User Participation: A Strategy for Work Life Democracy?

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ABSTRACT
Scandinavian system development projects have traditionally put a strong emphasis on user participation. In this paper we discuss to what extent user participation has contributed to work life democracy. We argue that there has been a development from politics to ethics, and that the political dimension should be brought back to system development research.

A reorientation of system development strategies aiming at increasing work life democracy can learn from the historical success stories, in particular the combination of global strategy and local action used in the LO-NAF cooperation projects and the NJMF project. Recent development in technology and work life will, however, introduce new challenges to system development, and the reorientation may include a discussion of what is possible to achieve through system development.

KEYWORDS: user participation, democracy, Scandinavian system development projects

USER PARTICIPATION

The last couple of years, "Participatory Design" has been put on the agenda for computer scientists through professional journals and conferences, eg, the biannual Participatory Design Conferences [Müller et al, 92; Schuler and Namioka, 93] and the special issue on Participatory Design in *Communications of the ACM* [ACM, 93a]. In this paper, we discuss user participation as the historical and conceptual basis for participatory design. The term user participation denotes a set of strategies, methods and techniques that aim at involving the future users of a computer based system in decisions during system design. The degree of involvement varies, as do the degree of actual influence and power. Our aim is to discuss how previous experiences with user participation can be of relevance to system development in the 90ies.

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User participation in system development has been discussed and conducted in the Scandinavian countries for more than two decades [Aarhus, 75; Briefs et al, 83]. Already in 1977, Bjørn-Andersen and Hedberg [77] put forward three reasons for user participation in design:

- improving the knowledge upon which systems are built,
- enabling people to develop realistic expectations, and reducing resistance to change, and
- increasing workplace democracy by giving the members of an organisation the right to participate in decisions that are likely to affect their work.

The first two reasons are rather practical, and found in several system development approaches. The belief is that users' knowledge will improve the fit between the computer system and the work. The third reason is culturally and politically biased, and found in research and ideological literature (eg, legislation, political literature).

Many Scandinavian research projects in system development during the last decades have subscribed to the third reason—to increase workplace democracy. Democratic ideals emphasise the right to maintain a different opinion than those in power, to forward opposing positions, and to build knowledge on an alternative basis to support a different view. Organisations can thus be seen as a meeting place for different opinions, and democratic ideals aim at giving all opinions a voice. Workplace democracy gives the right for all the workers to influence their work situation, through work arrangements and participation in decision making fora. Work arrangements usually concern several interest groups, thus workplace democracy also includes balancing the claims from the different stakeholders. Many of the Scandinavian research projects aimed at increasing industrial or work life democracy, ie, workers' influence at the societal level (cf, next section).

One Scandinavian approach in which user participation has been predominant, has been called the "Collective Resource approach" [Ehn and Kyng, 87] or the "Critical approach" [Bansler, 89]. The paper follows two different trends of the

Collective Resource approach that have ended up being rather different although they share the same starting point, the Scandinavian trade union projects in the early 70ies. We argue that user participation has had a limited effect on creating work life democracy, even if workers' control of the work situation and in the workplace may be strengthened. We find, however, that the conditions for user participation today have changed so much that the strategies for user participation developed in the 70ies and 80ies can contradict the democratic objectives they are supposed to serve. The Collective Resource approach has also been discussed by Bansler and Kraft [92], although from a somewhat different point of view.

We start by discussing the first trade union projects. The next section describes a branch of projects characterised by their focus on design for the skilled worker. Then we look at another project series starting approx. at the same time, with the same basic values, but taking a different path by its focus on use of computers in an organisational context. In the last section we discuss dilemmas of democracy that are not easily solved by current strategies for user participation.

THE SCANDINAVIAN TRADE UNION PROJECTS

Historically, the starting point for user participation in system design was the discussion about the relationship between work and democratic values in Scandinavia around 1960 [Gustavsen, 86]. At that time, it was generally agreed that industry should level the general democratic principles in society, and that opportunities for increased individual engagement should be created as a means to increase productivity and efficiency [Thorsrud et al, 64; Thorsrud and Emery, 70]. A large action programme for improving the working life in Scandinavia was designed and conducted as an industrial democracy programme by The Norwegian Federation of Trade Unions (LO) in cooperation with The Norwegian Employers' Federation (NAF). NAF was interested in rationalisation and improved organisational development, LO wanted to empower the workers. One result from the Cooperation Projects was the modernised *Workers' Protection and Working Environment Act*, acting from 1977 [AML, 77; Sørensen, 92]. AML's *section 12* states that workers and their representatives should be kept informed about systems used for planning and performing work, and about planned changes in such systems. Sufficient education for using the systems, and participation in the design process is emphasised. The main idea is that the workers themselves should control and be responsible for performing work.

