

# Testing in the Field

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## Abstract:

*It is widely acknowledged in the HCI community that much can be gained from bringing aspects from the field into the lab, and this principle is dominating within usability groups in Danish Industry. This paper describes three such Danish usability groups and their experiments with turning the tables by using aspects from the lab in the methods applied in the field during field work projects.*

*The context of use plays an important role for a richer understanding of the usability of particular products. As such implications of this is not surprising, neither theoretically nor empirically. What is interesting, however, is how findings of this type are instantiated in the particular cases; how the three usability groups have used the lab approaches to aid them in working in the field and how the new methods may enhance their existing methodological tool-kit.*

*The message of the paper is that there are a variety of ways in which the theoretically driven, pre-planned, and pre-directed may meet the situated and open-minded, both when usability work is conducted in the field and in the lab.*

## Introduction

This paper aims to describe and discuss the experiences and considerations held by three Danish usability labs that have experimented with stepping out of the lab and into the field, and particularly ways of bringing aspects from the lab into the field in such a situation. The experiences from this experiment are largely positive, but we do not see the solution as abandoning the old and familiar methods. Rather, we wish to look at ways in which we may successfully combine aspects from field and lab and create better settings for usability work.

We may for a moment look at the fundamental problem of field work, at least when taken to the extreme, e.g. through ethnomethodology (e.g. [10]): The open, non-directive

search for particular phenomena is an interesting methodological approach, but in design/evaluation, a more goal-directed effort is often necessary. As [8] points out, designers, and we would argue usability workers too, face three challenges: the dialectics between abstract theoretical and situated practical understanding; between planning and responsiveness; and between using a framework or a description method to structure the analysis of the situation, and an open-minded "letting the situation speak to you".

Field studies provide insight into aspects of the actual usage crucial for successful design but hard to create in a lab, for instance interruptions, complex patterns of co-operation and the physical environment as well as provide usability people and designers with important insight into the complexity of real life activities, e.g. how use takes place in ways that are not anticipated and perhaps could not be so. Thus, doing field studies, facing the complexity and emergent nature of real use situations is a way of training sensitivity and open-mindedness so that usability workers, when faced with surprises in the lab, are ready to give up control and pre-planned actions, at least for a period, and dive into the situation.

In contrast, the lab excels in the level of control of a situation it is possible to attain, through e.g. capturing more aspects of tests on videotapes. The lab opens up to staging the situations much better than a field study by enabling the usability people to test specific use situations, to enhance the documentation process by using advanced logging devices linked to the video and to experiment with specific parts of a system and work methods.

The methods the usability groups within the three companies have based their work on are largely concerned with bringing aspects of the field into the lab, and to a lesser degree the other way around. The field studies described in this paper introduce experiments of bringing aspects from the lab into the field that offer solutions to the dichotomy of being focused while still letting the situation be open.

## General presentation of the project

Our project, BIDI (Usability work in Danish industry), is an action oriented research project that aims to develop the work practices of usability, based on our own theoretical and empirical work in the area ([5, 6, 7, 14]) as well as that of others. Our theoretical and methodological platform includes participatory design, activity theory and ethnographic method. The goals of the project are 1) to bring tests situations closer to the nature of the future situation of use, 2) to explore new kinds of user participation, 3) to explore how learning takes place and how new patterns of use evolve 4) to investigate usability issues related to new kinds of products beyond a conventional interface with screen, mouse and standard keyboard, 5) to support self reflection among usability professionals, 6) and to explore how field studies and lab test mutually may support each others.

The BIDI project is a collaboration between Bang & Olufsen, Danfoss, and Kommunedata, the first 3 Danish companies to have usability lab facilities, and Århus University. The three organisations perform usability work rather differently, but they share an interest in moving further out of the lab and into the field and to increase the user involvement in their work.

### Bang & Olufsen

Bang & Olufsen (B&O) is a manufacturer of integrated video and audio products linked in a small network allowing them to share services. The prime characteristic of the products is that they are part of people's everyday environment.

