Design in an Organizational Context
- an Experiment

Keld Bødker & Finn Kensing
Computer Science Department
Roskilde University
Denmark

Abstract
In the paper we give a detailed account of an action research design project where ethnographic techniques were used to provide insight into work practices. We consider such insight to be important in order for the future computer system and the (redesigned) organization to be well matched. The detailed knowledge of work practices can be used to challenge what at a first sight seem to be obvious solutions - technical, methodological or organizational.

1. Introduction
In this paper we present and discuss our experiences with a set of tools and techniques for design in an organizational context. We use the term design in the same way as architects do - focusing on the analysis of needs and the preliminary design of functionality and form - in contrast to what is common within computer science, where the design term is borrowed from engineering - focusing on construction and implementation. We have conducted design in various organizations. The project reported on here was carried out in cooperation with three journalists and a secretary in order to investigate possibilities for computer support at their workplace. The workplace was an editorial section at a Danish radio station, and the project focused on computer support for editorial and administrative work.

The main point of our design approach is that when designing in an organizational context designers have to be able to identify and discuss work practices in order for the future computer system and the (redesigned) organization to be well matched. In that way they will be able to challenge what at a first sight seem to be obvious solutions (technical, methodological, or organizational). This is not to favour conservatism, rather by challenging obvious solutions designers might be led to consciously redesigning the organization of work in order for that and the vision for computer support to be well matched. However, we also found that it might lead to discarding a vision of computer support that would probably never work, due to strong traditions in the work practice.

In this design project, and in others, we have experimented with using ethnographic techniques for providing insight into work practices. By focusing on involved action at the workplace, elicited through qualitative studies of workplace conversations and workplace culture, knowledge of work practice was developed which guided the design activities, as did our knowledge of standard products for this type of work setting.

In section 2 we describe our ongoing research and the setting and objectives of the design project. Section 3 gives an introduction to the setting we worked in. Section 4 describes the applied tools and techniques and presents the result of applying them. Section 5 concludes the paper with a discussion of the role of descriptions in the project and matching computer systems to (future) work practice.

2. The design project and our ongoing research
The project reported on here is part of our research programme called MUST. The programme addresses theories of and methods for design. We have chosen an action research approach for experimenting with and developing techniques for design. Using this approach we have carried out eight design projects, and we also plan the research programme to comprise design activities carried out by others using our approach. Further we intend to carry out case studies of design in industrial settings, i.e. in the research programme we play the role of designers as well as the role of researchers.

One of our goals in involving ourselves in this kind of work is to develop an understanding of the conditions for and effects of supplementing and integrating traditional design approaches with tools and techniques based in the social sciences and the humanities.

We are interested in design in an organizational context rather than in design of standard systems, i.e. we consider results of the latter to be input to our design endeavour. We consider design, i.e. the early activities in system development, to be an important area for improvements in relation to the often noted findings from studies of use of information systems in organizations. A typical finding is that individuals and organizations experience that often they do not get the computer support they (thought they) asked for, e.g. (Lyttinen & Hirschheim, 1987). The part of our research reported on here however, is not sufficient to (dis) confirm this hypothesis.

153
We look upon our research as an example of what Ehn in a discussion of Bansler's three Scandinavian schools: the systems theoretical tradition, the socio-technical tradition, and the critical tradition (Bansler, 1989) adds as a fourth approach: "professional systems design" (Ehn, 1988). I.e. our knowledge interest is to contribute to a professionalization of system designers, which is also part of the argument for choosing an action research approach.

The action research project reported on in this paper was conducted in an editorial section of a Danish radio station. It was initiated from the editorial section in order to clarify the section's needs in relation to computer support for editorial and administrative work. Our research goal was to develop and test tools and techniques for analysis of workplace conversation (Winograd & Flores, 1986) and workplace culture (Schein, 1985) in a design context. I.e. the role of the radio project was to develop tools and techniques based on these authors and experiment with the usability of these tools and techniques in our emerging design approach.