Within this cooperative climate, some more explicitly stated political projects were carried out as efforts to support and strengthen the trade unions. Stronger trade unions were supposed to contribute to democracy by giving workers a voice and an opportunity to influence their work situation.

The first political project was initiated by the Norwegian Iron and Metal Workers' Union (NJMF), in a resolution made at the annual meeting in 1970 [Nygaard and Bergo, 74; Nygaard, 79]. The NJMF project started in the beginning of January 1971, and ended before summer 1973. The objective was to apply a workers' perspective on development and introduction of new technology, in order to produce a plan for action that would represent and strengthen the workers' position with respect to introduction and use of computer technology.

The NJMF project emphasised situatedness, ie, that knowledge gained locally should be a basis for the trade unions to act on a central level. The results from the project include technology agreements, textbooks, and vocational training programmes on technology.

The Swedish DEMOS project (DEMOkratiske Styringssystemer), was effective from 1975 to 1979, did research on behalf of the responsible, skilled worker [DEMOS, 79; Ehn and Sandberg, 79]. The basic assumptions were that use of computer technology contributes to rationalising work and deskilling workers, and that there is a fundamental conflict between workers and employers that cannot be resolved. The responsible worker has the right and duty to participate in decisions concerned with both what is produced and how it is produced. Power is not equally distributed between workers and management, however, and a model for negotiations between management and unions on the introduction of computers was proposed. The negotiation model more or less institutionalises the conflict between employers and workers.

The Danish DUE project (Demokrati, Undervisning og Edb) was effective between 1977 and 1980. The objectives were to build resources within unions, to increase the unions' influence on the use of computer systems, and to contribute to a professional curriculum and research programme in systems development [DUE, 78; 79; Kyng and Mathiassen, 79].

The first trade union projects, NJMF, DEMOS and DUE, have some characteristics in common. They were based on the contradiction between capital and labour, claiming that there is an antagonistic relationship between the two. They were striving for a democratic research and development process claiming that researchers have a duty to support those with less power and resources—stating that unconsciously they often support the powerful [Sandberg, 75]. The projects were mainly concerned with the organised work force and mainly with production work. The researchers believed that work life democracy can be reached through trade unions as institutions representing the workers collective.

DESIGN FOR THE SKILLED WORKER

The experience from the trade union projects showed that strong unions may increase the workers influence on technology, but that this is not sufficient. It appeared to be necessary to create alternative technologies as well, to break vendors' monopoly. The next "generation" of projects thus concentrated on technological alternatives.

The UTOPIA project

The UTOPIA project (Utbildning, Teknik, och Produkt I Arbetskvalitetsperspektiv), effective from 1981 to the end of 1984, was a joint research project including several Scandinavian research institutions and the Nordic Graphical Union [UTOPIA, 81].

The goal of the UTOPIA project was to develop technology for graphical workers that contributed to high quality graphical products, skilled work, and a democratic organisation of work. The project aimed at creating technological alternatives for the involved trade union. The project limited its focus to work processes concerned with page make-up and image processing in the newspaper industry. The research site was a laboratory, in which trade union representatives participated as skilled workers.

In order to make a requirements specification for a computer system to support the chosen work process, traditional and more or less formal system descriptions were used. The descriptions was not successful as means of communication as they were too abstract. It turned out to be easier to involve graphical workers in the design process through a rather concrete approach using mock-ups and simulations of computer based work environments [Ehn, 89]. The mock-ups were more or less sophisticated, like paper boxes representing mouse and laser printers, or large paper drawings and (later on) slides showing alternative screen layouts [Bødker et al, 87; UTOPIA, 85]. It has been put forward that one of the benefits from this approach is that the workers do not have to explicate their work processes, they can express their craft skills by demonstrating and doing work. This approach was called "design-by-doing".

