politics, and left the Liberal Party when I realized that I had become a socialist. I was the chair of the committee on environment problems within the Norwegian Association for the Protection of Nature for a couple of years, and I worked closely with socially outcast alcoholics in an alternative institution experiment. Both tasks showed me other realities, very different from those I had known before.

You have observed that the main personal pronoun used till now has been "I". This does not mean that I was working alone. On the contrary, nearly all my work has been done in teams. But the decisions discussed above were made by me. From 1967 on I became a member of a group within a broad, democratic movement genuinely representing the interests of the workers. (In Norway unionization is at the 80% level.) It was no longer a question about what I felt was good for other people, but instead participation in a collective effort to shape a strategy for all of us.

The group members came from a wide range of sectors in the society: Job shops, chemical plants, transportation, white collar work, hotels and restaurants, the public sector. I was the only researcher in the group and had for that reason special functions in our work. But the other members had their own areas of competence, equally important for the task.

We first discussed possible consequences of the imminent introduction of information technology in various sectors, then how we should build up our own competence. We never considered building that competence by teaching to union members the curriculum used by programmers, engineers or managers. Knowledge is organized for a purpose and reflects the world view of the authors in terms of corporate values, power structures, objectives to be achieved etc. Uncritical acceptance of such material would make us brainwash ourselves. What we needed was a reevaluation of the use of information technology based upon the world view of the union members, emphasizing solidarity, industrial democracy, safe employment, safe working conditions, decent wages etc.

Since no such exposition of information technology did exist, we concluded that it was a research task to produce one. In Norway the Royal Norwegian Council for Scientific and Industrial Research is supporting a wide range of projects in information technology, and the Norwegian Iron and Metal Workers' Union decided on its convention in 1970 to apply for money to "evaluate planning, control and data processing, based upon the perspective of organized labor" and to ask the Norwegian Computing Center (where I was working) to carry out the project.

This was the first project application of its kind to the Research Council. It was handed over to its Committee for the Mechanical Industry which, no surprise, had its offices in the building of the association of the employers in that industry. Their responses, internal discussions and attempts at getting control of the project have recently been published in a research report. They are interesting, but the end result was that the Iron and Metal Workers' Union got the funding and the Norwegian Computing Center got the contract.

In order to understand what happened behind the scene, one has to be familiar with the Norwegian labor market situation which, at least till recently, has been rather different from e.g. the US and the British situation. The Norwegian Unions have been both stronger and also more actively interested in having a responsible influence upon company policies. As a result, the employers accepted that all information about the planning, control and data processing systems in four selected company sites were made available to the Iron and Metal Project team.

This does not at all imply that there was no resistance and conflict surrounding the project or the other projects referred to. Those stories do not, in my opinion, belong in this paper.

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The Iron and Metal Project turned out to be very different from other projects. Not only did the shift from a managerial to a labor perspective generate a range of new observations and insights, even the basic criteria for achievement had to be reconsidered.

The project was organized as usual with a steering committee which, as usual was expexted to do next to nothing. In our committee we had key union people. From the very start it became the forum for thorough policy discussions and where necessary mutual understanding and consensus about main decisions was established.

Associated with the project were four local unions at four companies, distributed over the country. They were intended to function as reference fora, sources for information and criticism. The group at the Norwegian Computing Center consisted of two researchers, and we had a very active and helpful contact person in the national union offices acting as our most important advisor.

Our first plan for the project was presented to the steering committee, the local unions and even to the national board of the Iron and Metal Workers' Union in the spring of 1971. It was well received, and well conceived (we believed). We intended to

examine the planning systems being used in the four companies, interview the local union members about what they wanted (and did not want) from the systems. Then we would examine the possibilities for modifications of the systems to make them conform better to union objectives. From this we wanted to extract guidelines both for system design and for trade union policies relating to new systems.