The usability-work at B&O is characterised by a high degree of specialisation: industrial designers design, engineers build prototypes, and the psychologist in particular does the testing. The lab facility is a "living room" wired with video and microphones, accompanied by an editing suite. B&O has a user panel from which to select people to bring into the lab, consisting partly of their own employees as, to B&O, everybody is a potential user.

B&O's prime concern in the field study was methodological: how does one do field work in the home of users, in situations where the actual use is sporadic and infrequent? Because of this particular concern, pure observation was abandoned immediately, and the person undertaking the field study decided to conduct a kind of *in situ* interviewing instead. Five families were visited, two B&O customers and three from the regular test panel.

### Danfoss

Danfoss is a manufacturer of mechatronics products like flow meters, temperature sensors and controls. Products are

used in a diversity of settings ranging from private homes, apartment buildings, supermarkets, and district heating stations to waste water treatment plants. The products are often only a small part of highly complex systems.

The design and test practices at Danfoss are heavily influenced by the Scandinavian approach to HCI and systems design [2, 3]. Laboratory tests are supplemented with a lot of field studies, bringing daily users, service people, sales people, product developers together in workshops. Drama pedagogy techniques and similar techniques are used experimentally in workshops, [9].

A study of the work at the Sønderborg combined heat and power plant was the setting for Danfoss' field study. It was carried out in several rounds encompassing 3-8 people spending several days in the plant, primarily observing key users of the existing system. This field study was the initial activity of "The Smart Window" project in which Danfoss wanted to explore portable interfaces of the future. Thus, the field study did not relate to an existing product but observed work practices of a possible future context for a Danfoss product.

### Kommunedata

Kommunedata is the principle supplier of administrative systems for local city administrations in Denmark. They develop computer systems for a diversity of work settings including hospital, dental clinics, municipal offices, etc.

The usability work at Kommunedata is fairly formalised and most communication with the developers about tests is through test reports. Developers are brought into the test process but they mainly play an observing or occasionally a facilitating role. Going on field trips to potential users is the principal source of information for preparing for a test of a system. Focus groups have also been used to some extent for bringing users, usability workers and developers together.

Previously, the lab had tested a nursing/care plan system for hospitals, and several problems were then identified. This test was followed by a field evaluation where the focus was to see if the problems identified earlier still occurred after a period of use, and whether new problems had occurred. In the present field study Kommunedata wanted to move beyond this narrow focus, but at the same time build on prior experiences from the field setting and of the product. Another issue for Kommunedata was to develop their usage of collected data. The field work was structured as follows: two usability testers visited two particular wards at two hospitals, one day each place and observed the use of the system.

## General overview of the field studies

The general preparation of the field work experiment started with a couple of workshops in the BIDI project. All three companies conducted the field studies within the same period of time and immediately after a one-day seminar with Melissa Cefkin of IRL (Palo Alto) was held. The focus of the workshop was interaction analysis of video recordings as all three usability groups used video in their field studies.

Following the field studies, Kommunedata and Danfoss brought back some issues from the field study to discuss with the users. Kommunedata in particular found the approach of bringing central findings and questions back to the users so useful that they are now considering how this approach can be more frequently applied.

A month later, after the organisations had concluded the analysis of the field work, a two-day workshop was held with Jeanette Blomberg, Xerox PARC, with the particular focus on ethnography and design, and the combination of ethnographic and other methods such as interviews, prototyping, etc.

## Bringing the field into the lab

It is widely acknowledged in the usability community that much can be gained from bringing aspects from the field into the lab, and it is chiefly this principle the three usability groups in question have built their usability methodologies on. In the following we will look at some of the techniques already used in this respect by the three usability groups.

Test and workshop surroundings are created with the specific goal of bringing the physical context of the field into the lab for a more realistic work setting when conducting usability work.

The usability groups often find inspiration for their test or workshop scenarios in the current work setting. Scenarios based on field studies are a way of enriching the testing in the lab, so as to bring in the users' perspective on their work/use situation instead of just the usability workers' and designers' understanding of their artefact. However, it is equally important to study how work practices change as new technology is introduced. If test scenarios in the lab are developed solely on the basis of the earlier (non-technical) work practices, the issues that might arise from the introduction of the technology are not taken into account in later tests and therefore not included in the product. Therefore we would advocate field work as an integrated part of the usability tests throughout the development cycle.