The concrete result from the UTOPIA project was a requirements specification for a computer system for graphical workers, delivered to the vendor Liber. A pilot system TIPS (Text and Image Processing System) was developed based mainly on the specification, and the application was tested in some newspaper test sites. However, the vendor ran short of capital before the final development of a commercial product was made, and the application was never taken into use [Ehn, 89].

At the end of the UTOPIA project, the "tool perspective" was developed, summarising the basic ideals of the project [Ehn and Kyng, 84]. The tool perspective is a design approach inspired by the tool design within traditional crafts, and influenced by the workers' control movement [Sandberg, 84]. The computer should be a tool for the skilled worker, and the worker should be in control of the tool. The tool is conceived as a means to form raw material into more refined products—tools are extensions of the accumulated knowledge of tools and materials in a given labour process. A specialised tool presupposes professional skills from the users. The tool perspective fits with the design-by-doing approach.

The basic assumption in UTOPIA was that democracy can be increased by changing the balance of the contradiction between labour and capital, by strengthening the labour side. The labour side can be strengthened through the trade unions. The work force should build its power on knowledge about work—as do guilds and professions. Control over work can be achieved through specialised tools controlled by workers through i) tools requiring specific knowledge for use, and ii) a collective that controls the production of professional knowledge. Computer systems can act as specialised tools controlled by workers, and give the workers more control of their work.

Formal institutions like trade unions are modern versions of the guilds. Like the guilds, trade unions emphasise one group of workers without relating to other groups or the workers collective; they want to control the means of production, and they want to protect the professional interests and jobs of their members. Since democratic ideals emphasise the legitimate right for all groups to forward their interests, research on behalf of one union does not necessarily contribute to a more democratic work life. An example from UTOPIA is the (female) perforator typists. Their work has been seen as typing on PCs the text that journalists have written on typewriters. Their work thus depends on the fact that journalists do not use PCs. Gunnarson and Lodin [83] discuss how the new technology can benefit the perforator typists' jobs arguing that they take over some of the work tasks traditionally performed by graphical workers. It is difficult to spot effects of this view in the concrete work agreements approved by the UTOPIA project (eg, [Dilschmann and Ehn, 84]).

We find that the UTOPIA project can be seen as an continuation of the history of guilds and trade unions to support graphical workers at the expense of women and unskilled men in the composers' room, described by Cockburn [83]. Consequently, the UTOPIA project has not contributed to workplace democracy where all different stakeholders have a voice in the design of the new computer system. Besides, the laboratory setting of the design process may have weakened the possibility for influencing real life work situations. The basis for design of the TIPS system was control of the craftsmanship by one occupational group rather than support of a set of work tasks carried out by that group in coordination with other occupational groups.

Cooperative design

The UTOPIA project has inspired research on user participation in the 90ies, eg, projects like the AT project [Bødker and Grønbæk, 91], and books like "Design at Work" [Greenbaum and Kyng, 91] and the thesis "Cooperative prototyping" [Grønbæk, 91]. The basis for these is the tool perspective and the design-by-doing approach. The basic assumption is that a computer system that fits work and is controlled by the worker can improve his/her work situation. The process of developing the system needs to be influenced by the worker in order to get a good "tool". Focus is on how to conduct a participatory design process in which users can influence the system. The design process is closely tied to a concrete work situation.

Cooperative design is described by, eg, Bødker and Grønbæk [91]. The future use situation is the focus of the design process. In addition to what is described through formal system descriptions, it is important to pay attention to tacit knowledge and implicit, shared understanding. Even if possible conflicts within the organisational context is discussed [Bødker and Grønbæk, 91], the emphasis is put on activities for facilitating user involvement in the design process. Cooperative prototyping may uncover conflicts, but the "conflicts cannot be dealt with or resolved by experimental design" [Grønbæk, 91: 47].

Greenbaum and Kyng [91] includes a collection of techniques for cooperative design (and analysis). Many of the contributors place themselves within a tradition of workplace democracy and worker participation in design. Greenbaum and Kyng argue for participation emphasising usefulness and quality of the product, ie, influence on the work situation, not workplace democracy.

Cooperative design certainly supports user participation. But the focus on process, action, and situatedness tends to disconnect the design process from the larger organisational context in which power is enacted. The scope is the design process itself, viewed as a rather harmonious dialogue between designers and users about the design of a particular computer application. For a cooperative design process to increase workplace democracy, the design must be realised in a computer system. In addition, an organisational willingness to introduce the proposed changes is required. If this is not the case, the participatory design process becomes a nice experiment for those who participated—but the democratic ideals turn into an illusion, as argued in [Procter and Williams, 92].