The editorial section wanted to be well prepared in relation to the management's plans of implementing a standard application in all editorial sections. The system was originally developed to assist in planning and reporting of music-based radio programmes, while the section in question is presenting comments on political and cultural affairs. The head of the editorial section, the chief editor, and several journalists were sceptical about this system, which they feared wouldn't match their needs. So, in order to clarify their own needs, they called for our assistance. We had a couple of initial meetings with our primary contact person, a journalist, and the chief editor. These meetings focused on establishing the project.

It was agreed that the objective of the project was to design computer support for editorial and administrative work in the section. It should be carried out by a project group of three journalists, a secretary, and three designers working part time. The group was established after presenting the idea to the whole section at an editorial meeting. The focus of the project was to design computer support for the planning and administrative follow-up of the programme production as well as during broadcasting. The three designers each spent five months part time, equivalent to approximately five person months in total on the project. It was also part of establishing the project that the section agreed on playing a part in our ongoing research.

3. The setting

In this section we describe the editorial section where the project took place. At the same time it is a demonstration of parts of the shared understanding developed by applying the tools and techniques to be described in the following section. I.e. this section shows the kind of insight we developed based on our adaptation of Winograd & Flores (1986) and Schein (1985).

The section and its programme

The editorial section produces a one-hour programme on all weekdays with political and cultural comments on national and international issues. The section is staffed with 12 journalists, a trainee, and a secretary. Besides that a number of freelance journalists and reporters abroad are affiliated with the section. The section is headed by a chief editor who is responsible for the planning and content of the programmes. The section was formed a couple of years before the project took place by merging two sections.

A programme consists of a small number of taped features, typically 5 - 8 depending on the length of the features, and maybe a live discussion or a telephone report from a reporter abroad. The features are linked by comments of the editor. It is the responsibility of an editor to put together the programme. The editor is appointed among the journalists on a day to day basis, sometimes tentatively 2-3 days ahead. The editor is also the studio host, i.e. the one who presents the various features and eventually heads discussions during the live production of the programme. In the studio the editor is assisted by a technician, who takes care of mixing the various audio signals (mics in the studio, taped features, music, internal mics). And he is assisted by a producer, who is responsible for having all material (especially all taped features) ready when the programme starts, taking care of guests, and for keeping track of time during broadcasting of the programme.

Planning and producing the programme

Planning of the programmes is the subject of editorial meetings. There are meetings three times a week, where the programme of the day and the coming days are planned at a general level. At the meeting journalists are appointed to the producer and editor roles for that and the coming days. The meeting starts in the morning, and all journalists present tell about their planned features or what they are working with presently. The chief editor heads the meeting. He has a dominant role in evaluating plans and ideas from the journalists. The ambition is to present programmes forming a coherent whole. However our observations showed that coherency issues are not central topics at the regular editorial meetings, and that quality values, typically advocated by the chief editor, are mostly directed towards the individual features. The secretary - and a few of the journalists - take notes and the secretary distributes an official minute indicating topics and names of those responsible, guests, and the like shortly after the meeting.

The editor starts from the list of proposed features made up by the secretary after the editorial meeting (the official minutes). His job is now to put together a coherent programme consisting of 5
to 8 features and/or a live interview, a telephone report, or the like, well balanced between national and international issues, which is exactly 58 minutes and 30 seconds long. Our observations showed that this basically involves a lot of negotiations with his colleagues on how long a feature should be, how an already produced feature can be cut down with say two minutes to allow enough time for another feature, or postponing a feature till the next day. The programme is broadcasted live in the late afternoon, so the editor spends most of the day planning the programme, and maybe fine tuning own features. At noon he is expected to present an outline of the programme and maybe a spot of one of the features to a central unit dealing with programme news.

Planning of the programme is done in terms of refining and detailing the so-called sequence. In the morning the sequence is just a list of proposed features and the names of the journalist responsible for each feature listed from the editorial meeting. As the editor receives the features from his colleagues during the day or as he receives more exact information about the content and duration of a feature under way, the sequence is refined and detailed with information about duration, status, time still available etc. Along with features on tapes, the journalists present the editor with a proposal for introducing and closing the feature. As the editor develops his mental image of the programme, he will rewrite the sequence many times while trying to fit everything together to form a coherent whole. When discussing with colleagues about their feature the sequence is used for referencing.

