Taking Video beyond 'Hard Data' in User Centred Design

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ABSTRACT

In this paper, we discuss how the use of video in e.g. ethnographically inspired fieldwork can gain from looking at video as a design material rather than as 'hard data'. The participatory nature of the video media is emphasised, and co-authoring is suggested to be potentially fruitful when design teams work with video. The paper introduces four cases, which suggests various ways of working with video as a design material

Keywords

Video, ethnographic field work, user-centred design, participation, design representations, scenarios, emphatic design.

INTRODUCTION

Video is a fascinating representational media. At first it seems so much richer and more accurate in its account of events, than notes, drawings and diagrams. But working extensively with recording and editing of video materials reveals an ambiguity and open-endedness of interpretation that makes it surprisingly dependent on the participation of actors, recorders, editors and viewers.

Many user centred design groups have integrated videography in their work. Video is used for documenting user trials and workshops, and in later years video has also been more widely used as part of the ethnographically inspired inquiry into user contexts. Video documentary on work practices appears to most designers as a valuable input to the design process, but the leap from documentary to design artefacts is difficult and poorly explored. In this paper we will discuss how design groups can work with video materials and particularly how the video media itself can be used for creating design 'moves'.

VIDEO AS DESIGN MEDIA NOT 'HARD DATA'

Video has often been used to provide accountability for results. In usability engineering a highlight tape from user

trails accompanies a report on results to justify the conclusions of the usability professionals. The implicit or explicit point is made that opponents can 'go and see the entire tape' if they disagree with the conclusions. In ethnographic fieldwork a somewhat similar approach has been taken to recordings of 'life in the field'. The analyst is taking the stand that the analysis can only involve what can be seen and heard on the tapes. (This is particularly clear in the traditions of ethnomethodology and grounded theory see e.g. (Jordan & Henderson 1994)). With these approaches videotapes become a kind of basic data comparable to the data-log of the laboratory scientist.

When video recordings are looked upon as 'hard data', a number of problems continue to trouble the analyst. The recordings themselves should not affect the event that is being recorded. The selection of taped 'chunks' for detailed analysis has to be accounted for and tested through alternative trials. And the readings and transformations of tapes into (paper-based) results have to be made open for cross-examination (Jordan & Henderson 1994).

When designers get their hands on camcorders and editing machines there is both a need and an opportunity to overcome the limitations of viewing video material as data. Donald Schön proposed to see the designer as working in a cycle of seeing-drawing-seeing [2]. Seeing in the first place is here framing the design problem. Drawing means creating a design move by imposing an order on what is seen, and seeing again means appreciating how this order imposed on the material 'talks back' to the designer. Schön has worked out this scheme from studies of how architects work when drawing on paper, but to us it seems to translate well into a situation where the designer works her way into a design problem by recording, editing and viewing video materials. In this case video recordings from e.g. a contextual inquiry are no longer hard data but rather the first attempts to create stories that frame the design problem and impose order on the complexity of everyday life.

Video materials are in this perspective genuine design representations in the sense that the tapes provide an imprint of a design move, that has to be invoked again to come to life when the video is played back. Although this is a formal

similarity to other design representations such as drawings or diagrams, it does not mean that video materials behave like these other media. Video is as McLuhan has pointed out a highly participatory media, where participation and emphatic engagement has to be invested to make sense of the material (McLuhan 1964). This participation is much unlike what is involved in translating written or diagrammatic representations formatted by a long and delicate process of professionalisation (Latour 1990), and it calls for ways of manipulating the material that can handle the 'flow' of real life interactions without detours of putting it 'on print'.

**DESIGNING DOCUMENTARY VIDEO**

Over a number of years we have been using the video camera, as we have been following people mostly at work telling and showing us about their everyday life. When we started out we saw the video camera (and even our own presence) as a rather neutral 'observer' taking down events and environments 'as they are'. Quit soon we learned that this was far from the truth. Being present with a camera as an 'outsider' is a very obvious intrusion, but on a social level the intrusion is already there with our presence. The difference that the camera makes has more to do with how the directedness of our attention gets a very concrete manifestation. The people we have followed react to this, and tend as we get to know one another to be conscious about not only what they tell but also how they act in front of the camera. This introduces a strong bias, in the material we are collecting, but we have found that we can see this bias also as a starting point for a collaborative inquiry. We are entering the everyday life of other people as designers and with the purpose of imagining how this everyday life can be different by the advent of our designs (which we still do not know much about at this point). By making obvious the things we focus on with the camera as they catch our attention, we spell out aspects of our 'project' that our collaborators can spot and react to. So over the years we have developed a practice that centres our inquiry on the production of a series of video artefacts.