USE OF COMPUTERS IN AN ORGANISATIONAL CONTEXT

The second branch of projects also had their basis in the first trade union projects, and shared the same values, ideas, and beliefs as UTOPIA. Due to practical differences, however, the projects developed differently, towards a focus on the organisational context rather than the skilled worker.

The Florence project

The starting point for the Florence project, which took place between 1984 and 1987, was a concern that the large computer manufacturers would have too strong influence on workplaces. Computer systems based on the knowledge of a profession would be an appropriate answer to computer systems mainly aimed at automation and rationalisation, delivered by the large manufacturers. The Florence project chose to focus on nursing because it is a profession interacting with other professions; it is female dominated (as opposed to previous trade union projects), and it is mainly oriented towards non-production work.

Before the Florence project started, the "application perspective" was developed as a background for the research, cf, Bjerknes and Bratteteig [84]. The application perspective emphasises that computers must be understood in the context in which they are used; knowledge needed to maintain the daily work routines should be the basis for design as opposed to production routines; people are superior to computer systems; and the benefit of the computer system should be measured with respect to the benefit of the users, not of the organisation as a whole.

The aim of the Florence project was to build computer systems for nurses' daily work, based on their professional language and skills. The technological solutions should be tested in real work situations. To avoid the bias from one workplace, the project decided to involve at least two hospital wards. Due to the workplace orientation it became difficult to maintain a strict bias towards the nursing profession; other occupational groups, like medical doctors and nursing assistants, had to be considered as well. These groups were therefore also represented in the project group.

The project resulted in two prototypes [Bjerknes and Bratteteig, 87a; Bjerknes et al, 85] and a pilot system which was used in the hospital even after the formal completion of the project [Bjerknes and Bratteteig, 88a]. Two conclusions were reached: 1) it is possible to build a computer system for a profession, even if the work places where the professionals act will be organised in different ways, 2) computer applications depend very much on the organisational and physical design of the use context—thus particular applications have to be tailored to specific work situations in order to become useful, ie, the computer applications must fit the work situation. Most of the publications from the project concern the second conclusion.

Even with its focus on use, the application perspective is centred around computers. Thus, expertise in both domain knowledge and information systems development is needed in system development projects. One consequence of a perspective that equally emphasises domain knowledge and knowledge about computers is that mutual learning is essential, ie, that both users and designers need knowledge about and understanding of each other in order to communicate [Bjerknes et al, 85]. The activities that were labelled mutual learning resemble activities later described as cooperative prototyping and participatory design [Bjerknes and Bratteteig, 87a; 87b; 87c; 88b].

Some limitations of the application perspective appeared during the project. The perspective is a "one-party perspective", and in spite of its basis in the institutionalised conflict between labour and capital, the project was in fact rather harmony oriented. The one-party perspective implicitly assumes harmony within the workers' collective, thus several important conflicts in working life can be ruled out as "uninteresting" within this perspective. Like the cooperative design projects, the application perspective is non-democratic by forwarding a one-party perspective. Thus the application perspective is subject to the same criticism as the cooperative design projects, even if the Florence project included several different interest groups.

The pilot system could have been more useful if integrated with other computer systems in the hospital. This raised the question of how local and situated it makes sense to be. A focus on local needs ensures an awareness of particular local interests. However, sometimes a local unit will benefit from improved communication and coordination with other units. Relations between work groups cannot be catered for from an application perspective. The Florence project cannot be said to support workplace democracy because of the focus on one profession, and because of the emphasis on work situations rather than the workplace as a whole.

The FIRE project

In 1992, the FIRE (Functional Integration through REdesign) project was initiated, addressing problems in maintenance and large development projects, ie, addressing some of the weaknesses of the application perspective. The aim of the project is to develop principles, techniques, and guidelines for redesign of computer based systems so that the systems become functionally integrated for groups of users [Bjerknes et al, 91; Braa et al, 92a; 92b].

