

Co-operative Design — perspectives on 20 years with 'the Scandinavian IT Design Model'

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Introduction

The authors were all involved in the 'seminal' Utopia project, 1981-85, where Co-operative Design methodology, involving users very early in the design process, had an early development and application in the use of computers.

One strong goal was to 'give the end users a voice' in design and development of computer support in work places, thus enhancing the quality of the resulting system. The 'secondary result' of Utopia, the methodology, with ingredients such as low-tech prototyping, early design sessions with users etc, has had great impact on IT design in general. This is the case not only where the methods are a main ingredient as in Co-operative Design and in Participatory Design, but also as part of now common practices in HCI and in CSCW in general and in later methodologies such as Consensus Participation, Contextual Design and Co-operative Inquiry.

Thus the obvious idea to involve the users as early as possible in systems and interface design, using low and high tech prototypes, has become a standard to which most developers pay at least lip service. That it is not necessarily followed in practise is usually because of time constraints and lack of insight rather than ill-will, but there are also inherent difficulties.

In Utopia and in further Co-operative Design practise we have met important concerns not taken into account in the original Utopia work. In our 20-year practical experience from several design and development projects we have gained insight and found methods to deal with these concerns, not always solving but at least relieving the problems.

Utopia

The project Utopia (acronym from 'Training, Technology And Product In Quality of work perspective' in Danish, Norwegian and Swedish) was started in 1981 at the initiative of NGU (the Nordic labour unions for graphic workers). From a research perspective the Utopia project may be seen as an ambitious continuation and follow-up of a number of projects in Norway, Sweden, and Denmark in the 1970s, in which researchers followed and supported the attempts of local trade unions to influence the use of technology at work.

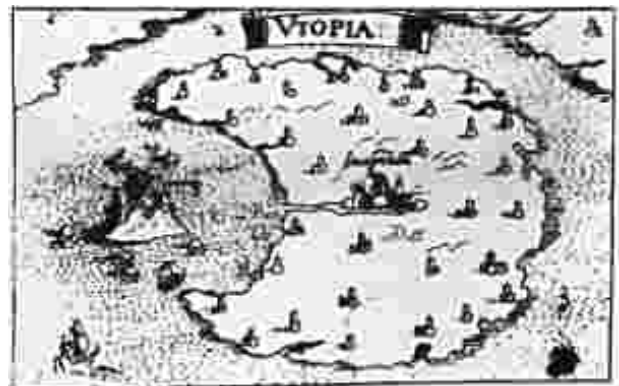


Image from an edition of Thomas More's Utopia from 1516

The overall objective of Utopia was to contribute to the development of powerful skill enhancing tools for graphic workers, in the light of the emerging graphic workstation technology. Quality of work and product was very important. Both technical and social prerequisites, as well as obstacles and limitations were examined. The labour processes of page make-up and image processing in integrated computer based

newspaper production was in focus. Participants were 5 members of NGU (4 in Stockholm, 1 in Aarhus) and researchers from the Swedish Centre for Working Life (ALC), Stockholm, NADA at the Royal Institute of Technology, Stockholm, and DAIMI at the University of Aarhus.

The main activities during Utopia (1981-86):

- mutual learning between the active participants: graphic workers, computer and social researchers
- requirement specification for a system for newspaper text and image pre-press production, under development by a Swedish manufacturer
- studying a pilot installation of the image system in real production at the Swedish newspaper Aftonbladet
- dissemination, especially to the graphic workers and to the scientific community. 20 'Utopia reports' in Swedish or Danish on different aspects of technology, work organisation and work environment were produced. All about 50000 members of NGU got the final, 48-page edition no.7 of the project newsletter, Graffiti. The experience formed a main theme of the 1985 Computers and Democracy conference in Aarhus and of CSCW'88 in Portland, Oregon.

In order to accomplish this we established a 'technology laboratory' with development tools to simulate different kinds of page make-up, image processing, and the surrounding organisation. Thus we made it possible for the graphic workers in the project to develop requirements and wishes on a concrete level by actually carrying out the page make-up and image processing on simulation equipment.



