

Communication Support for Participatory Design Projects

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Abstract

Communication plays a crucial role in system development projects. In this paper, communication means supporting participatory design projects are presented on the background of teaching participatory system development in a university context. The use of communication consultants, i. e. project members who are particularly responsible for communication within a project, and the use of project diaries, i. e. a means of reflecting project activities in addition to product documentation, are investigated, and implications for the practice are discussed.

Keywords: participatory design, prototyping, process documentation.

Introduction

Communication plays a crucial role during the development of computer-supported information systems. Already in the late sixties, Schwartz (Schwartz 1970), amongst others, reports that poor communication between programmers is one reason for the failure of system development projects. This statement is still true, as Curtis et al. (Curtis, Krasner & Iscoe 1988) report in a recent study where communication in the developer teams is identified as being one of the major problems in system development.

Communication is even more important in participatory design projects, where developers and future users work together (cf. (Pape & Thoresen 1987), (Bjerknes & Bratteteig 1987)). In this paper, I discuss ways of improving communication

in participatory design. In four student projects, which were part of university courses in which participatory design was taught communication was facilitated by communication consultants, who used project diaries.

The paper is structured as follows: first, the set-up of the student projects is explained with emphasis on the communication consultants' tasks and the use of project diaries. Then situations are described where communication, improved by communication consultants and the use of project diaries, supported project work. Problems which arose in connection with the communication support measures are also investigated. Finally, I discuss some of the implications my findings may have on future practice. The findings presented in this paper are based on project diaries that were written by the communication consultants, on reports written by each project group, and on interviews with all project participants. Quotations from the documents are used to illustrate the various issues.

Set-up of the Projects

Participatory design projects are based on the experience that computer systems for work places can only be designed with participation from the users (cf. (Ehn 1988), (Greenbaum & Kyng 1991)). This requires training on the part of both developers and users. Courses on participatory design, which take these insights into account, are offered at some universities as part of the computer science programme. The projects under consideration in this article were conducted by the author with four student groups as the practical part of two graduate courses on prototyping as a strategy for participatory system design at the Technical University of Berlin and the University of Oslo. The task for the groups was to develop prototypes for an interactive information system to support the management of bibliographical data and literature reference lists.

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To give the students a feeling for the problems encountered in participatory design, the projects were run as a kind of role play, where different groups with different tasks were represented. Each group had 6 - 9 members with the following task distribution:

- two to three members adopted the users' perspective,
- two to four members acted as developers,
- two members served as prototyping method consultants.

Within the project groups, no official project leader was appointed. The groups had to deal with the management of their projects on their own. The author of this article acted as a kind of external authority, who determined the prevailing conditions for the projects. Each group was provided with an identical three-page document informally describing basic requirements for the target system. The time span of the projects was restricted to eight weeks. Weekly project meetings and a written project report on the project's development, as well as the usual product documents accompanying the prototypes were required as part of the final result.

Communication Consultants

In order to improve communication in the project groups, one further person, who worked as a communication consultant, was engaged as an additional project member for every group. This person's task was to concentrate on the communicative aspects of the work in the project groups. The communication consultant was to follow and to analyze the development process in order to help in cases where problems related to communication occurred. This was one reason, why the communication consultants' task included making written records, as far as possible, of discussions, meetings, and the project work as a whole. The communication consultant was thought to be a rather passive project member. The interpretation of the task was, however, free to the consultants and the project groups. How differently the task was fulfilled, is mirrored in the following statements:

"I tried to motivate the users, in particular to express their critique. I chaired the discussions and strove for a shared, understandable project language. I considered the recording as an additional service to the project group."

"As communication consultant I behaved more passively than the other project members and recorded the course of the discussions and their results. This

was what I considered to be my job. I understood it as a service without essential design functions."

"In the beginning I acted as a kind of day-to-day project leader. I wrote the diary and was expected by the group to chair the meetings. Since my role was communication consultant, we decided to share the directing of the meetings."