One of the basic assumptions in the FIRE project is that users have a stake in redesign as well as in design, thus the redesign process must be properly organised to facilitate user participation. Many users have to relate to several applications in order to carry out their work tasks, and the applications often do not fit each other nor the work tasks. Functional integration refers to that users should experience the applications as an integrated whole. Redesign is an opportunity for functional integration, and the wish for integration may lead to redesign. Post-implementation changes of computer based system must be expected, and organising and planning for continuous redesigns of the system is necessary.

The focus on the organisation as a whole has resulted in some conclusions rather different from the cooperative design projects and the Florence project. One main conclusion in the FIRE project is that systems development has to be regulated by contractual arrangements to ensure a voice for different stakeholder groups, cf, eg, [Bjerknes, Bratteteig and Espeseth, 91; Braa, Bratteteig and Øgrim, 94]. There is a change in focus from techniques for doing systems development with users towards a focus on how systems development should be organised in order to maintain workplace democracy.

It is not easy to spot the Collective Resource Approach in the FIRE project. The work situation is conceived as a basis for design, but the overall organisational objectives seems to weigh more than single work processes. Integration of computer based systems often unveil organisational conflicts between different parts of the organisation and between local and central interests. Aiming at making compromises that can be accepted by everyone may lead to a position that resembles the Socio-Technical, consensus-oriented approach criticised by the trade union projects for being manipulative [Ehn and Kyng, 87]. An approach seeking to find a solution that works for all interest groups may favour any political position—political unawareness can easily support management.

PARTICIPATION AND DEMOCRACY: A DISCUSSION

So far, the discussion of the projects have been centred around two axes—focus on organisations as a whole vs focus on particular interest groups, and focus on institutions vs focus on situated groups, see figure 1.

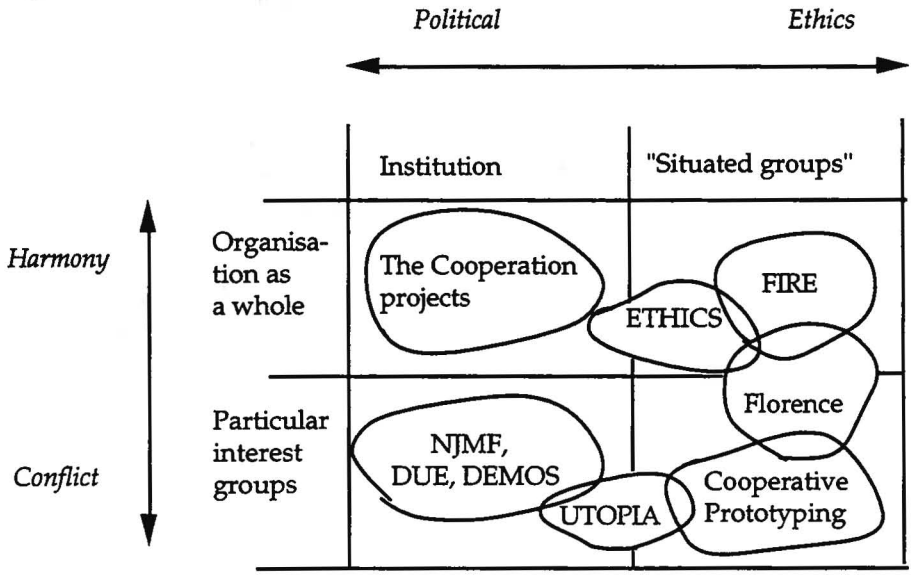

Figure 1: illustrates the dimensions used to analyse the projects.

Democracy: Harmony vs conflict

The axis between organisation as a whole vs particular interest groups can be seen as characterising the difference between the Socio-Technical and the Collective Resource approaches. The Socio-Technical approach stresses that employers and employees have a common interest in developing useful computer systems, and has discussed and developed techniques for stakeholder participation (see [Bjørn-Andersen and Hedberg, 77; Bostrom and Heinen, 77a; 77b; Markus, 83; Mumford, 83]). The Collective Resource approach, on the other hand, emphasises that there is an inherent conflict between employers and employees, and that it is the researchers' duty to support the weaker party, the employees. Thus the projects in this tradition are mostly one-party projects, supporting either a particular group of workers through their union, or supporting a particular group of workers in a selected work place.