When we have first established contact with a group of people who are willing to work with us, we go through one or two visits where we introduce ourselves and our design interests and get acquainted to the environment. Then we follow each individual for three to six hours as they go about doing what they usually do. On such a tour we have the videocamera running all the time and we ask questions to the things we do not understand as well as to whatever we find unusual or just interesting. We do typically not have a particularly clear agenda at this point, but we try to allow ourselves to move and get distracted by what we see. We seldom take notes; instead we rely completely on the videotapes we make. This makes us very eager to make sure that we got an interesting answer to a question or a demonstration of something on the tape, and we do not hesitate to ask our collaborators to repeat what they do our say, if we have not been attending with the camera. This habit is often met by some impatience, as it creates resistance to the everyday flow of activity, but we have found that it typically also raises the awareness as to what we are 'after'. We always follow up on these first visits by editing a small documentary of our visit. The documentaries are structured by the chronology of the visit, and they have usually the form of a small video portray of the person we have followed and his environment. Quit often have we been a larger design group following different people, and we then organise within a few weeks from the visits an informal meeting where we show our documentaries to the people we have recorded. At this point we try to avoid a thematic editing of the material, we basically want to make the videos our account of the visits we made. The informal showings of these videos are crucial to the continuation of the collaboration. We typically introduce them by briefly stating how we hope to capture the ordinary rather than the unusual, and we state our willingness to change the material if we have misunderstood or in other ways misconceived what we have seen.

The more we have been entering the field in this way the more often have we passed this first step with a fairly unproblematic approval of our videos. Paying attention to the ordinary rather than to 'problems' or dramatic events has been instrumental in getting to this point. When we work with new colleagues they tend to look for action and problems to solve, and their videos typically provoke uneasiness, because the resulting 'portray' tends to make the day-to-day life of our collaborators 'problematic'. As we have learned to see it, this is very rarely the case, and for us as outsiders/newcomers the calmness of everyday life in an unknown domain is much more important to grasp than the unusual. Nevertheless the video portrays are our first design representations. They set the stage for our design work by being the first attempt to portray the environment, the people and the activities in a way, that make sense to us as well as the people portrayed.

Our first case is a brief account of how we made the first video portrays in a design project together with process operators.
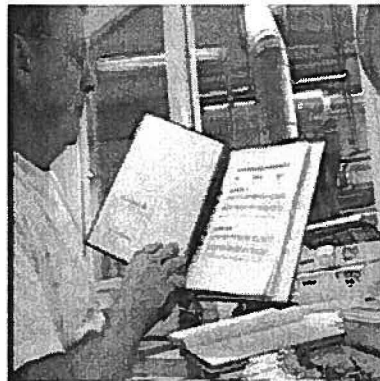
Case 1: A video portray of a process operator

I (Binder) met Rolf for the first time a little after 7 am in his office at the process plant. I had been to the plant twice before, but had not been introduced to Rolf before. He had volunteered to have me along for the following 4 hours. He knew I brought the video camera, but still we needed to use some time to talk about our project, and why I wanted to tape my visit. After looking at the camcorder and being acquainted, he started to look at his PC for 'his logs'. These where curves showing the flow of material and the production of gas. He noted that some processes working in parallel seemed to produce differently and he flipped a number of times between the different curves to make sure what he had seen, and eventually went to the process diagrams to check. At this point I couldn't really follow what was going on so I asked him to explain to me what he was looking for, and he went over the different screens once again. Later he took on his coat to take his daily round at the plant. We went outdoors, and he picked up a headset, which he left at a door we passed on the way. He told me we needed that later. We went to the tanks, to the centrifuges, to the pumps in the basement and to the cabinets at the top of the gas tanks. On the way we met people, had a chat and a smoke, and got updated on what happened elsewhere on the plant. In the basement Rolf listened carefully to the pumps and explained to me that things didn't run smoothly today. I asked if it was a problem with the pumps, but he laid his hand on one of them and said – no it's not the pumps its the sludge, which is not right. We also passed the different 'bases' where PC's were available and it was possible to do things without being too much disturbed by the noise from the machines. After some hours we came back to the door with the headset and entered the room where the gasmotors are placed. This was without doubt the most noisy room I had been in that day, but there was also something else. Rolf took of his coat and took me through the room to tell me about the different components and the efficiency of the machines – 'This is where we make money' he said, if the machines run properly we can produce a lot of electricity. In the back of the room there was a door to a smaller office-like room where we went to gather the notebooks. We should take down the temperatures of the exhaust, to see if combustion was all right. We ended up taking out the spark plugs and with the outmost of delicacy Rolf filed the plugs – 'I want to do this by myself so I know how the motors are running'. My interest as a designer was mobile interfaces, but that didn't really enter the picture at this stage. When I came home what had impressed me most were all the different environments that Rolf was passing through and all the different attitudes he seemed to change between as he went on his tour. This became my entry to my video portray of Rolf. A portray which was not an attempt to get into more personal matters, but simply sought to capture the landscape, the places and the kind of awareness that seemed to be associated with being there. When I later came back with my video, Rolf liked it, as did those of his colleagues who had