Project Diaries

To perform their work and to support communication within the project groups, the communication consultants were requested to use the method of writing diaries. Diaries are known as a means for private and personal reflection. They are used by people to get a better understanding of themselves and their environment, one of their aims being their own personal development. In contrast to private diaries, the project diaries were meant as a means for professional development. One aim was to support an understanding of the actual project as the basis for successful work, including changing work procedures, if necessary.

The use of this method in system development goes back to Naur (see (Naur 1972), (Naur 1983)), who has applied diaries to study programming work. Jepsen et al. (Jepsen, Mathiassen & Nielsen 1989) report how system analysts used them for the management of their tasks. In the projects described here, their use was extended to documenting and supporting cooperation between different interest groups throughout the various activities of prototyping, comprising analysis, design and implementation. The recording was basically chronological.

The communication consultants used a format for the diary entries which all project members had agreed upon. To facilitate access to the information available, it had fields for the date of an event, respectively of a discussion, the name of the particular topic, the course and result of a discussion, and special fields for general remarks from the communication consultant. Only the communication consultants wrote the diaries, but as they were intended for collective use, they were public and the other project members read them and commented on their contents. The overall use of the diaries was explained communication consultants as follows:

"The diary documented the course of the projects and made changes in the attitudes and expectations of all those involved visible. The development of model monopolies¹ could be observed and uncovered clearly. This created the possibility of breaking them. For the evaluation of the projects the diaries

¹The concept of model monopoly introduced by Bråten (Bråten 1973), (Bråten 1983) to describe dominance in discourses was known to the students.

were invaluable."

The different ways each project used the diaries are best described as follows by the groups themselves: "The diary was supplemented, restructured and commented on by the communication consultant after each meeting. ... The diary was used as an archive for shared knowledge and decisions. Grasping the overall state of the project was simplified by the diary."

"During the project the only one who used the diary regularly was the communication consultant. He used it for settling arguments during discussions by often quoting decisions made. At the end of the project, two developers used it to prepare their overall project evaluation."

"The communication consultant was responsible for the diary, a technique which together with the reports forced us to reflect upon the development process. ..."

Situations for Communication Support

During the projects, the participants benefited from the communication consultants' work and from the existence of project diaries in different situations, which all are of great importance for the course of a project (cf. (Floyd, Reisin & Schmidt 1989), (Andersen et al. 1990)). Communication support was achieved when:

- establishing a project
- defining a project goal
- structuring project meetings
- developing a project language
- providing transparency
- resolving disagreements.

Project Establishment

Project establishment is crucial to the course of a project. The project members may meet each other for the first time and lay the foundations for their further cooperation. The situation, however, is often characterized by a considerable uncertainty. One problem is that project members do not know each other and do not know how to get communication going at the beginning of the project. One communication consultant put it this way:

"It really seems to be uncomfortable for every one to present himself or herself. Throughout the whole

session an atmosphere of uncertainty could be felt. This became obvious in particular by the fact that virtually no one volunteered to take the floor without my asking them."

This statement already suggests a solution to the problem. This was described more clearly by another remark, where the communication consultant concerned explained his understanding of his task: "In the beginning of the project, my job was the moderation of the discussions between the project participants. During the first two sessions I had the feeling that, if I had not been present, all the others would have gone home. But as the project became more concrete, the moderator function became less necessary."

The communication consultant himself took the initiative to lead the discussions. He described the resulting atmosphere between the users and the developers as very good and constructive.

Goal Definition

The definition of a common project goal and a plan for how to reach this goal are prerequisites to the actual project work. Without a shared goal people work along-side each other, which is a frustrating experience. One problem is that project members do not clarify their goals and work strategies. Many activities are started which do not lead to satisfactory results.

One project group described this with the following words:

"Our greatest weakness was defining a common goal for the project. The users wanted a pilot system, whereas the developers, first and foremost, wanted to explore the possibilities of the software tool for the desired target system. But this was never thoroughly discussed."