Normally the producer is involved in the final planning of the programme about an hour and a half before broadcasting. The producer collects all material (basically the tapes) for the programme, and from the final sequence he makes up the producer manus, which is the sequence with exact planned time figures of the features and the editors comments between the features added. The producer also instructs the technician right before the programme begins. During broadcasting the producer keeps track of the time by recording the actual time figures in relation to schedules and tells the studio host to speed up or cut out material, if say a live discussion takes an unexpected but preferable direction that should not be stopped.

**Journalist work**

Apart from the cooperative planning at editorial meetings and the very close cooperation and coordination between the producer and the editor, our observations showed, in contrast to what the journalists told us in interviews, that journalist work is very individualistic. Each journalist has his own subject area, which he is expected to follow closely and produce features about. So the journalists spend a lot of time reading books, articles, news and telegrams within their subjects.

To assist in the work each journalist has built own archives of documentation, notes, copies of papers, etc. Some journalists "organise" the archives as piles of material on their desk and shelves, while others maintain well ordered archives of folders and binders.

For particular features the journalist further builds on information from politicians or from contacts in the public administration or in various organizations (their sources). For a particular feature, the journalist produces a text using a typewriter or a PC. Then he tapes a reading of the text, and he might also have taped comments or interviews on the specific subject. From this raw material the journalist produces a taped feature by editing the taped elements into a final feature. In this he is assisted by a technician, whom the journalist directs by a written editing instruction, or by being present in the studio during the editing. Journalists in the international area of course travel a lot. While travelling, they might give telephone reports, which are taped and edited by a colleague, or transmitted live during the programme.

**Administrative follow-up**

The secretary is responsible for writing various kinds of documents using a terminal based word processor, which was often down due to overload and transmission problems. Already mentioned is the minutes from the editorial meetings. From the producer the secretary receives a copy of the producer manus from the previous day with the exact time figures of the various elements of the programme added. From this the secretary produces a programme report, and she further takes care of paying honorarium to guests who took part in the programme, and of reporting payment of fees to writers or music composers whose products were used in the programme. Besides this the secretary takes care of a lot of coordination. She knows who's in, and who's not, and she receives all kinds of messages for distribution among the journalists. Finally she is in charge of reservations of the section's studio located in the nearby main building of the radio station. The editorial section has the disposal of the studio throughout the day for producing taped features for the programme.

4. The project - three scenes

In this section we describe the tools and techniques applied in the project. The description covers design activities, while project management is given no attention in this paper. We present three snapshots, reflecting the progress in the development of the knowledge required in order to come up with realistic visions of future computer support. Here we refer to Kensing & Munk-Madsen (1993) who propose a model of user-developer communication and identify six areas of knowledge in user-developer communication, see figure 1.

155
<table>
<thead>
<tr>
<th>domain of discourse</th>
<th>Users' present work</th>
<th>New system</th>
<th>Technological options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract knowledge</td>
<td>Relevant structures on users' present work</td>
<td>Visions and design proposals</td>
<td>Overview of technological options</td>
</tr>
<tr>
<td>Concrete experience</td>
<td>Concrete experience with users' present work</td>
<td>Concrete experience with the new system</td>
<td>Concrete experience with technological options</td>
</tr>
</tbody>
</table>

Figure 1. Six areas of knowledge in user-developer communication. (Kensing & Munk-Madsen 1993).

They state that it is the responsibility of designers to apply tools and techniques allowing users to develop knowledge in area 2, 5 and 6 and themselves as designers to develop knowledge in area 1, 2, 5 and 6. In addition the designers are expected to bring to - or develop during - the design process knowledge from area 3 and 4.

The presentation below of tools and techniques applied in the project refers to these areas of knowledge. In the description of the project activities "we" denotes the three designers.

4.1 Scene 1 - understanding users' present work
We started the project by following the daily production of programmes. The domain was completely new to us so we spent several weeks part time (equivalent to three person weeks) getting acquainted with the workplace. Carrying a tape recorder we hang around, conducted semi-structured interviews and observed editorial meetings, journalists on research and working in the field interviewing, journalists working in their offices and in the studio preparing taped features and during broadcasting of the programme. Finally we arranged workshops around large formatted collages representing our emerging common understanding of their work.