been followed by other people from our design team. As some of the more distant colleagues said 'We should keep this, because it tells something about what we do'.

Later we will typically visit the same people and again follow in their footsteps with the videocamera. They will get more active in directing us to things or relations that they want us to pay attention to, and as they now know what kind of material to expect to come out of it, they will often very directly direct 'the shooting'. On our part we will start to analyse the video we bring home for themes that cut across the different visits. We produce logs of the tapes, and with an approach very similar to the one described by Orr (Orr 1996) we try 'softly' to identify 'chunks' which in one way or another seems interesting. Out of these fragments we edit small thematic videos somewhat similar to Karasti's video collages (Karasti 1999) and use these videos as starting point for new discussions with our collaborators. In a project on new monitoring devices for process operators, one such theme was 'experiments'. We had found across a number of different people and visits that operators seem to be engaged in continuos experimentation with processes and equipment. We picked video 'chunks' from different visits that we saw as pointing in this direction, and made it an issue at a workshop with operators from different plants. This eventually led to the editing of a small video on a particular instance of experimentation.

Later in these projects we create what we call 'type scenarios'. A type scenario is a small episodic video edited from the tapes we have made at our visits. The type scenario provides a story of practice, which to us encapsulates the issues that we are addressing in our design work. The type scenario is anchored in the existing practice, as it is edited from what people do today, but they are also open for explorations of how things might be different. From these type scenarios we can envision the future by introducing new props or setting the stage differently. The scenarios provide a recognisable and negotiable ground for these explorations.

The way we engage the video material in the dialogue with the people in the field is in many ways inspired by ethnographic fieldwork. First of all we have tried to learn from ethnographers how to approach the world of others with a curiosity towards the ordinary rather than with a search for problems we can 'fix'. The video documentaries enable us to focus on and raise questions to different aspects of the practice we see without forcing us or our collaborators to put this practice into words. We can develop a foothold of insight in the new environment without loosing direct reference to what we have seen and heard. We have also learned from ethnographers how to engage in open-ended searches for thematic patterns while remaining grounded in what is on our tapes. Even our 'type scenarios' can be seen as prototypical 'episodes' which attempts to grasp 'role models' or 'ideal types' that constitute the social practice. We do not however see ourselves as ethnographers. We are designers in the sense that

we are looking for ways in which new artefacts can make a difference in the everyday environment. And very often we enter a particular field with some idea of what kind of artefacts to explore. Our obvious intrusion with the very visible camcorder is our attempt to expose not only our presence but also our 'project', and we are searching for the conversations or even confrontations that our video material can provoke. To us it is designing, because every new video is an attempt to come to terms with 'why we are here' and when we are most successful this inquiry into 'what is' and 'what could be' becomes a collaborative endeavour with our collaborators.

CO-AUTHORING VIDEO MATERIALS

The participatory process of collaboratively recording and viewing videos of everyday life contains already a strong element of co-authoring as we on our visits are guided by what our 'hosts' want to show and tell us in front of the camera. The tension between what we put on record and what the people we work with want to tell is part of what drive our collaboration forward. By committing ourselves to 'negotiate' our video material we further institute 'rules of the game' that invites arguments. But co-authoring involves more than negotiating 'stories'. As Wenger has suggested, the designer is not only a peripheral participant in communities, trying to discover, what experienced participants already know. The designers' trajectory shaped by their purposes and interests challenge the community to re-tell itself in the light of this intervention (Wenger in Binder 1996). This is not necessarily straightforward. In an early project where we were to produce video accounts of best practice for a group of machine setters, we found that we could not simply videotape how people worked. The machine setters appeared to have a rather diverse practice, and they had not before we came been confronted with the question of what should count as best practice. As the project evolved they constructed this account by directing and commenting upon the video material that we produced (Binder 1995).