Without having defined a goal, the group acted without a framework for their work. The work situation became worse and the participants became rather frustrated. At that point the communication consultant initiated a reflective meeting. Two important issues were raised during this session:

"We realized that we had too much work to do and almost no time to think. We brought this upon ourselves by deciding to have a demonstration of a prototype every week."

"We started a big discussion about what we are doing; whether we are making a complete system or a prototype and what the overall goal of the project is and what the goal for each prototype is."

As a result of this discussion, the project group defined a realistic goal for the next steps and decided to have regular sessions to evaluate their work

and define new goals on the basis of the results achieved. In the final report, they described the effort they had put into defining a goal, and the resulting consequences:

"We used a lot of resources in the second cycle to prevent a repeat of previous failure. This cycle was the most successful one. This is reflected in the end product of this cycle: a prototype the users were very satisfied with."

Structuring Meetings

Too little emphasis on organizing information exchange and decision making lead to inefficient work and demotivating work conditions. Badly organized meetings are often felt to be a waste of time. One problem is that project members do not plan and structure information exchange in meetings appropriately, thus issues which should be discussed are forgotten and decisions are not taken. A typical situation was described as follows:

"In the beginning the discussions followed along spontaneously determined agendas, but without a clear reference to the single topics. Individual project members complained about a lack of structure".

The communication consultant intervened:

"Thus I required agendas for each follow-up meeting at the end of every session. When the discussion drifted too far away from a topic, I asked the project members stick to the point."

and took further steps:

"If topics were not decided or discussed at all, I asked the group members at the end of the meeting to make decisions or to put the topic explicitly on the agenda for the next meeting."

Development of a Shared Project Language

People in system development projects have varying professional backgrounds. This is especially true where users and developers are supposed to work together. This makes it necessary to develop a shared language, a kind of common project language. One problem is that project members do not understand each other because they each use their kind of terminology. One communication consultant declared:

"On a group basis, when looking through working papers produced by individual project members misunderstandings often emerged due to different use of terminology."

This can develop into very severe problems as stated by another communication consultant after the following observation during a prototype demonstration:

"As the user cannot understand the screen forms directly, the developers explain the existing program errors to her. In doing so, they partly use programming language notions. The user cannot follow. One consequence is that she now judges the software tool to be useless. And what is worse, she seems to lose faith in the developers' work."

The language problems mentioned were tackled in different ways by the communication consultants:

"I did not really have to translate between the users and the developers, but rather press both sides continuously to use a more generally understandable vocabulary."

"When the group members themselves failed to explain notions, I made a point of asking for clarification. By doing this, communication difficulties could usually be removed quite fast."

One communication consultant concluded:

"I think mediating in language problems contributed to a work style that can be described as continuous, to the point and very relaxed."

Provision of Background Transparency

It is important that the project members make their different background assumptions transparent. Without such transparency, misunderstandings resulting in conflicts are virtually unavoidable. One problem is that project members do not understand each other, because they work on the basis of different unspoken assumptions and do not recognize this.

As conflicts in one of the project groups increased, the communication consultant arranged a meeting, where the project group's analysis resulted in the following statement:

"We found that there exists a sort of misunderstanding between the users and the developers. The users write system specifications and no prototype specifications. The developers believe that they have to implement all the demands that the users write about."

The project group succeeded in finding the reason for many quarrels and the bad atmosphere in the project. The communication consultant reported:

"And then the developers turn hostile about every new proposal. The users' idea is to write system specifications and then to negotiate what should be included in a prototype. I do not think this is clear to everyone."

Here, the communication consultant helped the groups to recognize their different bases for the common work. To prevent this kind of misunderstanding, another communication consultant chose

the following procedure during regular meetings: *"At the beginning and the end of the sessions I often asked questions about points from the previous meeting which had struck me as being based on unclear, non-transparent arguments and assumptions. This policy turned out to work well and helped to clarify a couple of misunderstandings".*

Resolving Disagreements

Disagreement can be a source of progress in project work. But it becomes a problem when a project group does not manage to resolve the disagreement and find a compromise. The communication consultants' functions as referees and mediators have already been shown in the preceding examples. In this section, a special situation will be discussed. One problem is that the project members do not agree and have different opinions on matters which have already been discussed.