Observations, interviews and workshops. The description of the workplace, given in section 4 above, focuses on structural aspects - an example of area 2 knowledge. The description given below focuses on how the journalists, the secretary and the technician in various ways enacted the identified roles, used their tools, etc. in their daily work. In order to develop these description we had to get concrete experience with users' work practice - area 1 knowledge. This was done to qualify ourselves to participate in discussions of current work practices as well as to evaluate the relevance of the elicited structural aspects in relation to design.

We observed the various activities in which the journalists and the secretary took part, e.g. the editorial meetings, accidental discussions in the secretary's office, the work of five journalists in their offices, in the field, and in the studio. Special attention was given to the roles of the producer and the editor who also played the role of the studio host.

The observations were simultaneously documented by written notes as well as by audio recordings. We added to the recordings, by voice over, where we were and who were speaking or present. The notes focused on the purpose of the activities, the roles played and the cooperation and the division of labour, the tools used to support the activities and the written documents that were used and produced. By focusing on these issues we built a representation of the communicative structure they engaged in. This we saw as a basis for the organization of the activities. The observations allowed us to see how they enacted these structural properties during work. In this way the relations between area 1 and 2 types of knowledge came into play. During the observations the journalists often noted ideas for computer support in relation to the task they were engaged in. At coffee or lunch breaks these occasionally voiced ideas often led to more detached, unstructured interviews or talks about the ideas mentioned and the reasons behind them.

A large proportion of the tapes were transcribed and read several times. Together with the written notes and our emerging "inner picture" of the editorial section, they formed the basis for our descriptions of their present work. At this point of our work the descriptions took the form of a list of roles and several large formatted collages consisting of freehand drawings combined with clips of pictures from journals. These clips illustrated tools or situations that related to their work practice.

These descriptions were presented at a workshop in the project group. The discussion focused on to which degree we - as designers and outsiders - had understood the essence of their work practice. The list of roles and the collages were subsequently corrected and added to. The focus was directed towards what they (dis-)liked in their jobs and the way in which they enacted the various roles and situations depicted in the collages, as well as towards inexpediences and breakdowns. Whenever design ideas came up as to computer support or new ways of organising the work, these were
briefly discussed. The workshop session was audio taped (however only listened to, never transcribed) and notes were taken.

**Design goals and ideas**

Though the focus was on understanding their present work, some ideas for computer support came up during these types of activities. They were especially concerned with:

- how to improve the quality of the daily programme,
- how to improve the editorial process,
- how to make the editorial process transparent,
- individual tools for the journalists and the secretary respectively.

The main idea was to share data in cooperative aspects of the work, i.e., providing support for planning ahead (a kind of a calendar of ideas and planned features that often were related to specific events ahead in time). For the individual work the ideas were an "electronic archive", access to a central library system as well as external databases (news agencies).

4.2 Scene 2 - developing design proposals

The knowledge developed so far, i.e. identified needs, inexperience and breakdowns (area 1 and 2 knowledge), combined with an introduction to "technological options" (area 3 and 4) constituted input to the design of computer support. In developing the design proposals four techniques were used: design workshop, mapping, horizontal prototyping and vertical prototyping. In general, the products of the design activities in scene 2 were oriented towards describing or illustrating visions of computer support in order to facilitate a discussion of the applicability or strengths and weaknesses of the design ideas.

The basic idea of the activities was to enter into knowledge areas 5 and 6. In order to develop design proposals we draw upon the "relevant structures" of the present work practice, i.e. knowledge area 2, as well as to "concrete experience with users' present work", area 1. When describing the techniques we will highlight how this relation between "relevant structures of the present work practice" and "visions and design proposals" were handled.