Some authors have argued for handling over camcorders and cameras to the people they work with (i.e. Goldman-Segall 1992). Goldman-Segall has in her video ethnography on life in the classroom invited the school children to take part in the recording and integrated the videotaping in the overall setting to be explored. This is an interesting route to explore, but it has to be pursued without loosing sight of the necessary tension between design project and practice account. We have in our work taken a different direction. With 'video portrays', thematic 'video collages' and 'type scenarios' as a kind of documentary baseline we have invited more free-floating improvisations of 'what could be' in the everyday setting of our collaborators. This is not without similarities with the dramatized scenarios suggested by Verplank. He sees these scenarios as a means for designers to seek an emphatic engagement with design artifacts in a simulated context of use (Verplank et al. 1993). But where Verplank puts emphasis on the emphatic engagement of the designer we want to

establish a shared playground for exploration of new design possibilities. Ehn and Sjögren have suggested a theatrical metaphor for such a collaborative exploration, and they have stressed the productive role of stages and props for creating a common language of engagement (Ehn & Sjögren 1991). Integrating the production of video in such improvisations make our collaborators not only actors but also authors of the resulting video artifact.

Our second case reports how process operators in collaboration with designers create improvised scenarios in a familiar setting. It suggests that videotaping such improvisations is a way for the operators to contribute to the design process with their own design artefacts.

Case 2: Improvising scenarios on location

Later in the same project we looked into in case 1, we had been going though a number of design workshops with the process operators where we had discussed different types of mobile interfaces. We had come to focus on a particular device which we called the Pucketizer, which could bookmark and annotate components as the operators where moving around in the plant. At this point we had some details on how it might work but only simple cardboard mock ups to illudate the design. To bring us a step further we discussed if we could bring in operators from other plants and have them 'test' our design. The operator group agreed to this and they prepared for this event three 'problematic situation' which in their view would be good test cases.

When we had our next workshop at the plant 6 operators from other plants where also there. After a brief introduction to the plant and our design ideas, we formed three mixed groups with each their camera crew and each their set of design 'props'. The three groups went out in the plant to look at the 'problematic situations' the hosts had prepared for them. One situation was how to evaluate leakage from a particular pump, another situation was how to communicate during the test of particular valve, and the third situation had to do with calibration of a measuring device. The task given to each group was to create a small video scenario of how they would use the new devices.

The groups went through their particular area and discussed the problem as well as the different ways of working each of them were accustomed to. As a common understanding started to emerge. They began to equip themselves and the environment with the cardboard mock-ups. They had to decide where to put things, what to do first and what to next, and who to involve. This could be acted out on the spot and as the scenario evolved new question to the design could be raised and solved. When they were ready for it all groups made a small five minute video scenario that they later showed to each other and discussed.

Out of these small videos the design took new directions and after the workshop, one of the process operators and I (Binder) re-created and re-fined the scenario in new video takes, which eventually became the final design.

COLLABORATIVE SENSE-MAKING

Goldman-Segall has discussed the needs for editing and annotation tools that enable the researcher to organise and view different passings through a bulk of tape material (Goldman-Segall 1992). Both she and also Mackay and Pagani argue that we need a way of engaging with the tapes that does not presuppose a 'literary style' structuring of the material in advance (Mackay and Pagani 1994). Jordan and Henderson has suggested that readings and analysis of taped material include sessions where the people who where video taped, take part in what they call interaction analysis laboratory (IAL) workshops. Jordan & Henderson further acknowledge the participatory nature of the media by suggesting that analytic readings are best obtained when people with diverse background take part in the IALs (Jordan & Henderson 1994).

We have in our own work been influenced by the Scandinavian tradition of participatory design, as we have been doing user-centred design in iterative cycles of user dialogue (Brandt & Binder 1997). Working in this tradition, we have a.o. been designing interactive video, where co-authoring seems to appear and contribute to the results through out the design process (Binder 1995). To become better at designing with video we need in our view not to do away with the participatory aspects of the media, but rather to learn more about how to engage our collaborators and ourselves in co-authoring.

