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Man-Machine Communication Dept.
Zurich, Switzerland



Technical University of Gdańsk
Faculty of Management and Economics
Ergonomics Dept.
Gdańsk, Poland

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Software Ergonomics in Practice: The Importance of Acceptance-Related Issues

Marc Hassenzahl & Jochen Prümper & Edmund Buchbinder
Büro für Arbeits- und Organisationspsychologie,
Berlin, Germany (*hassenzahl@bao.de*, *buchbinder@bao.de*)
Fachhochschule für Technik und Wirtschaft (FHTW),
Berlin, Germany (*pruemper@bao.de*)

1 Introduction

In the past two decades the field of software ergonomic design has made substantial progress; now providing rich resources of frameworks, tools and techniques waiting to be applied in commercial projects. However, from the perspective of the usability consultant such projects are often problem-centred, small budget consultations, requested as "last hope", instead of integrated, well-planned collaborations of system developers and the consultant.

What are the reasons for this? One answer may lie in the issues related to the *content* of the field. Theories, models and methods constituting software ergonomic design may not be appropriate for commercial application. We disagree with this view. In the last two decades, theoretical and methodological progress was made, culminating in a consensus about the cornerstones of design: early prototyping, many cycles of design iteration, involvement of real users and co-operation in interdisciplinary teams (Carroll 1997). The usability consultant can choose from a wide range of tools and techniques to select the methods that fit best the circumstances of the software ergonomic project on hand. Thus, *content-related issues* may not play the crucial role.

To understand why clients are often not willing to substantially invest in software ergonomics, we start with an example for problems we are confronted with in our daily work as usability consultants:

Imagine yourself being a usability consultant...: "A client asked you for help. A software system built for in-house use is not accepted by the users. You offered an evaluation of the system and promised to work out solutions for major usability problems revealed. When presenting your results and suggestions for improvements, your client is surprised and bluntly questions your work. He tells you that he believes the software system is already good enough as it is. You have to learn that nobody allows for additional time and money required for changes, although the need for these resources is obviously clear."

In analysing this scenario it becomes clear that *acceptance* of software ergonomic design goals and methods may play a crucial role. In our scenario the central goal, namely "improvement of the software system's quality by improving its usability" is not accepted. Otherwise the refusal of additional resources cannot be explained. The client obviously speculated that the mere presence of a usability expert will increase acceptance among users.

As the example shows, the behaviour of a client can be rather irrational. On the one hand he decides to hire a usability consultant in order to solve his problems, on the other hand sometimes even basic goals are not accepted, i.e. shared between the client and the consultant.

To understand these - in our view - *acceptance-related issues* is the subject of the remaining paper. First, we present a way of thinking about a client in order to understand the reasons for the problems described above (see section 2). Second, we will present examples for essential acceptance-related issues (see section 3).

2 A way of thinking about your client

A way of thinking about your client is as an organisation having a certain degree of maturity or being on a certain *evolutionary stage* referring to usability (Ehrlich & Rohn 1994; Nielsen 1994).

This view has some important implications: First, the client's behaviour will be different depending on the stage he or she is in, therefore problems will be different, too. Second, the consultant's behaviour must take the degree of the client's maturity into account. Third, the client has at least hypothetical chances to evolve.

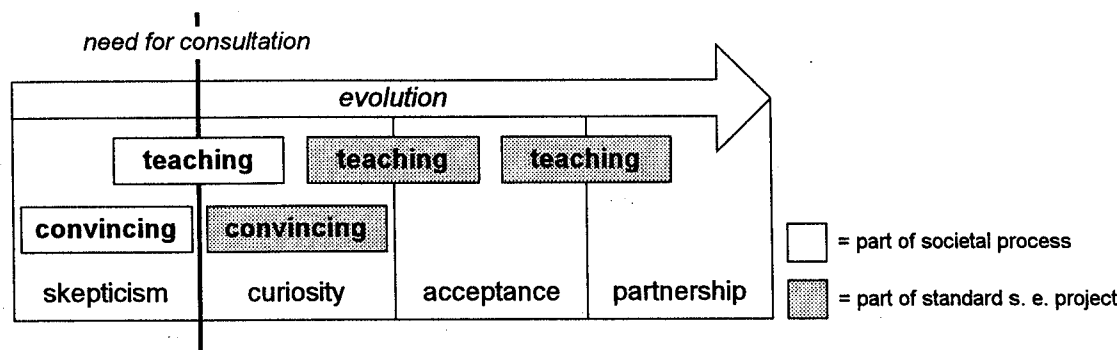


Figure 1: Evolutionary stages and acceptance-related activities

Figure 1 shows four stages of evolution (Ehrlich & Rohn 1994). In the "skepticism stage" software ergonomic consultation does not take place at all, either because usability is not important or the organisation is of the opinion that good usability can be achieved by the regular staff in the regular development process.

There may be two processes leading to the request of an usability consultation: First, the organisation has got an actual problem with a software system (e.g. acceptance is low) and somebody *convinced* it that the problem may be solved by usability consultation.

Second, the organisation does not have pressing problems concerning usability. However, it has *learned* about software ergonomics either from propaganda or formal education and finds it worthwhile to test whether the quality of its software systems may profit from the application of software ergonomic methods.

The two processes *convincing* and/or *teaching* (see Figure 1) are central to the development of a need for consultation, but they are societal and only under indirect control of the usability consultant. In other words, whether the "need for consultation"-barrier will be crossed is mainly a question of marketing and education.

By going beyond the "need for consultation"-barrier, an organisation enters the "stage of curiosity" and becomes a client. Projects at this stage are often characterised by small budgets. The client's request for consultation occurs late in the development process and is driven by special problems or breakdowns in the design process (i.e. problem-centred). Moreover, clients often do not know much about even basic goals and methods of software ergonomic design. Instead they sometimes possess a kind of "naive theory" of the way a usability expert is supposed to do his work, which often does not match reality well.