**Design workshop**

In preparation for a design workshop we outlined the proposals for new tools for the individual as well as the cooperative aspects of the work. The basic idea of the design workshop was to establish a shared framework where all design proposals - identified in scene 1 activities - were collected and related to each other. For each role identified in the role list, we described which tools were used today, and we added the proposals for new tools. This was documented by informal freehand drawings on large sheets of paper. The proposals were presented and discussed at a design workshop. In the presentation and discussion we focused on how the use of existing and new tools were related to the various documents used and produced in editing and preparing the programme. As a follow up all new tools, i.e. ideas for computer support, were put together in a coherent presentation to illustrate the functional relations or sharing of data among the various parts of the design, see figure 2.

![Figure 2. The design proposal](image-url)
Mapping of the quality of programmes and the editorial process

The basic idea of mapping is to become able to identify possible actions capable of changing a problematic situation (cf. Lanzara and Mathiassen (1984) for a description of mapping). A "map" is characterized as being a interpretative description of a problematic situation. We mapped problems in relation to two central issues: the quality of the programme, and the editorial process. The two issues were closely related to the general aim of introducing new tools to improve the general quality of the daily programme, and to look for possibilities for improving the editorial process, and as part of that making the editorial process more transparent.

We presented the mapping technique to the members of the project group, and asked the journalists to prepare individual maps as "home work" for a meeting. At the meeting we drew up a shared map, and based on this we had discussions about which type of problems (identified in the map) might be solved by introducing computer support, and which type of problems could not, because they were caused by e.g. inherent contradictions or time pressure in relation to the organization of work - not by inadequacy of existing tools. The discussion focused on to which extend the visions about improving the coherence of the programme and about improving the editorial process could be realized taking the individualistic work practice of the journalists into account. Hereby we modified the design and "adjusted the expectations" towards how problems or inepedencies might be improved, and to which extend such improvements could be obtained by introducing computer support.

Horizontal prototyping

We developed a very simple horizontal prototype, actually a mock up, that illustrated the sharing of data in creating the various documents or work sheets from the very beginning of outlining the programme (at the editorial meeting, e.g. in terms of the official minutes) to the final producer manuscript used during programme production. The mock up also illustrated the subsequent adding of precise time figures of the various features during the broadcasting of the programme, noted by the producer, and it also included the programme report, prepared the following day by the secretary.

The mock up was but a Microsoft Word document, which we had prepared to simulate the key functionality and a possible user interface of the proposed system. It was presented to illustrate the vision and to facilitate a discussion of how the vision (area 5) related to the elicited needs (area 1 and 2). The basic idea of the design was to eliminate situations where lack of information lead to double (sometimes even triple and four double) the typing/writing work. The design proposal also aimed at making the editorial process of the editor transparent to all the journalists. Rather than designing a specific work flow, the point was to facilitate the oral and written communication around the emerging programme in terms of an electronic version of the sequence. The mock-up primarily showed how data produced for one "document" in one situation (e.g. by the secretary) were reused in the production of another "document" (by the editor in another situation), and further on reused in a third situation (by the producer) ending at the secretary for the production of the final programme report. In addition it showed how these data could be accessed by everybody in the section.

As the mock-up had no functionality at all, it could not be used in real work situations, i.e. it was not possible to develop knowledge in area 6. But clearly the vision had now materialized further, and the mock-up did facilitate discussions of two types. Basically the journalists liked the functionality, but they would like to modify parts of the user interface, i.e. the modification focused on "inner" features of the mock up (area 5). The mock up also facilitated very detailed discussions of the relations between the vision and the work practice: the mock-up was evaluated and modified and in doing this especially the relationship between the roles of the producer and the editor, and of how that relationship differed with different pairs of journalists playing these roles were discussed.

Vertical prototyping

This technique was related towards developing and evaluating a vertical prototype of an "electronic archive", one of the envisioned tools to support individual journalist work. One of the designers and a journalist developed a database and an interface to allow the journalists enter, search and retrieve information on issues, persons, etc. in relation to features, books, articles, etc. The prototype was presented to the group, and later three journalists in turn used it in their daily work for about a week before it was evaluated, i.e. allowing for area 6 knowledge to develop.