As user centred design practices move in the direction of active participation of users in design rather than usability testing (Buur & Bagger 1999), it is no longer evident that video from such activities should be analysed and interpreted by experts, with the results then being handed over to a design team. We believe that working with video should be an integral part of the activities of the team. On the other hand, video analysis in a traditional sense is too time consuming for industrial product development practice. So we have developed a new technique, the Video Card Game, which works with novice video analysers and covers a reasonable footage of video within a one-day session (Buur & Søndergaard 2000).

The basic idea is to turn video segments into artefacts (cards) which the designers can refer to and handle in a design discussion. The design of the Video Card Game draws on both the anthropological tradition of making sense by bottom-up structuring of observations (Kawakita 1982), and a participatory design practice for involving users in structuring ideas using cards (Tudor et.al. 1993). We found it useful to work with the metaphor of the 'Happy Families' children's card game to develop and explain this technique. In this game the players collect families of four cards by asking each other for cards in turn.

Our third case shows how a team of designers can work with a large amount of video material from user settings to understand and solve usability problems – within a one-day session. It suggests that collaborative video editing is a way of creating a design move grounded in user work practices.

Case 3: Video Card Game

In a particular incident we were asked to assist a design team in involving users to evaluate and improve the usability of a new pump design concept for domestic heating systems. We chose a participatory user workshop format with six heating system installers collaborating with the six designers. The users were asked to install, wire and adjust the prototypes in a working heating system and to suggest improvements to the design. Both the use activities and the discussions were video taped.

The Video Card Game took place one week after the workshop. In preparation, we worked through eight hours of video recordings to do a course selection of 60-70 short sequences, which seemed significant. The sequences were digitised on a video-editing computer and we used a key-frame from each to create cards for playing the game.

We divided the cards randomly in stacks for each participant. Following a short training exercise in video analysis (what is observation, what is interpretation?), the designers' split to watch their video sequences individually. They used the cards to take notes of what they observed.

Together again I (Buur) asked the designers to group their cards openly in front of them on the table and briefly described their structure. I then asked the designers to choose a favourite family of cards, i.e. a theme, which related to their work responsibility. One after another the designers described as precisely as they could the theme they had chosen and invited the other players to contribute with cards, which seemed to fit into the same theme.

After a brief discussion of priorities (where should we start?) the designers started discussing one family after another, trying to understand what the video clips said and what understanding this family evoked about the design. Since none of the participants had seen all clips, they each showed 'their' clips to one another and explained why they thought them relevant.

25

One example of the problems, the team dealt with during the Video Card Game, was concerned with mounting a fist-sized union to attach the electric motor to the pump housing. Several of the video sequences indicated that users had difficulties fastening the union. When discussing this theme, the designers played the clips in different combinations, they compared them, and they grouped and regrouped them to make sense of the users' actions, and to translate what they saw into design challenges which they could name and do something about. "There is one here about mounting the union – there was a problem with the thread. And then there is something about getting a hold on it." said one designer. A second one continues: "Then I think we should see no. 33. That's where the problem starts. We may as well see what he does in reality."

At one point one of the designers grabs the prototype lying on the table and tries to replicate the exact movements of the user on the video, while the others ask questions: "Is it the thread?" "Is it the material?" The team finally managed to break down the theme into two separate problems: One was about the length of the thread (the union doesn't catch), and the other was about the shape of the union (fingers may slip). In the process of identifying the problems, the designers came up with several design solutions.

By the end of the day, the design team had produced collections of video clips each elaborating on a particular design theme. They had gone through all the card families and named design problems. They had also made decisions on which problems should be solved and by whom and for many of them they had noted down possible solutions.

Compared to previous design discussions based on highlights tapes, the Video Card Game sessions take on a new quality. Through the structuring of video clips, the designers 'design' hypotheses of a product with improved usability. In the discussion they check if the family of clips makes sense and propels the design process on. In contrast to reports and memos, the team's new design understanding has direct links to the original video from the user's world.

We have worked with Video Card Game sessions on a number of occasions with different design teams and varying types of video resource [Buur & Søndergaard]. It has proven highly successful. An interesting track of improvement planned for the future will be to ask users to collaborate in this process too.

SHARING TAPES AND NEGOTIATING STORIES
Even when we succeed in involving many different 'stakeholders' in co-authoring video materials, the tapes continue to be open for a multitude of readings. Not only do the tapes in Schöns terms 'talk back' in different ways to the different viewers, they are also likely to have produced a rather different kind of sense in the first place, depending on how different viewers (or co-authors) invest themselves and their experience in reading the materials.