As use situations often turn out to involve more than one active user, the co-operative aspects must be taken into consideration. Furthermore, prototypes need to be more

complete in order to be suitable for co-operative situations, an aspect that is also part of the added complexity in test situations [1]. The usability groups approach these problems carefully and take great effort in supporting these aspects by e.g. creating scenarios for multiple users. We are convinced that good scenarios and simulation techniques where users act out more of their work situations [4, 9, 15] are suitable for enhancing lab tests of co-operative situations and will continue to work with this issue.

Workshops actively setting the stage for use or simulated use are means frequently used as a way for users to become active participants in the testing and evaluation of particular products. Video clips of work may help set the stage for such testing together with scenarios, and users may further contribute by bringing their work tools and materials into the test situation as well as create their own scenarios.

These were all examples of how the three organisations generally take on usability work. It is now time to take a look at what experiences were earned from the field studies and how elements from lab practise have aided the field work.

## Bringing the lab into the field

By setting up tests in the field rather than in the lab more realistic tests may be conducted. Artefacts or prototypes may be brought to the workplace and tried out in the actual context of work. As a side effect the artefacts may be spotted and commented by people from the workplace not originally involved in testing.

The context of use plays an important role for a richer understanding of the usability of particular products. As such implications of this is not surprising, neither theoretically nor empirically (for a discussion of context and the study of HCI in use, see [7]). What is interesting, however, is how findings of this type are instantiated in the particular cases, and how the three usability groups have used lab approaches to aid them in working in the field.

In the following we shall look at some of the ways lab approaches were introduced in the field studies and the consequences of this.

## Aspects of the lab used in the field

Since people do not constantly operate their audio and video devices, the use of B&O products is fairly infrequent and fragmented which makes it harder to conduct observations of 'real' use if a field study is to be concluded within a realistic time frame. The same thing can be said to apply to the Kommunedata case as the nurses did not have time specifically dedicated for using the computers, but had to squeeze some typing in whenever possible throughout the day. Though rather extreme, in that the operation of e.g. radios is infrequent, short and fragmented, this problem is

certainly more general as can be seen from the Kommunedata example.

In the B&O study an approach based on recall interviews combined with informal simulations was chosen. It somewhat complicates the matter that the general type of field studies B&O are interested in depend on getting access to people's homes, potentially at times where people are literally not dressed up for public appearance.

The primary concern for the B&O team was how to handle these situations in order to produce meaningful data within reasonable time limits? They got fine results from combining open-ended interviews with more structured simulations of e.g. yesterday's breakfast routine. The B&O field trip team also discovered that they got a much more open response if they started out with an informal chat with the users over a cup of coffee and went on to the simulations afterwards. This suggests that the order in which the tasks are performed is not completely without influence on the result.

Kommunedata chose a combination of interviews with the nurses and observation of their daily use of the system. They discovered that they got a lot out of changing from pure observation to asking users to think aloud in a way that was rather similar to their normal thinking aloud procedures used in the lab. However, we would like to stress again that an important part of a field study is to remain in the situation with an open mind and not just to delimit one's observations to what have been planned. Thus, it is necessary to abandon some aspects of lab testing whereas others may well be brought to bear on the field situation.

Danfoss conducted their field study through video filming workers as they went about their daily business, combined with in situ interviews. This field study was primarily an experiment with ethnographic methods and as such drew less on methods from the lab. However, the usability group did include logging as part of the observation, i.e. the usability people aimed to take notes regularly while video filming to create a conceptual log for the video.

### **Problems emerging in the field**

Having determined that field studies can provide us with information largely unattainable in the lab, the question now becomes how to conduct the field study? We shall look at some problems encountered in connection to field studies and some solutions to them.