Such situations often lead to fruitless discussions and are often experienced as an uneconomic use of project resources. The communication consultants used the project diary in such situations. They stated:

"When differences in the group arose, I could refer to statements made earlier in the project."

"The diary was used by the project members for reference purposes during arguments and as an official record of decisions made."

"During discussions, the project members referred to the diary. They often asked me whether I had documented some particular fact they could not agree upon at that moment. Most of the time this was enough: the diary contained the necessary information and the disagreement was resolved."

Negative Aspects of the Communication Support

The projects also revealed certain negative effects of using communication consultants and diaries. All project participants stated that their unfamiliarity with the communication support means prevented them from using them more fruitfully. They mixed up the communication consultants' tasks with other tasks in the project, and the function of the project diaries with the function of other documents in the project. This led to situations where the communication means were felt to be an obstacle and a disturbance, and in some cases even experienced as a threatening means of control.

Mixing up Tasks

The communication consultants' job, as it was de-

signed for the projects described here, comprised many different tasks. This has two dangers. First, there is the difficulty of keeping the different tasks apart, and second, there is a high risk of overloading the consultants with work.

All communication consultants expressed general problems when listening and making notes at the same time. When the recording function served several purposes and was combined with other tasks, the situation became even more difficult:

"I found out that I could not always fulfill the requirements of being a chair person, taking minutes and observing and analyzing communication behaviour all at the same time. Especially recording results of a discussion and its course in parallel was sometimes hard to do. To report the communication process, it is necessary to describe the different opinions in detail. Recording the discussion results, often entails neglecting minority opinions and generalizing view points."

This illustrates the dilemma of a communication consultant who attached the same degree of importance to both result reporting and the interaction process. It became even harder when the same person was also expected to preside over discussions. This has additional consequences as the following statement from another communication consultant shows:

"As a meeting leader, I suddenly became more and more responsible for the decisions we made and the time schedule we had set ourselves. It turned out to be a middle management problem."

The communication consultant found herself caught between the other project participants and the external authority. As she acted as the moderator of the meetings, the project group had also, without making it explicit, chosen her as a kind of project leader. They delegated unpopular responsibilities like taking care of the project schedule to her. This led to conflicts between her and the rest of the group. She was overworked by the sheer number of different tasks and the project members were unclear about her role. They concluded:

"The group has missed not having a project leader who could intervene in situations where discussions became quarrels and who could accept or reject goals and working plans, - a project leader who did not interfere in the how, but in the what."

They did not see the difference between a project leader, who has the responsibility for a project as a whole, and a communication consultant who could have helped them in solving some of their problems connected to their communicative activities. One reason for the confusion was certainly the open definition of the consultants' tasks at the beginning of

the projects.

Mixing up Documents

Documentation has always been pushed to the sidelines of system development. Developers dislike documenting their work. They see documentation as an inferior job (cf.(Strübing 1988)). The project participants were no exception. Although, at the end of the projects, they acknowledged the benefits of process documentation, their attitude towards this task during the projects was problematic.

All groups underestimated the effort of producing documentation. One group mixed the project diaries with other documents. They reported:

"The diary was written to document decisions made in the project. It contains quotations from discussions to show the development of ideas. It also contains all major documents distributed and referred to in the discussions."

The project diary here was also used as a management document and as a product document. As, in addition, the responsibilities for documentation were not determined, the group was faced with the following situation:

"Documentation during the project was not structured enough. Documents produced were not part of the overall plan, but were produced more or less when needed. As a result, these documents were unstructured, not updated and often it was not clear what was the official version."

Documentation of intermediate products like confirmed specifications or descriptions of design proposals, was disregarded in the belief that the project diary would contain this information. But this was not always the case. Thus the following happened:

"During negotiations, the users often elaborated verbally on their documents, but did not update them to reflect this. Therefore the developers often had two specifications, a written and a verbal one. This gave them problems when interpreting user ideas and also hindered them when determining their own preferences."