During the summer 1971 I felt more and more uneasy about this plan, but I could not spot what was wrong. Gradually it dawned upon me that our strategy would produce some reports about systems, and two researchers who had knowledge on behalf of the union members. The reports and the knowledge would not be linked directly to the action possibilities of the local unions, and no action strategy would be developed and tested by the unions themselves. No comprehensive learning process was incorporated, and the interviews would be of limited value when no serious knowledge had been built among the members.

The reorientation was painful, but eventually we chose to tell the steering committee that we had to completely change the project plan. I hope that similar choices will not turn up too often in the future.

The key decision was the acceptance of the following statement:

"In most research projects the results of the project may be said to be what is written in the project reports. In this project another definition will be applied: We will regard as results actions carried out by the trade unions, at the local and national levels, as a part of or triggered off by the project."

The statement was even, at the insistence of the researchers, made subject to vote and passed unanimously.

The immediate consequence was that the local unions got a new and pivotal role. The task was to create knowledge-building processes locally, and to initiate action relating to the local situation, supported by analyses made by the researchers and working groups of local union members and elected shop stewards. The researchers became consultants and participants in a mutual learning process.

Each of the four local unions formed working groups. Approximately 30 members participated at each site, split into groups of 6-8 members. Each local union selected tasks they wanted done, and the results of their work appeared in reports, to a large extent also written by the unionists. The reports were presented at meetings with the rest of the members, and important decisions were subjected to ordinary decision-making procedures.

One of the unions made a "Company Policy Action Program", concentrating upon the planning of work within the union itself. Another made a comprehensive study of a production control information system, and succeeded in modifying the system in a number of important ways. The other two unions also produced interesting results, according to the above definition.

The main result of the project was a self-sustaining process which did not depend upon the presence of external researchers and project money. In 1975 an agreement (the "Data Agreement") was signed between the Trade Union Congress (corresponding to e.g. AFL/CIO) and the National Federation of Employers, stating

the right for the trade unions to be informed and participate in the development and introduction of computer-based system impacting upon their working conditions. They got the right to elect specialized shop stewards ("data shop stewards") to work with information technology issues. there are ca. 2000 data shop stewards in Norway today. They also have the right to negotiate privacy issues. We do not have many, if any, information systems spying upon its users.

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What we gained in terms of general knowledge was a much better understanding of system development and cooperative knowledge-building processes. Today these insights are more relevant than ever, particularly in the area labelled "Computer Supported Cooperative Work".

A standard question during the numerous confrontations with "mainstream" people in the 1970s was: "Do you agree that your work with the unions is politicized research?"

Our standard reply: " You may get the answer you want - ‘yes’ or ‘no’ “. If you regard the research along traditional lines going on in research institutions as politicized, reflecting the interests of management - then the answer is "yes". Our research is also political. If your regard traditional research as non-political - then the answer is "no"."

The Iron and Metal Project was followed by other trade union projects carried out along similar lines, both in Denmark, Sweden and Norway. A number of gifted young researchers were running these projects together with trade union members. A community sharing a common basic perspective on system development emerged and was joined by other competent scientists doing other kinds of projects.

We felt that the effort we were engaged in was urgently needed, and that it was necessary to avoid that any single person became indispensable. This was easy to state but somewhat less pleasant to experience: When two Danish colleagues told that we for the first time had been asked to give a one-week course at the Danish Trade Union School, I enthusiastically started to discuss how we should do the course. I got no response, and finally they told me that they had decided that I should not participate, except perhaps during the last day. Cooperation with Danish unions should be handled by Danish researchers. Yes.

I have been criticized for not using more time in the 1970s to promote the Simula language. Many other people have done a much larger job than I. It was a conscious choice. Should a single idea or project use up your whole life as a researcher? Simula (and object oriented programming) is like a child: You have helped create it, you are responsible for its young years, you must see to that it gets a chance to succeed. Then your responsibility ends. You may be proud of it, wish it well, but realize that it will develop on its own and is no longer your property. Your duty is now to care for the new baby and then for any future children.