Minneman has reported on how experienced designers were able to communicate with video 'letters' in complex design exercises involving distant but collaborating design teams. He found that designers were able to shape accounts of design problems and ideas that could be interpreted through viewing the video 'letters'. He puts emphasis on the way both authors and viewers manage the ambiguity of their on-going design work and suggests that video as a media is well suited for communication involving such ambiguities (Minneman 1991). Even though the kind of video use that Minneman describes is confined to communications within a design organisation, we find that his work indicates that video as a media for expression of design moves is both viable and compatible with how designers interact.

Due to its dynamic nature, video is capable of representing activities, interactions, and processes. This makes it an interesting choice for creating stories about the design process itself. Designing is not only about developing products, designing is also about learning and innovating new ways of working. Horgen et al. use the notion of *process architecture* to describe an action framework of workplace design that takes into account the continuing changes both inside and outside organisations. They claim that it is necessary for the designer to carefully programme (design) the design process while simultaneously developing the physical artefact (Horgen et.al. 1998).

Design work has to deal with mutual learning between participants involved in a design process as well as learning on the organisational level. Wenger views learning as a social process that needs meetings between different communities of practice in order to learn. He argues that "No community can design the learning of another and yet no community can design its own learning by itself" (Wenger 1991).

But it is not straightforward to make room for the design team to reflect on their own way of working. To see the design process as a chain of design events (Binder et.al. 1998) to be reflected upon and to create fora for the 'shifting of stories' among designers as described by (Lanzara 1991) may be a way to improve learning 'opportunities' for the design team.

Our fourth case shows how designers can use video documents from design events to reflect on their own work practice as designers. It argues that video is a strong media when design teams engage in on-going learning to develop their competencies.

Case 4: Video as reflective material
In a recent project I (Brandt) was asked to help a design team evaluate the user involvement activities in their product development process. I had been part of the design team previously with the role of preparing one-day workshops with potential users (Brandt & Binder 1997). All the workshops had been documented on video.

It seemed important to reflect on, for instance, how the participants interacted with one another and how the dialogue evolved between the design team and the users. I decided in collaboration with the team to organise an internal workshop with reflection based on the video documentation from user workshops. I chose a set up fairly similar to the user workshops we had arranged for the users to let the design team experience themselves what we had asked the users to do.

I edited three video stories focusing on each of the three component groups the team was designing (valves, motors and cylinders). While editing the videotapes it became evident that some more fundamental concerns among the participants, never seemed to get response.

This encouraged me to make a fourth video story focusing on these instances. I constructed a video illustrating questions and answers between users and designers, and I called it "Harry's frustrations". It showed for instance users saying: "What do you want to compete with?", "It is easier to take position if you say it is about the saw. Around the saw is one or maximum two valves. Then it is not that bad that the valves are so big, but if you want us to have nine valves stacked on top of each other then I can not relate to it". A designer responded: "We are not so settled that we can say where we want the components to be positioned". Later a user said: "You asked me to be creative an find places where the components could be used. Here I want to talk about other things, than you do, because I don't believe in what you have on the posters".

I hoped that when the design team saw episodes from previous user workshops after some time had passed, it would enable them to experience the episodes in a new way.

The workshop room was furnished with four stands. Each stand had besides the video monitor also the mock-ups that had been produced during the project, competitors' products, and posters from previous user workshops with user statements.

The design team was divided in four groups who spent 15 minutes at each stand; looking at the video, reading the posters, discussing the mock-ups and writing comments on post-it notes (just like the users had done). When everyone had visited all stands, each group presented their concerns. This led into discussions about interaction with the users. The design team found that it was not always easy to have a fruitful dialogue. A designer stated for instance that "one has to be careful when you meet customers and users because they look at things differently". A team member from marketing said that he now had "a better understanding of the customers and users needs, their use of terminology, and the way they work and think". It was also mentioned that the user workshops had an important impact on securing cohesion and compatibility between the different members in the design team.

When they reflected on the video about "Harry's frustra-

tions" it became clear that the design team talked very much about visions five years ahead, and not very much about the near future. For instance, the designers had not considered where to begin implementing the new technology, what kind of applications that were suitable etc. Things that the users asked for in order to be able to evaluate and come up with ideas about the design. As a result the design team found that they had to be more concrete when communicating with the users. They later made a little folder about three applications built from the new components and sent it to the users along with the invitation for the last user workshop.