Mock-up situation

The tools and methods in the laboratory were innovations:

- Colour slide mock-ups with picture sequences that were also pasted on the walls, for simulation of work processes

- Low tech mock-ups of equipment (wooden mouses, cardboard laser writer ...), material and menus (paper)
- A graphic workstation for illustrating prototypes of computer based tools
- A tool kit (box with waxed cards) for modelling and experimenting with work organisation



Blackboard image sequence for cropping

The main results from Utopia were not so much the pilot computer tool built and used at Aftonbladet as the experience and methods:

- for the NGU members, who from Utopia knew, at least as well as their employers, the pros and cons of the emerging technology and what to require from it, for a functionally and socially acceptable introduction in their work
- for the researchers the challenging insight that the human interface is very important for how useful a computer based tool will be, inspiration for establishing IPLab at NADA and similar efforts in Aarhus
- for the researchers and the design community in general a methodology, Co-operative Design, for involvement of end users together with interface designers and program developers on equal footing in computer application projects



Pilot installation at Aftonbladet

Utopia experience

In retrospect we can see the following four main features of qualities in and experience from Utopia, coined in modern terms.

Where workers craft technology

This characterisation comes from MIT Technical Review (Howard 1986) with the observation that Utopia showed that it is possible to design information technology based on use requirements such as work organisation, work environment, forms of co-operation and working skills. This idea was almost blasphemy in some management circles then, hardly today.

Setting the stage for design in action

Utopia was precursor to current practises in interaction design in staging active design exercises such as the organisational tool-box and use of mock-ups and prototypes as a way to involve end users in design. Crucial are the means to create meaningful design objects for all participants (different groups of users and designers).

Playing the language game of design and use

Utopia gave a lasting contribution to the theoretical understanding of design with users through contributions such as Pelle Ehn's and Susanne Bødker's dissertations (Ehn 1988, Bødker 1991, Bødker 1999) and several other papers. Today a 'Communities of Practice' perspective is mainstream for understanding design and learning.

Bringing design to software

By this title, borrowed from Terry Winograd (Winograd et al. 1996), we want to point out that Utopia can be seen as a 'paradigmatic example' of how design thinking and practise can be brought into software development, not entirely successful as early paradigmatic examples seldom are.

These and some other important factors and concerns met in Utopia and/or in the Co-operative Design practise since then follow with examples in the next sections.

What one does in a project can be difficult for an organisation to use in general

In the AT project, a co-operation between Aarhus University and the local branch of the Danish National Labour Inspection Service (NLIS), a

purpose was to design a number of computer applications for the branch and to develop a long-term strategy for tried to spread the collective experiences of participation beyond those directly involved in the project through workshops for everybody, access to prototypes and through a newsletter decentralised systems development and maintenance.

In the AT project we deliberately worked to make the organisation able to maintain its new competence, even after we left the organisation, and we have seen that the organisation is still heavily influenced by the methodologies we have introduced.

Thus conditions and concerns of the AT project, as compared to Utopia was to

- Work with both managers and ordinary users
- See researchers as resources for the whole organisation as well as for groups within it

Though we were quite concerned with the issues of power and resources, we occasionally fell into the trap of working with a group of people without much concern for their relationships in the organisation. This may have been more of a problem than we were aware of. We did put a lot of emphasis on education, supported by all parties of the organisation, including management. Though all parties found this important, at times it was a problem to get the participants' compensation from their normal work load. Perhaps these last observations illustrate more than anything how easily we can all be seduced by a friendly atmosphere until the real power issues show up.

'Standard technology' where only some 'tailoring' might be possible

Part of the idea in the AT project was to utilise standard technology, at the same time as the project was to develop and implement overall visions about the use of computer technology in the organisation. Thus it was a central issue, new compared to Utopia was to

- Be visionary with standard technology
- Access to tailorable off-the-shelf software becomes more and more wide-spread. Experiences from NLIS enforce the impression that a two-level strategy is necessary, or at least that situated, local problem solving is not sufficient. Within the project we quite successfully worked with both levels, whereas it is questionable whether the top level concerns will be dealt with also in the future. This may be a problem for a more long-term expansive

development of technology use, and for technical problems of consistency, complexity, etc.

In situations like the NLIS where much design is a matter of local adaptation of standard technology a further fundamental question is how 'globally' we may support local participatory design, i.e. local resource acquisition? First of all flexibility of the tailorable standard technology is a necessity. This does not do the trick alone, though. It is important to rethink the design process to include structures through which ordinary people at their workplace can promote their own interests in a more democratic fashion.