The evaluation indicated that the key information should be related to a person, and not an issue, because it turned out in the actual use situations that a specific person was always the starting point for information retrieval in the "electronic archive", i.e. the evaluation required knowledge from area 1 and 6. The evaluation also showed that it was essential for computer support for the journalist's individual work to allow quick changes from one part of a system to another. In the prototype, due to the software available on their PCs it was simply too cumbersome to shift from text processing into retrieval of information in the "electronic archive", and back again. Again, the discussion related knowledge developed in areas 1 and 6.

We now had a rather stable design, but for some parts of the design we felt a bit uneasy. During our
observations and subsequent analysis we had noted aspects of work situations which for some parts of the design challenged the assumptions behind the vision. So we decided to go back to "observation and reflection mode".

4.3 Scene 3 - making assumptions about work practice explicit

To explore these uncertainties further we returned to studies of their work practice in order to contrast visions and design proposals (area 5 and 6) with concrete experience with users work (area 1). Here we used two techniques. One was to go back to observing and recording the communication involved in the production of the daily program, this time from the perspective of the editor. What turned out to be important insight from this technique was the explicit assumptions and values surfaced through conversations among colleagues - assumptions and values concerning the product of the work: features and the programme as a whole as well as concerning the editorial process and work organization. The other technique used was a study of workplace culture focusing on values and assumptions in relation to central aspects of the journalists' individual work: the journalists doing research on a new topic or for a particular feature; the journalists' use of notes and sources; and the journalists' views on what constitutes a good feature and a good programme. In this study we particularly focused on assumptions in relation to the use of artifacts in the journalists' individual work practice, i.e. work tools such as note pads and archives and work routines such as their use of sources.

Perspective of the "observation and reflection mode"

During the observations and the subsequent analysis we focused on any mismatch between the actual actions taken by the journalists and the inherent assumptions in the design proposal. We performed so to speak "a mental test" of the design proposal against their actual actions, asking ourselves questions like "What would happen if our proposal was implemented?" For instance we had incorporated in the design that it would be possible for all the journalists to look into the plans and options of the editor, e.g. to see which features are currently planned to be in the program and for how long time (the sequence). The observations clearly revealed that the editor needed to keep this kind of information to himself as it played a part in the ongoing negotiations with his colleagues (see the discussion below for further details). It would have been easy to modify the design, but instead we included it as an example of a conflict/dilemma that had to be addressed, since some journalists had asked for this kind of information and because it was part of the general aim of improving the coherence of the programme as a whole.

After recapitulating the design proposal the results of these detailed studies of work practice were presented orally to the project group in the form of 11 assertions (see figure 3). These were presented to stimulate and provoke a discussion of the premises and consequences of the design by explicating assumptions behind the ideas for computer support as well as behind articulated and observed work practice. The assertions expressed how we, as designers and outsiders, perceived their work practice to be, as opposed to how the journalists and the secretary, as insiders, said or thought it was. I.e. the objective was to test if - and where - the design was founded upon espoused or idealistic assumptions about the work, which were not reflected in the actual work practice.

During the discussion we constantly focused upon contradictions or tensions between how the journalists and the secretary said or believed they worked, and our interpretation of how they worked and the implications for design. We were able then to discuss changes of the design and become aware of critical premises and fundamental values and beliefs regarding changes of the work practices. In turn, these findings had to be regarded as essential organizational decision points if the new system was to be used as intended.

Applying the assertions - three examples

For example, the observations showed that the journalists consider their sources to be "an integrated part of themselves" and thus highly private (assertion 2). This meant that for reasons of privacy, data about sources would never become part of a computer system, not even in a private file protected by a personal password. The consequence of the assertion "sources are highly private", was

| 1. You don't write that much |
| 2. Sources are highly personal |
| 3. Notes will remain hand-written |
| 4. You talk a lot about team-work, but you work very individually |
| 5. Decisions about the programme are made at many locations |
| 6. Unclear division of work between the editor and the producer |
| 7. Many persons create their own vision of the programme during the day |
| 8. There is no editorial process |
| 9. Good ideas for features should be implemented right away |
| 10. How can the producer use spare time in the studio? |
| 11. You are undisciplined and hectic - and You like it. |

Figure 3. 11 assertions about work practice in the editorial section
that what could become part of a computer system was names of more formal contact persons and persons who had appeared by name in the programme, which the secretary already kept in a manual file.

