IN THE BEGINNING...
PRINCIPLES AND THE B-FORE MODEL FOR
PARTICIPATORY ERGONOMICS AND DESIGN

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Despite user involvement, the problems of acceptance and sustainability of systems design still remains. The thousands of methods of traditional, user-centred or co-operative design supports the view, that the problem solving isn’t the problem, but the problem is the mutual understanding of the problem. The presented work analyse design experiences, derive principles in participatory design practices and develop a model - not of design stages but of the roles, tasks and processes in the interactions of designers and users. Result is a structure of four principles: simplicity, confrontation, character of games and overview. The developed B-fore model shows the importance of reciprocal changes of the processes „show-recognise“ and „explain-understand“. This lead to a co-operation of interpretations before (‘B-fore’) the co-operation in actions of problem solving begins.

INTRODUCTION

The Problem isn’t the Problem

„...more than 3000 methods for problem solving“ (Hürlimann, 1981) - the field of design seems to be flooded with methods and flow charts. That means, that the problem solving isn’t the problem, but identifying and mutual understanding that’s the problem!

Than the success in design management isn’t the question of the right sequences or iterative circles of the expert’s activities in the sense of: Plan-Do-Check-Act. The challenge is, to invoke a culture of interactions between the project’s participants. Consequently a model for successful design approaches has to show the roles, tasks and processes of both parties, expert and users.

The ISO 13407 Bug

The norm: „Human-centred design processes for interactive systems“ (ISO 13407, 1998) figure out the important aspect of incorporating user feed back during the design process. Core element to visualise the process is a flow chart of activities. But the first step: Identify need for human-centred design“, finds neither links to methods nor further explications in the norm. (figure 1).

Figure 1: The ISO 13407 Bug: The first activity of Identify need for human-centred design“ has no explications in the norm.

This bug and the entire norm lead to questions:
- Which interactions are necessary to identify needs, i.e. to recognise problems?
- Are there principles to design and apply methods to support those interactions?
- Is the objective of the further standard activity „understand and specify the context of use“ a one-side expert’s understanding?

The following work will clarify this.

METHOD

Three steps:

− An analysis of failure in the experts-user interactions in co-operative design projects.
− A derivation of principles of successful participatory design methods.
− A conception of a model to improve design project management.

RESULTS

Key Factors of Failure

Analysing experiences in co-operative or “user-oriented design (Rauterberg et al., 1994; Naro & Imada, 1991; Koslowski, 1988; Mumford & Welter, 1984) shows main factors in project failure:

− Iceberg interactions
  The participants (experts, users) have difficulties to come close together and to show their meanings. The interactions results in a more superficial and „cold & mechanical” information interchange. Most of the mutual interpretations and valuable knowledge sources rests hidden.

− Problem recognition
  The analysis of the status quo and the user’s requirements shows an inadequate problem recognition for the participants.

− Knowledge verbalisation
  Designer or ergonomists and users are experts of their work and have difficulties to verbalise and transfer their knowledge.

− Responsibility
  The participants couldn’t overview the entire process of change. Therefore they can’t control the change, get fear to take responsibility for decisions and loose motivation for co-operation.

Derivation of Principles (Table 1)

Participatory design (Held, 1998) shows simple, direct and robust methods in the project phase of analysis. Their effect are an ‘ice-melting’. They help to overcome inhibitions and to facilitate the process of understanding the analysis work.

Confrontation can help to break the ice too. But the more important effect is the problem awareness. Used to do their work over a long period of time, the users get indifferent toward their familiar work surrounding. „For the same reason that the fish will be the last to discover water...“ (Siegler & Richard, 1982). Unusual point of views or photo snapshots of the users at work can effect confrontation. Therefore it must be a media which effects a „self - focusing appeal“ (Eco, 1987).

Further the character of a game facilitate problem awareness and knowledge verbalisation. For example a simple role play at the work place but beside the work process. It provide an error tolerant situation and releases time. Both support the user’s motivation and creativity. When the play or game acts with simple substitute for real objects or with scenarios, than the users have to activate their imagination. This supports the linkage and verbalisation of experiences.

Overall, participatory design projects shows small stepwise and concrete changes combined with a feed back communication of the results. This insures all participants not to loose control of the project and permit them to take responsibility.

Table 1: Principles and their intentions.