A reason for these problems connected to documentation was certainly that the affected group failed to clarify the function of the diary and its relation to other documents at the beginning of the project.

Interference and Control

Some concrete objections to communication consultants and diaries were also stated. Interference by the communication consultant, although judged to be positive in problematic situations, was experienced as being negative in the normal course of

discussions. One communication consultant recognized this:

"A precise presentation of results requires inquiries. But such questions may influence and manipulate the communication process in an unwanted way."

A developer openly complained:

"But I felt often narrowed and restricted by the communication consultant and slowed down by his questions."

In this context, the topic of control came up in the project evaluations. Another project participant argued that detailed protocols raise mistrust and the feeling of being controlled. In another group the communication consultant was confronted with the following:

"In the discussion about the purpose of the diary, the developers reproached me for not having restricted myself to just recording results. They felt controlled and under pressure through the publicly accessible remarks about I made about their attitudes during the sessions. It seemed that they thought these remarks ought to have been approved by the groups first."

Some of the unnecessary interruptions can be explained by inexperience and overenthusiasm of the communication consultants in trying to support the project participants. Negative feelings towards the communication consultants in their role as controllers can be explained by the unpleasant feeling of being observed by a person who is not really an ordinary project member that takes part in the development activities. Reluctance towards the diaries in this context was again due to the fact that the groups had not thoroughly discussed the purpose of the diaries.

Implications for Practice

The communication consultants and the project diaries supported communication in the projects described here, although the participants had some difficulties working with them. These projects, however, differed from ordinary system development projects. In ordinary system development projects, there will usually be an assigned project leader, and not a flat organization, and there will probably be no resources for employing one person as a communication consultant. But more, and severe, conflicts of interest between different groups are likely to occur than in student projects where all participants have the shared goal of passing the final exam of the course. Thus, care has to be taken when transferring the set-up of the student projects to system development in practice.

Nevertheless, by focusing on communication, the

communication processes themselves improved and the process documentation which was produced contributed to better product documentation and to improved project evaluation. These results can be transferred to ordinary system development. In the student projects, they were achieved by making one person responsible for facilitating communication. In ordinary system development, the effects may be achieved by defining distinct areas of responsibility that support the different communicative activities.

The project diaries are useful to record the course of a project and to collect process information. Analyzing this material in regular, spoken and written, reviews, helps to improve the evaluation of projects underway. Process documentation supplements product documents. Documentation of the reasoning behind decisions and the essence of discussions can also be supportive when enhancing software systems in subsequent project (cf. (Mathis 1986)).

Many of the tasks performed by the communication consultants, are tasks one would expect to be done by a good project leader. An explicit focus on communication by a project leader will in many cases improve project work. A project leader can support the regular communication both on the social and on the technical level by taking on tasks of a mediator and facilitator. This is however not always possible. A project leader is involved in, and often even directly affected by, the project work. In such situations it might be more useful to ask a supervising consultant from outside to join the project for limited periods of time.

The tasks of leading meetings as well as editing the different documents can be assigned to regular members of a project. Thorough planning and sufficient resources both in terms of people and time are indispensable. This applies in particular to the task of editing documents. The management and production of documents are responsible and time-consuming tasks that cannot be carried out incidentally. When the tasks in a project are distributed, this has to be taken into account. A possible solution is the division of the editing jobs in a way so that several persons, each with a separate area of responsibility share the task. To share the burden, editing and moderating tasks can be rotated in a project team. What has to be ensured, is that the task distribution is clear and transparent and that the communicative activities are given a place of importance in the project.

Final Remarks

The courses forming the background for this study

show that it is possible and sensible to teach issues of participatory design, although university training is rather restricted compared to practice. Training of this sort contributes to raising of the level of consciousness about communication as one of the major aspects in participatory design and system development in general.

The communication support measures discussed here make communication an explicit part of project work. The study indicates that they offer possibilities to handle problems related to communication in practical system development.

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