This leads to the relation between harmony and conflict. The Collective Resource approach claims to be conflict oriented, being different from the Socio-Technical approach and management approaches that are seen as harmony oriented [Sandberg, 75]. The conflict orientation emphasises fight and confrontation. The Socio-Technical approach is said to be harmony oriented through its emphasis on balance and consensus [Sandberg, 75; Ehn and Kyng, 87; Ehn, 89; Bansler, 89].

Interestingly enough, it is difficult to see a difference between Socio-Technical and Collective Resource approaches in practice. Knowledge about conflicts has been the basis for how projects in both traditions have been organised. A certain cooperation with management has been necessary in all projects that has been carried out within an organisational context—it seems to be very difficult to introduce technology against management's will. We therefore find the conflict oriented view somewhat oversimplified.

Moreover, a focus on particular worker groups might have been necessary in the beginning of the 70ies, but the conditions for this approach has changed considerably. The pressure on the labour market makes it difficult to regard "workers" as a homogeneous group—workers have all sorts of employment contracts and besides, a large part of the work force is unemployed. The ideal to help the weak party by focusing on particular worker groups has outlived itself. It seems that the Socio-Technical approach is better in promoting democracy at the work place today [Hirschheim and Klein, 94] even if work life democracy is not achieved by this approach alone. We think the relationship between the Collective Resource and the Socio-Technical approaches should be reinterpreted, and we find that the conflict-harmony axis is of less interest today.

Democracy: Politics vs ethics

The second axis focuses on institutions vs situated groups. By focus on institutions, we mean that projects tried to influence and develop institutional regulations to promote democracy. The LO-NAF Cooperation projects achieved to get worker representation into enterprise boards [Thorsrud et al, 64], the early trade union projects developed a negotiation model between workers and management to ensure a democratic negotiation process [Ehn and Sandberg, 79] to mention some important examples. All of the early projects contributed to laws and agreements that (still) regulate the introduction and use of computers in work life. When the project topics moved from work life in general to specific work places, the focus shifted towards "situated groups". By this we mean emphasising how a particular system developer should behave in order to ensure workplace democracy, or to increase the influence of a weak group, in a particular setting. The design-by-doing approach and the Florence project provide examples of techniques that fit this perspective.

This brings us to yet another relation between politics and ethics. The projects in the 70ies all had an explicit political bias by wanting to change "the system". From the middle 80ies, the quest for democracy was left to the individual system developer. This, combined with the effort to professionalise systems development, has lead to an interest in ethics, expressed in, eg, *ACM code of ethics* [ACM, 93b]. The snag here is that system developers should undertake a rather impressive personal responsibility for the systems they are developing, even if there is no professional organisation to support them when they run into problems, dilemmas, or conflicts.

In our view there has been a historical development from focus on politics and organisations as a whole (the LO-NAF Cooperation projects), to politics and particular interest groups (NJMF, DUE, DEMOS, UTOPIA), through a focus on ethics and particular interest groups (Florence, Cooperative prototyping) to focus on ethics and the organisation as a whole (FIRE), and back to a focus on politics and organisations as a whole.

We see a general trend emphasising regulation of information systems development. This can be found in, eg, the push to introduce quality assurance conforming to standards like ISO-9001, and in efforts to institutionalise systems development like the introduction of life-cycle models proposed by Swanson and Beath [89], or the strive for more mature software processes [Humphrey, 88; Paulk et al, 93]. Regulations and institutions can also be used to increase stakeholder influence, see, eg, [Bjerknes, Bratteteig and Espeseth, 91]. We hope that the return to institutions and contractual regulations of systems development also will be used by computer professionals to return to politics.

What can we learn from history?

The discussion of the Scandinavian research projects on system development described above lead us to distinguish between four levels of influence: 1) work situation, 2) workplace, 3) inter-organisational relationships, and 4) work life.

1. the work situation level: Employees can have influence by participating in development projects, or by selecting applications. Means of influence are project management

and techniques for participatory design. The influence on this level is increasing in that user-driven system development projects are becoming more usual [Clark, 92]. The computer technology in question will typically be computer applications; these can be off-the-shelf products, tailored commercial applications, or in-house developed applications. Florence and Cooperative prototyping has contributed to means in this category, as well as NJMF, DUE, and DEMOS.