Laboratory testing vs. field work for usability

Our project 'Usability work in Danish industry' was an action oriented research project that aimed at developing the work practices of usability within a 3-year time frame. In particular, we have been interested in how usability practitioners may develop, co-operatively and in interaction with researchers, their own work practice and understand the potential of self reflection. In the *Design Collaboratorium* groups from three Danish companies in co-operation with a group of HCI researchers, worked exploratively to re-frame their own work practice. The companies, Bang & Olufsen, Danfoss and Kommunedata, were the first three Danish companies to establish usability lab facilities in the early 1990s.



3D workbench prototype at Bang&Olufsen

Despite differences, the three companies all had an interest in moving out of the lab and into the field, of increased user involvement and of

enhanced co-operation between usability and development competencies in the companies.

While it seems to be common knowledge in research circles that usability labs are too limited, many companies still set out to build such. In our research project we have worked to strengthen the argument for a wider approach to usability by identifying a number of reasons why usability labs fail. Furthermore, these reasons are important, because they point in certain directions where usability work needs to expand.

The term *Design Collaboratorium* points directly to some of the inherent problems of the usability lab: The lack of co-operation between designers, usability professionals, and users, and the weak impact on design caused by the analysis/evaluation bias of usability. At the same time, the term holds on to some potentially positive connotations of the term laboratory—those relating to experimentation.

The design collaboratorium is furnished with artefacts for creativity, realism and decision, artefacts that bridge across activities, contexts and history of use, design, and of the design collaboratorium as such. These artefacts undergo transformations as the process proceeds.

A change of the competencies and working practices of usability professionals is necessary so that they become increasingly able to orchestrate this type of process at the same time as they themselves contribute with their professional insight into use and usability.

Kommunedata has moved out of the laboratory to such an extent, that anecdotes tell that people are wondering whether the usability lab still exists (which it does). Bang & Olufsen have started working in their permanent design room, and this process will be studied further in the future.

Design for other settings than work places

In the EU financed KidStory project (1998-2001) elementary school children in Sweden and England work together with adult researchers and teachers in development of computer tools for collaborative storytelling. The design process, Co-operative Inquiry (Druin 1999) has Co-operative Design with low tech prototyping and intergenerational design teams as central elements. The challenge from the current perspective is to investigate if and how young children can be part of a Co-operative Design process on an equal footing as the adults.



Mock-up of storytelling machine, made by a team of 4 children and 2 adults

We have found that as time goes on, our team members have begun to see themselves as technology inventors and partners. Children begin to see themselves less as users and more as inventors and adults begin to see themselves less as lone researchers and more as partners.

The team moves from 'wondering how this is done' to planning 'what will be done'. Children and adults alike gather field data, initiate ideas, test, and develop new prototypes. Team members do what they are capable of, and learn from each other throughout the process. We try to keep in mind that it is not easy for an adult to step into a child's world, and likewise it is not easy for a child to step into an adult's world. We have found that no single technique can give teams all the answers they are looking for, so a combination of techniques has been adapted or developed for the KidStory project.



Die from mock-up realised as sound and image recorder

We have found that when children see themselves as inventors, they can feel quite

empowered and challenged. Children have so few experiences in their lives where they can contribute their opinions and see that adults take them seriously. This experience can build confidence in children academically and socially. Children can grow to see themselves as something more than users of technology. They can come to believe that they can make a difference as inventors.

While this philosophy may seem simple, carrying it out is no small challenge when children are accustomed to following what adults say, and adults are accustomed to being in charge. Methods of communication, collaboration, and partnership must be developed that can accommodate children and adults as co-inventors. This takes time and patience to accomplish. When children are inventors and partners, the traditional structures of school can also be a challenge to negotiate. The design team activities must work around the limitations of an already busy school day. For particular activities, permissions may be needed from teachers and at times head masters. Limited school resources in terms of technology must also be considered as well as school safety procedures to keep new technologies from being stolen. In addition, the challenge of an on-going partnership with children must also be considered. No longer are children only a part of the research activities for a day, or a month. On-going years of collaboration means that the same children must be followed from one classroom to the next.