How can fieldworkers be sure that data from field trips is 'genuine' and not corrupted by their interference? It is our claim that the usability worker should not be invisible in the setting; it is true that interference on a larger scale can affect the results but it is necessary to a certain degree to guide the field study towards the focal point. Being as neutral as possible might result in data that is hard or impossible to use; e.g. Kommunedata discovered they got

much more out of their video tapes of the nurses using the system when they asked them to think aloud while working rather than just work. This kind of interference is sound because Kommunedata had previously gathered video tapes of nurses typing which conveyed no useful information for them whereas the think-aloud approach made them able to understand the nurses' motives and problems when using the system.

Other problems we face when engaging in field studies are related to the use of video to capture the scene. We shall look at two fundamental problems, namely how video can delimit the observation and how it may affect the users' behaviour.

Using the camera as the sole means of recording events, i.e. the "I am a camera"-approach, gives rise to the question of what might be missed when you limit your field of observation to be that which you see through objective of the camera. Furthermore, and more importantly, successfully operating a camera in this respect demands concentration which makes you less sensitive to e.g. peripheral activities or interesting comments from the user that might initiate a new discussion as is often the case with open-ended interviews. In the Danfoss study, a single usability worker not only had to operate the video camera continuously, but also take notes at intervals. It seems unrealistic that one person can be focused on the camera and at the same time remain open to the situation and what else may be going on in the surroundings. We opt for the presence of at least two people in these kinds of ethnographic field studies, so one can concentrate on operating the video camera and the other can be more openly aware of the situation.

We now address the question of how and to what degree the cameras affect people, and whether they should be there in the first place if they influence the behaviour of the participants. As an example, Kommunedata asked people when they entered the office if they minded being videotaped. Nobody said yes, on the other hand, often people worked very briefly and left again. Were they rushing the job because of the camera, or were they always that busy? In such a situation the camera should probably be omitted and replaced by note taking combined with the think-aloud approach described earlier, to the extent it does not prevent the user to perform other work tasks. However, if the users accept the camera as merely a mean of capturing what is going on, video tapes can be an invaluable source of information in a later analysis of e.g. use scenarios or recollecting details. In the B&O field study, the camera worked well in combination with open-ended interviews and simulations of the users' daily routines because none of the users saw the camera as dominating or threatening.

There is no reason to believe that what we get through the camera in the field is more objective or real *per se* than what we get from a lab test. What needs to be considered in

every instance is the balance between the negative and the positive sides of using video from the knowledge of the users and their environment and from that judge whether or not to bring a camera. For a more detailed discussion of the use of video as a recording medium in field studies, see [11, 12, 13]

## Aspects for the future

Even though the three usability groups already had a well-functioning assortment of techniques for usability testing, the field studies opened up to ways of enhancing their 'methodological tool-kit', both through their own experience with field work but also through the exchange of examples with the other groups during the evaluation following the field studies.

The combination of simulations and open-ended interviews in one field study and think-aloud methods and observation of users performing work tasks in another proved to be a very efficient way of getting an insight in how users interact with their technology. This becomes evident when you consider the limitation put upon these field studies, namely the limited time-span within which they were carried out - a working day spent at each field site at the most - and that this type of information is difficult to retrieve in general due to the infrequent nature of the use. As these limitations are hardly the ideal basis for a field study it becomes even more important to find ways of keeping a focal point in mind in order to obtain the necessary information. We believe the lab methods used in the field studies obtained this without compromising the openness of the situation and therefore let the usability workers approach the field with an open mind to what the field study may reveal of e.g. unanticipated use. We are supported in this by the usability groups' positive response to the results gained through these experiments and their readiness to adopt these techniques into their usability practise for the future.

We would once again like to stress the importance of weighing the situation with regards to using a camera. As argued before, it is unwise to use it at any cost because of the fundamental problems identified as potentially damaging to the situation; its presence may inhibit or influence the users, or the operation of it may make the usability worker more insensitive to e.g. peripheral activities or comments.