When discussing design ideas, the journalists highly valued computer support for retrieval of information on notes and sources. Given their actual use of note pads the observations made clear, that only a very small part of the notes might end up in the computer system - even if they had a laptop. Journalists take notes at many different places, during interviews (where they would never use even a laptop), at meetings, seminars, or at home (where they might), and they don't have time to re-write them. So we could formulate the assertion "notes will remain hand-written" (assertion 3). The implication was that there would only be a very limited amount of information to retrieve, unless the journalists individually chose to change their way of taking and keeping notes5.

A final example of a mismatch - between what type of computer support they initially requested and what the discussion based upon the assertions revealed not to be adequate - was also related to the idea of using a future computer system to share data. As briefly mentioned above there was a conflict/dilemma between on the one hand the need of the editor to have exclusive access to plans and options for him to be able to manoeuvre among and negotiate with the individual journalist, and on the other hand the individual (competing) journalist's interest in having access to these plans and options. Our observations revealed that this was an ongoing conflict, where journalists, some more often than others, tried to negotiate in order to promote their own feature, however basically respecting the decision of the editor (assertion 4 and 7). Our observations also revealed that some editors were not respected as much as others and sometimes even overruled by the chief editor (assertion 5). Our point in raising these types of questions was to make them aware that such conflicts/dilemmas would not be solved by introducing a new computer system (as they assumed, at least implicitly). They had to be dealt with separately, and probably even if they would not get any system at all.

4.4 What happened afterwards
The design proposal was now completed and described on paper. The hardware part of the design encompassed a local area network with PCs and servers. The software part was basically a set of standard products, like word processing, e-mail and interfaces to news agencies and internal as well as external databases, complemented with specific applications for this particular section. ranging from a simple database, the 'electronic archive', to more advanced applications, like the 'time recording producer manus'.

The designers now prepared a final report containing a description of the needs, the design proposal, and a discussion of its consequences. The report was presented at an editorial meeting. Later it was used by the chief editor in negotiations about computer support, a process we did not take part in.

5. Discussion
Our main point in giving this rather elaborate presentation of the project has been to illustrate how techniques and tools were used for the vision of computer support and the work practice to be well matched. By complementing structured descriptions with non-formal descriptions and insight into the situations at the work place (Suchman 1987), and by enforcing dialogues in the design group on the relations between the visions and the work practice, we believe a well-informed design process can be obtained. In this project these dialogues were structured by relating the design proposals to familiar concepts like well-known roles or documents used in the work. The main point is to relate the design ideas to familiar concepts in the work practice (cf. "family resemblance" (Ehn, 1988)), not the particular ones used in this project.

-matching computer systems to (future) work practice
Our project shows that it is important to design computer support for complex work settings based on a realistic vision of future work practice. In this project the journalists and the secretary formulated many ideas for computer support that were based on an implicit perception (structure) of their present work. When confronted with concrete experience of their present work developed by the designers - through the detailed studies of their work practice described in scene 1 and scene 3 - some of the ideas turned out to be based on merely espoused or idealistic assumptions about the work.

The leading motto in this type of work seems to be: Take users seriously, but take a deeper look! (Simonsen & Kensing, 1994). So, the area I knowledge enabled the project group to evaluate the design ideas rather thoroughly with respect to their applicability in relation to work practice. If we had a "nice" vision, but not in accordance with work practice, we had to make a choice:

a) to abandon the vision because it was unrealistic, or
b) to keep with the vision and then identify the necessary changes in e.g. work organization in order to make the vision realistic.

In the description of the project we have emphasized how the designers' insight in the work practice was used to challenge espoused or idealistic assumptions in design proposals. Of course, such insight also contributed to generating visions of
computer support. We know also from other studies (by ourselves and others) that knowledge in area 1 might contribute substantial new design ideas (Simonsen & Kensing, 1994 and Heath & Luff, 1992, Suchman & Trigg, 1991).