<table>
<thead>
<tr>
<th>Principle, Characteristics</th>
<th>Intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplicity, <em>direct, robust</em></td>
<td>‘ice-melting’ approach</td>
</tr>
<tr>
<td>Confrontation, <em>unusual perspectives</em></td>
<td>‘ice-breaking’ awareness</td>
</tr>
<tr>
<td>Game, <em>intuitive, error tolerant</em></td>
<td>imagination, creativity</td>
</tr>
<tr>
<td>Overview, <em>stepwise, concrete</em></td>
<td>control, responsibility</td>
</tr>
</tbody>
</table>

Improvement of Design Management

The expert’s intention in analysis is to recognise and to understand the situation. The users react in showing and explaining their work (figure 2).

Figure 2:  Tasks, processes and the flow of information (→) in expert’s analysis.

What the expert recognise is the basis for his interpretations. But those influences again his recognition. Result is the expert’s understanding. Which is often the start for problem solving and later usability testing of solutions shown in figure 1. It seems to be a first improvement of the analysis.
to explain the analysis’ results to the users before any actions of problem solving starts. But doing this explanations without given the users the chance to recognise, leads to a pseudo-improvement (figure 3).

Figure 3: Pseudo-improvement of the expert’s analysis, he explain, but the users haven’t any chance to recognise.

The real-improvement is to provide a reciprocal change of the processes „show-recognise“ and „explain-understand“ and to use the principals of simplicity and confrontation (figure 4).

Figure 4: Real-improvement, mutual learning by the change of the processes „show-recognise“ and „explain-understand“.

In this improvement, the expert’s tasks include the part of visualisation and the user’s task the part of a reception. The reciprocal approach reduces the distance between both parties as shown in figure 4.

Given the participatory analysis such a meaning, the entire design project has to be divided into a section of mutual problem recognition and understanding and a section of co-operative actions of problem solving and testing of design solutions.

This requires the change of tasks and roles for both sides, expert and users. The expert is first an actuator, then a moderator of reception and co-operation and at last a facilitator of change and implementation. Vice versa the users roles changes from operands to active participants who can be the actuators of further changes in their own system (Figure 5).

DISCUSSION

Expert’s analysis is too fast - User-orientation comes too late

„With most people everything moves fast until they understand, but when they get to the point it’s already over.“ (Nadolny, 1987). After the expert (ergonomists, designer) get to the point of problem understanding or production of ideas, he natural tries to reach user acceptance in problem solving. Than his orientation is towards methods like prototyping and feed back of usability test results (see figure 1). This invokes cycles of trials and is contrary to the fast and ‘efficient’ analysis to reach unilateral understanding.

Those cycles consumes time and cost by interacting with problem solutions without a consensus in problem understanding. It is in fact an engineering of user-orientation. At this point it is too late and to expensive to return to the beginning of mutual understanding and identification of needs.

To avoid Pseudo-Participation

Users can act co-operatively in processes of system design without an adequate problem recognition or any consensus in problem understanding with the expert’s thoughts. In this way the users are test objects and have to pseudo-participate in system changes. They neither know their needs nor if the changes will fulfil them.
Pseudo-participation causes system disasters. Impressive examples are the ways a government come into existence and act, which are design processes too. But no matter which dimension, in each project both designer and users need a learn process before they can act successful in design.

Therefore the B-fore Model propose:

- the co-operation of interpretations before the co-operation of design actions.
- the orientation and qualification towards problem recognition and understanding,
- the interactions for the mutual (users and designer/ergonomist) learn process.

**The End of the Euphoria of Rules**

Most management concepts in production and services looking to the participants (employees, clients) as objects. Even customer-focus or user-orientation is uni-lateral and blank-out the important qualification to allow participation. The advantage of those approaches is, that system changes are easy to handle. This is the euphoria of rules. Macro-ergonomics or user-oriented design can be seen as a set of rules (ISO 13407, 1998).

But due to the fact, that mass production systems have to change to complex and agile organisations - to be able to act in a flexible manner in small market segments - no new rules but new paradigms of system design and management are necessary.

**In the Beginning...**

The ISO13407 represents the manner to neglect the meaning of problem recognition in the project’s beginning. The approach of Systems Engineering admit this deficit: „Problem recognition itself isn’t object of Systems Engineering, although it play a central role in coping with problems“ (Daenzer & Huber, 1992).

**CONCLUSION**

The expert of innovative system design is still an expert but in the field of context management and knowledge transfer. He take into account, that:

- solving the problem isn’t a problem, but the problem is the mutual (expert, users) recognition and understanding of problems.
- the principles of simplicity, confrontation, game and overview supports the mutual learning or knowledge transfers.
- the co-operation of interpretations follows the reciprocal change of „show-recognise“ and „explain-understand“. This has to be done before („B-fore“) the co-operation of actions.

**REFERENCES**