## Conclusion

Field studies may be used to gain a deeper understanding of the artefact from the perspective of real use. The experimental use of lab approaches has shown ways of reducing the complexity inherent in real life work settings without putting unwanted restraints on the openness of the situations, involving only slight changes of the usability

groups' current field study practise. As stressed, this becomes essential to the quality of data obtained when the field study is limited by e.g. time frames. We have argued the importance of usability workers, when faced with surprises in the lab, are ready to give up control and pre-planned actions and stay with the complexity of the situation, and sketched how this may be accomplished through the description of the wide range of methods already used by the three usability groups. However, in addition to the enhanced lab methods we see more experiments with bringing usability work into the field and enriching the field methods with aspects of lab testing as necessary components of improving work and thus designing more usable artefacts.

The BIDI project as such has only just begun. The coordinated field studies are one example of activities that we have undertaken and a promising one indeed. Many methodological discussions have arisen on this basis and we shall continue to pursue these issues. The continuation of the project will certainly include more work with the combination of field studies and lab work in all possible settings.

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## References

1. Bardram, Jakob E.: The Role of Workplace Studies in Design of CSCW systems: From Passive 'Implications for Design' to Active, Cooperative Design. In Proceeding of the 19th IRIS Conference, 1996.
2. Black, A. & Buur, J. (1996) Making solid user interfaces work. *Information design journal* 8(2): 99-108.
3. Buur, J., Bagger, K. & Binder, T. (no date) Turning usability testing into user dialogue, draft, Danfoss.
4. Bødker, S. & Grønbæk, K. (1991). Cooperative Prototyping: Users and Designers in Mutual Activity. *International Journal of Man-Machine Studies*, 34, Special Issue on CSCW. Also in Greenberg, S. (Ed.) *Computer Sup-*

- ported Cooperative Work and Groupware*, Academic Press, pp. 331-359, London 1991.
5. Bødker, S. (1991). *Through the Interface – a Human Activity Approach to User Interface Design*. Hillsdale, NJ: Lawrence Erlbaum Associates.
  6. Bødker, S. (1993). Historical analysis and conflicting perspectives - contextualizing HCI. In Bass, L., Gornostaev, J., Unger, C. *Human-Computer interaction. 3rd International Conference, EWHCI '93*, Springer Lecture Notes in Computer Science vol. 753, pp.1-10.
  7. Bødker, S. (1996). Applying activity theory to video analysis: How to make sense of video data in HCI, in Nardi, B. (ed.) *Context and consciousness. Activity theory and human computer interaction*, MIT press, pp. 147-174.
  8. Bødker, S. & Christiansen, E. (in press). Scenarios as springboards in design. In Bowker, G., Gasser, L., Star, S.L. & Turner, W. (Eds.), *Social science research, technical systems and cooperative work*. Erlbaum.
  9. Grunnet, C. & Skak, A. (1996): Drama in Design, Applying Improvisation in Product Design (Unpublished report). Institute of Dramaturgy, Århus University, Århus Denmark; and Man-machine Interaction Group, Danfoss, Nordborg Denmark.
  10. Hughes, J. Randall, D & Shapiro D. (1993). From ethnographic record to system design: Some experiences from the field. In: *CSCW: An International Journal*, vol.1 no. 2. USA.
  11. Jordan, B. & Henderson, A. (1995): Interaction Analysis: Foundations and Practice. *The Journal of the Learning Sciences* 4(1): 39-103.
  12. Mackay, W. (1989): Video as a Research and Design Tool. *Special issue of the SIGCHI Bulletin*, Vol. 21:2.
  13. Mackay, W. (1995): Ethics, Lies and Videotape. *CHI'95 Proceedings: Conference on Human Factors in Computing Systems: Mosaic of Creativity*, Denver, Colorado, USA, pp. 138-145.
  14. Madsen, K.H. (1996): Initiative in Participatory Design. In Blomberg, J., Kensing, F. & Dykstra-Erickson: *PDC '96, Proceedings of the Participatory Design Conference*. Palo Alto, USA: Computer Professionals for Social Responsibility (223-230).
  15. Mogensen, P. (1992) Towards a Prototyping Approach in Systems Development. *Scandinavian Journal of Information Systems*, 4, 31-53.