In addition, the Iron and Metal project demanded attention. My intention was initially to supervise the activities in that project. Then I had to realize, as my boss

and a colleague strongly pointed out to me, that a failure for the project would mean that it would be the last of its kind. I had to work full time for nearly three years.

When the project was finished, the results had to be turned into an activity which could survive as an ongoing and integrated part of trade union work. To contribute to the initiation of similar activities in Sweden and Denmark was regarded as having second priority. This implied that the dissemination of information about the project in the scientific community only got third priority, and the researchers in the project never published any comprehensive account about the Iron and Metal Project in English. Much has been said about the projects by others, but I still feel that many of the most important insights have not been recorded properly. The original reports in Norwegian are still being referred to but, I suspect, never read. Reference lists are mostly proofs of awareness of what one ought to have read, and Norwegian is understood by less than 15 million people (and spoken by less than 5 million).

I regret this situation, particularly since I believe that much of our hard-gained practical experience in how to do this kind of research is just as relevant for publication today as then.

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After the Iron and Metal Project it became important to make what had been understood about the system development process and the societal implications of information technology a part of academic teaching and research on information systems. As a part of that process I ended up as a university professor (there were additional reasons) working in teams with students - many now colleagues - trying to build up an alternative curriculum in system development.

A main problem was to get our field accepted as first-class research. It was at that time frequently referred to as "boxology". Informatics is populated with people like myself, having a background in mathematics, natural sciences or engineering. Most of us share a common arrogance on behalf of our fields and a lack of understanding of social sciences and philosophy, two areas providing essential knowledge for any serious approach to system development. A strategy was definitely called for, even if colleagues at our own institute supported us.

The first part of that strategy was to make our courses very real-life oriented, with theory that was both demanding and useful in practice, and very tough. The second part was to be always active in explaining, arguing, defending, attacking when necessary. The third was to embark upon sufficiently ambitious (and thus risky) research projects.

The fourth was an agenda for myself: I decided that I would have to stay active both in traditional informatics (programming languages) and in system development, and also acquire and keep updated "hands-on" familiarity with important new developments (workstation hardware and software). If I succeeded, everyone would have to admit that we at least had some real qualifications. (In addition all three areas are great fun.) Or, more seriously: My work in languages could be used to legitimize our work on system development. This may sound silly, and perhaps it is. But it has worked.

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Reading this paper I start wondering. How many basic choices were really made? The political work combined with the implications of Simula led to the Iron and Metal Project. The Iron and Metal Project led to cooperation with unions in other countries and to the building of our approach to system development. We had to try to introduce those ideas to education and academia.

The basic Simula ideas were generalized in the Delta system description language, providing a first platform for the unifying efforts and further generalization attempted in the BETA programming language and for general concepts in object oriented programming. The integration of information technology in professions created the need for an examination of extensions to the concepts and languages of these professions, the agenda for the SYDPOL project. (The project changed content, but that is another story.)

The movement from traditional party politics to work at grass root level helped in shaping the participation and knowledge-building strategy of the Iron and Metal Project. That strategy combined with BETA and the development of the modern workstations created an important part of the research agenda for a large ESPRIT project proposal: The O-4 Proposal (Object Oriented Office Organization) with cooperating teams from France, Great Britain, Denmark, Greece and Norway. We did not get the project, but the agenda remains and has to be carried out in the years to come.

How many basic choices were really made? How many were difficult? When I try to remember, I feel that most choices were consequences, and that those remaining seldom were difficult. We had burnt so many bridges behind us that few options were open - a good strategy for keeping yourself in shape under pressure.

Acknowledgements

I have not given the names of all the persons who have been doing the work referred to in this paper. They are too many, and I will only say this: The Iron and Metal Project was carried out by approximately 120 persons. Two were researchers, one was working at the national union level, the rest were local shop stewards and union members. To work in such a project demands a different kind of self discipline and understanding of your own role than traditional projects. To make this well understood in academia is next to impossible. One has to be exposed to it through own participation. The cooperation in the Iron and Metal Project certainly is one of the most valuable and significant experiences of my work.