From 1980 to 2000 – ironies and promises

In the early 1980s and the 'era of democratisation in Scandinavia', when the belief in 'folkhemmet', the Swedish social and democratic version of the welfare state still was strong, there was no change of the production and consequently no contribution to productivity improvements. Management opposed to changes in work suggested by the trade union. The trade union opposed to the technology suggested by management. However, trade union understanding of new technology increased and a trade union strategy on design and use of information technology was developed. Contributions to important changes in laws and agreements were made, but the work itself did not really become more 'rewarding'.

In the current 'post-modern' conditions, where the national economy recently was a disaster, unemployment higher than ever, the legitimacy of trade unions is questioned, and

'folkhemmet' rapidly de-mounted, production really changed, in the direction suggested by the union and the workers in the early 1980s. Productivity increased, work really became more 'rewarding' and top management strongly supported the change. Is there a social and technical difference that makes a socio-technical difference? Which is the role played by the different actors and by technology?

Technology

In the early 1980s industry was mainly using mainframe computers with terminals. Production planning systems were used to control people and material. To design and implement new systems was very time consuming and a task for the central administration, often in the shape of a data department.

Now (2000) information technology is everywhere, not only at work, but in our whole life world. Work stations, personal computers, and mainframes can all be on the same 'net' or even on the truly global Internet. All data can in principle be accessed from everywhere. The interaction with computers has been simplified by the use of graphical interfaces. There are powerful tools for local design of databases, calculations, and programs of all kind, and a lot of relatively cheap standard software is available. Potentially workers can in technical terms be in control of the technology and use it as a tool.

Management

In 1980 the management literature on organisation, technology and change was suggesting participation, autonomous work groups, local planning etc. What we met in practice was, however, a management philosophy not much altered since the introduction of Taylorism as the principle to plan and control work. The whole idea with the computer use was based on this dogma. A dialogue with the union and the workers on development of the production based on skilled work, industrial democracy and participation was not an obvious approach.

Now (2000) we meet a management philosophy more according to the book. In the late 1980s many big companies really tried to use the whole worker as a productive resource. SAS had its service management, and ABB was successful with its T50 concept to mention two companies with relations to Scandinavia. The co-workers competence and their participation in changes were seen as a fundament resource.

Unions

In the early 1980s the trade unions in Sweden were stronger than ever, and with a lot of self confidence. Industrial and economic democracy looked as goals within reach. Laws and agreements were instigated on co-determination and work environment, wage earner funds, strong worker representation at the company boards, etc. Unemployment was something for other countries.

Now (2000) there are many signs of a weakened trade union movement, although it is recovering from the real hardship with the extreme unemployment around 1995. There is talk about a legitimacy crisis. Workers are no longer 'born into the workers movement', trade unions have to fight with company management for the souls - rights against privileges. Democracy at work and economic democracy are topics far down the agenda. Unemployment is the big threat.

But the picture is scattered. There is a general pattern of trade unions as less and less important players in socio-technical change. Concrete experiences show an opposite pattern: local unions as main players in participatory change of work and technology at the workplace.

Researchers

In the 1980s the researchers forming the Scandinavian co-operative design tradition did this out of a political commitment to the idea of democracy at work. We were dissidents from to the socio-technical tradition, which we found in practice to have failed its theoretical and ideological ideal. Our focus was on contact with local unions as the key players in socio-technical change. At the same time we tried to establish a link to the society level by trying to influence laws and agreement to be more supportive to democratic local socio-technical change processes. We also participated in the public debate about technology and democracy at work. We had a socio-technical change strategy, but we were weak on design methods. We called ourselves the 'collective resource approach' to design and use of information technology. It is not a coincidence that the results focused on struggle, negotiations, veto, laws and agreements. The approach was basically ethical, in the sense that it focused on the quality of function, which interests the technology served.

Now (2000) the picture has changed. In many projects during the last decade we have learned a lot about co-operative design methods. To make

real worker (and management) participation possible in the socio-technical design process we developed a number of methods based on prototyping, full scale mock-ups, organisational games, role playing, future workshops, etc. We have become more of designers than of politicians. The focus is rather pragmatic: Let us strive for good relations between workers and management and in participation make work more 'rewarding'. The approach has become more aesthetic, in the sense that it focused also on the quality of experience, how it is for the worker / user to use the technology.