- the role of descriptions
A distinct feature of a design process is the use of descriptions. Traditionally in software engineering and system development, descriptions are heavily oriented towards the computer system. The perspective is the system perspective. In design in an organizational context - like the one described here - more perspectives are needed. A general objective of descriptions in design is to assist in developing and maintaining an understanding of the present situation and of visions of computer support for work. The descriptions should facilitate a dialogue among designers and future users. In this project we have seen some diversity among the descriptions in the three scenes.

In scene 1 focusing on understanding work practice, the descriptions were oriented towards describing the present work practice - as captured by the designers. First of all, the designers needed to check their understanding, and second the descriptions were used to facilitate and structure a discussion of (dis-)likes, inexecivities and breakdowns which are candidates for computer support.

In scene 2, with a focus on envisioning computer support, the descriptions illustrated visions of computer support in relation to the identified "problem areas" - in various degrees of detail. So these descriptions were much more structured and formal - some even implemented in programs. The important point was, however, to relate the descriptions (i.e. the mock up and the prototype) to use-situations in order to facilitate an evaluation of the applicability of the ideas and visions.

In scene 3 focusing on challenging the assumptions about work practice inherent in the various design proposals, the assumptions were confronted with provoking assumptions about the present work practice as understood by the designers from detailed studies.

Based on our experiencing of their work practice (area 1), we were able to produce descriptions, primarily the role list and the collages, which in Kensing & Munk-Madsen's terms are structures of the work (area 2). The journalists and the secretary could relate to these descriptions due to the use of familiar concepts and their non-formal character. Although the descriptions missed specific aspects of the situated actions of work practice, the descriptions proved to be relevant structuring mechanisms in the discussions of (dis-)likes, breakdowns and inexecivities in the present work (area 2) and in discussions of visions and design proposals for a new system (area 5). Also based on the initial observations of the present work practice the designers identified a number of candidates for computer support, as illustrated by the mock-up (area 5) and the prototype (area 6).

By having many differing descriptions of the present work practice and design proposals with different perspectives, emphasis, aim and level of detail we were able to ensure that design proposals were anchored in a viable vision of change. Formalism is of course necessary and helpful later on in the process, but as shown above low structured and informal descriptions like the collages proved to be very helpful in getting the journalist to discuss their current work as well as needs for changes with us and among themselves.

- relating to other contributions
Above we have described how we approached this particular design endeavour. Other researchers have reported on similar approaches, i.e. with the same goal of informing the design process in complex work settings, e.g. Bentley, Rodden et al. (1992), Heath & Luff (1992), and Hughes et al. (1992). These studies have been labelled "ethnographically informed design", implying that the ethnographic study, performed by social scientists, could inform the system design, and further that the system design could be evaluated and tested by the social scientists (cf. Bentley, Rodden et al 1992). In this project we have taken a slightly modified approach.

We have combined ethnographic studies and design into one process carried out by the same group of people. Being computer scientists with an interest in work practice studies (but clearly, we are not sociologists or ethnographers) it has been exciting and challenging. The crucial question as to whether it is possible for designers in industry - as laymen - to apply concepts and methods from social science and the humanities is a very relevant question which we are investigating by studies of this kind. Ongoing work is aimed at further investigations and development of such an approach through practical experiments and the study of practitioners while they are conducting design activities.

Acknowledgements
We thank Anette Aboulafia, Dan Shapiro, Jesper Simonsen, Karlheinz Kautz, Leikny Øgrim, Tone Brattsteig and Uffe Munk Hansen for comments on an earlier version of the paper presented at the 16th IRIS conference in Copenhagen.

References


161
The authors and Karen Skov Andersen, a student doing her master thesis.

In this we were inspired by the work of Winograd and Flores (1986). We used their idea of revealing the organisation through its agents' recurrent patterns of conversation. However we didn't think of communication in terms of Searle's language acts.

See Floyd (1984) for a characterisation of prototyping techniques.

Of course, we could have used more adequate software. While the mock-up was "running" on a Macintosh that we brought in, with the "electronic archive" we found it important to illustrate what could be developed by the software available on the PCs in the section.

Today - or in a near future? - we might have discussed the possibility of scanning (hand-) written notes. But at the time of the study it was totally out of the question as far as available technology and money was concerned.

A term used f.e. in the title of a session at CSCW '92.