2. the workplace or organisational level: workplace democracy was previously defined as the workers' right to influence their work situation. To ensure this right for all workers, it is necessary to address the organisation as a whole, ie, in terms of workplace democracy. Computer technology at this level includes information technological infrastructure, realised as, eg, centralised mainframe systems, common systems, or networks. The infrastructure will be a frame for possible future applications, whereas need for particular applications will have impact on the chosen infrastructure. The question of influence on the infrastructure is only relevant to the extent that the technological infrastructure may support or hinder the development of desirable applications, ie, the alignment of infrastructure and business goals. Means for influence are what we would categorise as Socio-Technical Approaches. FIRE and ETHICS fit here.
3. the inter-organisational level: we distinguish between two different inter-organisational relationships, a) business relations and b) strategic relations. By business relations we think of relations regulated by contracts, eg, the relation between a subcontractor and a contractor. This kind of relationship can be supported by networks and standards, like EDI. Technological influence will be restricted to which subset of EDI that will be used in the business relationship.

   The other inter-organisational relationship is the strategic one, which is found when several organisations have a common, strategic interest in influencing something or someone. The subject of interest may be related to computer technology. The means for influence can be lobbying or forming of inter-organisational groups. Examples are international user groups, like DECUS, but more local level arrangements fit here as well, like groups composed of representatives from different organisations using products from the same software vendor, eg, a software house selling software for local authorities. The UTOPIA project fits in here—the Nordic Union of graphical workers had a strategic interest in developing alternative technology that could strengthen the position of their members.

   Current Socio-Technical approaches (eg, [Gustavsen, 92]) encourage building and maintaining networks between organisations in order to exchange and develop knowledge *and* common business strategies, seeking to integrate the two kinds of relationships.
4. the social or work life level: this level comprises laws and regulations for society, including work life. Means for influence will be legislation and social institutions. Some examples are *The Workers' Protection and Working Environment Act* and laws to protect the privacy of citizens and accompanying institutions that control the fulfilment of the laws. Computer technology at this level is public accessible software or information, eg, games and information from bulletin boards via the Internet. At this level it is no longer a question of how to influence technology, but to influence the information and software that is distributed. A current debate in Norway is about how to achieve control of the Internet. A proposal of a traditional institution like a legally responsible editor-in-chief for every bulletin board, has been put forward. The LO-NAF Cooperation projects and the first trade union projects (NJMF, DUE, DEMOS) can be seen as rather successful attempts to also address this level of influence.

The lessons we draw from history is that participatory design techniques should be accompanied by means and strategies aimed at other levels of influence. The LO-NAF Cooperation projects and the NJMF project are good examples. They both emphasised local action *and* global strategy, and their success lie in the way the two levels of influence were combined. This corresponds with a proposal for influence in a local government by Hales and O'Hara [93]. Global strategies should be a framework for local action, local actions should be exemplars informing the global strategy. Local action can benefit from many years of development and experiments with participatory design techniques. We conclude, however, that the boundaries of the locale should include more than one particular interest group, and suggest a larger emphasis on the organisational level. Local actions should be parts of a global strategy for influencing the inter-organisational and work life levels.

Challenges for future research

In many respects, we are back to where we started 30 years ago—to a global strategy aiming at institutional changes, combined with local action. However, the environment for systems development has changed. Computer technology is not mainly used for production, it is used for all kinds of work and leisure. Secondly, the focus has slowly, but steadily moved away from workers towards customers. The competition on the market has increased, and together with increased unemployment, the workers and the unions do not have the same influence as in the beginning of the 70ies. Finally, computer technology has developed from being mainly production technology to being communication technology. Technological support for communication and information processing integrates different kinds of technology (computers, telephones, broadcasting, and publishing). Technological infrastructures serving both professional and customer markets change the division of work between employees and customers (tele-shopping etc).

In short, we are moving from a society where labour force is a critical resource to a society where information and knowledge is a critical resource. Until now systems development research has mainly been concerned with distribution of information within organisations. Now we need to include technology like groupware and international computer networks, like the World Wide Web. In the near

future we expect that there be a significant difference between "information rich" and "information poor" people, organisations, and societies. This means that to support democracy—in work life as well as in society in general—we need to put more emphasis on the inter-organisational and society/work life levels of influence.

It is a challenge for future research to contribute to democracy by developing strategies and methods for a fair distribution of information, but also to address the question of what kind of information will be distributed. To achieve this, other kinds of institutions and other kinds of local actions apart from the ones we know from the Scandinavian history of industrial democracy, will be necessary.

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