Conclusions – future

These examples, from Utopia to KidStory, and many others help to develop the Co-operative Design methods both explicitly and as part of the general HCI design tradition.

Often the problems of user participation are discussed from the point of view of researchers getting access to the users. Yet, user participation should also be seen from the point of view of the conditions of the participation process, i.e. how the conditions are set for the users to participate together with designers (and managers). Experiences from Co-operative *Design* projects show problems that Co-operative Design *research* needs to deal with.

There are indeed a number of difficulties to be overcome, as we have mentioned in this paper. It is important to find the right set of participants, the right tools and techniques as well as the right location and physical space for the Co-operative Design. And not least it is important to create a setting where all involved groups can make active contributions that are meaningful to themselves as well as to other groups of participants. In our experience, this, in some cases, requires a serious change in attitude for many of the involved groups.

Our 'political' focus on worker participation and the development of new co-operative design methods have in the 1990s become a 'success' in the USA as 'Scandinavian participatory design'. The reason is simple: participation is not only a political and emancipatory category, it is also a basic epistemological (knowledge theoretical) principle. Participation is a fundamental process, not only for democracy, but also for learning. It would certainly be to overestimate our political impact to confuse the two. Today we are more at home in the academic world, than on the political arena. The researchers are no longer dissidents,

but for good and bad pretty main stream socio-technical researchers and designers.

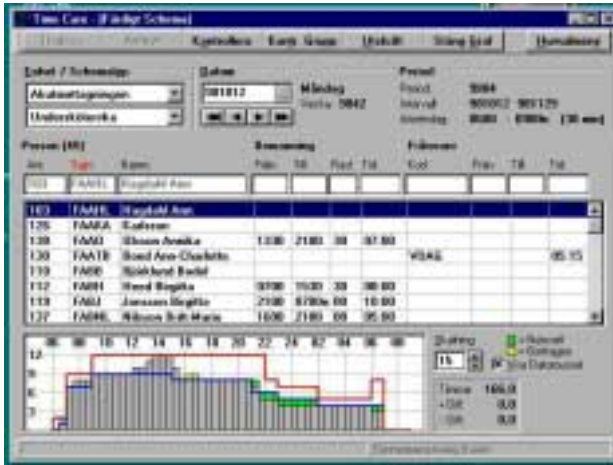
But then again, everything float, how should we pass the river the next time? Maybe by returning to the questions that more than two decades ago made a difference: 'How do we design systems to fit people' versus 'How do we make it possible for people to design their own systems themselves'. As researchers and designers socio-technical design we need the dialects between the two, to continuously develop our ethical and aesthetical competence as researchers and designers of a better place to work.

A very promising development is inspired by 'consumers movements'. The very successful computer equipment certification by TCO, the Swedish Confederation of professional employees, organising 1.3 million white-collar workers, is a remarkable example (Boivie & al 1997). As result of work at TCO. led by the driving force Per-Erik Boivie, more than 100 million users around the world now have TCO'99 or TCO'95 'environmentally labelled' computers or at least certified display screens. Most of those users do not know that is certified by a Swedish trade union. User organisation support was important in enforcing this certification and making it a market advantage.

Similar initiatives are now taken in Sweden for certification, or at least pushing demand on suppliers, of 'on the floor' computer support in work places. LO, the Swedish blue collar union confederation, has taken initiative to the ITQ project, 'Quality certification of Information Technology for the developing work', with pilot studies at several mechanical industry workplaces and care workplaces. Co-ordinating research partner is CID at KTH.

A part of the project is the 'Users award', driven by LO, TCO and CID, where users in workplaces nominate computer systems that give good support technically and socially. The first winner was a time scheduling system, TimeCare, at the emergency department at a hospital, Falu lasarett, where the nurses through a clever flexible planning program get work schedules much better adapted to their other needs than before ('much more freedom' as they put it.) A web presentation of ITQ with Users' Award is (Lind 2000).

ITQ with Users' Award might be the Utopia of 2000 and an inspiration for a 'work place user movement' for better computer support.



TimeCare at Falu lasarett, winner of LO-TCO-CID's Users' Award year 2000

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