The workshop was a team reflection process propelled by video stories. Watching video collaboratively gives the viewers a common frame for reflection even though they may not experience the same thing. Video recordings make it possible to review a situation several times to reveal nuances and to share interpretations of what happened.

The perhaps most striking outcome of this ' workshop on workshops' was that it revealed a fundamental uncertainty within the design group, as to what role the engagement with future users should play in the overall design process. On each of the previous workshops the design group had negotiated issues to take up, and they had puzzled together a workshop programme that could accommodate these issues. When entering the evaluation workshop and being put in a setting similar to the one they had organised for the invited users, a kind of double loop learning started to evolve. Had the user workshops been a simple gathering of information? Or were the user workshops a kind of collaborative design process where users and designers searched out and elaborated on critical design issues? Each of the participating designers had different views on these questions, and was acting more or less according to these views. The meta-discussion on design process initiated by the temporary immersion into a setting constructed in correspondence to the previous user workshops and the opportunity to go through the video recordings in this settings surfaced a discussion on design process, which is often neglected, but highly relevant in user centred design.

PARTICIPATION AND REPRESENTATION

Within the debate on participation and design the issue of representation has always been important (see i.e. Greenbaum and Kyng 1991). If a design process has to be open to many participants, it is crucial, that these participants find ways of representing their contribution in ways that both make sense in their own community as well as in that of the other participants. Ehn' s notion of collaborative design as 'the meeting of language games' is one attempt to phrase this precondition for collaboration (Ehn 1988). But participation is also about negotiation. Schön has polemically suggested that participatory design is more about ' negotiating the platonic republic (of use)' than about designing new artifacts (Schön in Binder 1996a). We take his point so far as to acknowledge that participatory design projects may too often

27

have focused on how the (designers') representations should make sense rather than on which representations to include in the design process. But nevertheless we think the issue is more how to find ways of keeping conversations open in the representations we work with than in giving up the strive for participation.

At the other end of the scale we may see the interest in ethnographically inspired approaches to design oriented field work, as a way to more or less do away with committed conversations between designers and those they design for. The increasingly widespread and trivialized notion of users, user studies etc. may be seen as an indication of a new divide between designers and this one-dimensional category: users (Binder 1996b).

To us every challenging piece of design work has participatory aspects that position it in a creative force field of different interests, experiences and aspirations. To design is to have a 'project'. Getting the design process moving is to expose and transform this 'project' in a conversation with those that it might eventually affect. Wenger has suggested seeing design as a process of participation and reification propelled by the way the design project challenge different communities of practice (Wenger in Binder 1996c).

We see the co-authoring of documentary video as we have described it in this paper, as an obvious arena for this process of participation and reification. The improvisation of video scenarios are not 'what the user want'. The scenarios are a collaborative inquiry into 'what might be' in which the participants are, with Dunne's word protagonists rather than users (Dunne 1999). The design group plays out their design moves, as they provide 'props' for this enactment, and they provide both the commentary and the informed audience for the improvisations. The operators and technicians on their side provide the setting and play 'their own part' in the evolving new design artifact. In this process as in the joint reflection of practice in the Video Card Game, it is in our view essential that participation and representation is fueled by the tension between design project and the many other 'projects' of the participants. If this tension is weakened by letting different stakeholders work 'with their own issues', it is not only very likely that any impact on the design will be lost, the issues may simply evaporate when no longer challenged by the change potential of the design project.

Video is a soft and flexible medium of representation, which as we have pointed to, enables us to manage ambiguities and to gently approach the yet unknown. These are important qualities, which enables us to express ourselves while we leap from 'what is' to 'what could be', without loosing an anchoring in a reality we know of. As we have argued in the last part of the paper, video as design material will always be very open for different interpretations, and will never provide us with the rigidity of drawings or diagrams. This is however a sought for quality as it smoothens the transition from partic-

ipation to reification. If this informs the design of the artifact, it does also allow us to continuously reflect and elaborate on our design process.

In conclusion we believe that combining the ability of the video media to manage ambiguities and to maintain reference to the context of use, makes designing in video a good candidate for a way to create coherence in collaborative design. Video provides a media for on-going negotiation and reflection on stories of the design to be created. Sharing tapes but allowing them to invoke yet new stories gives the design team a new arena for collaborative design, which we still know too little about how to handle

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