Thus, *convincing* remains an important activity at this stage - it even has to be *part* of the software ergonomic project. However, the type of convincing changes. Now that the general benefit of software ergonomic consultation is accepted by the client, the focus of the convincing process has to be put on the legitimation of the specific goals, methods and results.

Besides convincing, *teaching* must be an important part of a project at the "stage of curiosity" as well. From an organisational or "political" perspective projects at this stage are often

problematic, but as regards professional contents not very demanding. This may be frustrating for the usability practitioner. Moreover, there is a potential risk that in future projects within the same organisation the practitioner has to cope with these problems over and over again. Thus, conditions for following projects have to be changed, i.e. the *organisation has to be changed*. Usability must become an element of organisational culture, and we consider the support of this change being an important part of the usability consultant's role (Hassenzahl, Prümper & Buchbinder 1998; Mayhew & Bias 1994). He is more than an expert for improving quality - he is a "change agent".

The "stage of curiosity" is followed by the "stage of acceptance". At this stage the organisation already had the opportunity to gain experiences with software ergonomic methods. Work at this stage is less problematic because of the general acceptance of goals and methods. The conditions may not be perfect, but the client is willing to do what is required to improve the usability of the software system. Hence convincing is not an important activity anymore.

However, *teaching* still remains important. The major objective of organisational change at this stage is to enlarge your client's independence. The application of software ergonomic methods must become a common practice, i.e. a part of organisational culture.

At the last stage, the "stage of partnership", usability is accepted and the organisation is able to act independently. There are different indicators of being in that stage. There may be a usability laboratory and/or dedicated groups of usability specialists. Within an organisation at this stage, software ergonomics is a part of early planning and the methods are used throughout the entire development process. The usability consultant is expected to act as a discussion partner when facing special problems.

3 Examples of convincing and teaching

As discussed above, *convincing* is an important activity especially when working for clients at the "stage of curiosity", whereas *teaching* is an important activity at all stages. In the following, we present examples of both activities.

3.1 Convincing

In the early stages (stages of "scepticism" and "curiosity") the organisation must be convinced that software ergonomics is necessary and useful. One of the most discussed strategies in this context is to reduce the costs of software ergonomic projects (Nielsen 1989), which is basically a "foot in the door"-strategy. The consultant speculates, that there will be a rising commitment to software ergonomics due to positive experiences.

Although the reduction of costs may be the crucial argument leading to the application of certain software ergonomic methods, to offer a cheaper method will not lead to any commitment by itself on behalf of the client. In other words, the client may have accepted the costs, but not the objectives and methods.

Sometimes it is necessary to convince a client that his software system is of poor ergonomic quality. In this case the client has to accept the consultant's basic goals, methods and standards. To accomplish this can be rather difficult:

In one of our projects, we carried out a user survey with the ISONORM 9241/10 questionnaire (Prümper 1993; Prümper 1997), which corresponds to our standard screening procedure. We used previously collected ISONORM-data to derive a coarse rule of thumb for determining whether the user's subjective assessment of the usability indicates acceptance or not. The data clearly showed the non-acceptance, i.e. discontent of the users.

However, this conclusion was questioned by the client. He argued that our standard might be too high and unattainable by an ordinary software system. Fortunately, through the years we collected ISONORM-assessments of many other software system. By that, we were able to demonstrate that other software systems which were used at the workplace (e.g. MS-Word 6.0) did meet our standards. The client devalued this

argument by pointing out that MS-Word was a standard system for word processing whereas their system was specifically developed for their purposes and basically a database. As a result, we compiled data which showed that even in these categories systems can be found that meet our standards.

Even now, our client was still not convinced. He argued that the users (which are members of the client's organisation) are especially critical; indicating that the negative assessment may be a consequence of a general negativity of the users. We organised a second assessment, now asking users to judge a software system normally used at the workplace in the client organisation. On average their judgement of the usability was clearly more positive when judging other software systems than judging the software system in question. Moreover, the average judgement met our standards. Thus, the argument of a general negativity did not hold anymore. This was the moment for the client to give in and take steps to improve the usability of the system.

From a psychological perspective the client's behaviour in the example is easily explained: he may be reluctant to accept the usability problem because of the effort (time, money, emotions) already spent for a somewhat poor software system.

For the usability consultant it is important to be prepared for all types of convincing activities. Without proper arguments in the form of quantitative data (as used in our example) or a scientific "backing", some projects might end up quite unsuccessfully.

3.2 Teaching

Helping a client to evolve should be an important part of a standard software ergonomic project. If the usability consultant neglects those activities the client might remain at his actual stage. This is especially problematic at the "stage of curiosity". As pointed out above, work at this stage is often dominated by activities not directly related to the improvement of usability. Nevertheless, the consultant tries to improve the usability of the software as well. Given that the consultant is successful despite the bad circumstances, the client might learn from this that by and large the conditions he provided were adequate. The success works as a kind of reinforcement which lowers the motivation to provide better conditions for a following project.

A way to prevent this "getting stuck" at a certain stage is *teaching*. In our projects we made positive experiences with two types of activities. First, we constantly emphasise problems arising from inadequate conditions. Even a success will be contrasted with what could have been achieved under better circumstances. This is meant to demonstrate how an early integration of software ergonomic methods in the development would have eased the way to a high quality product. As a consequence, the client might be motivated to improve the way of dealing with usability questions, leading him or her to a higher stage of evolution.

Second, we always embed parts in our software ergonomic processes which are not primarily aiming at the improvement of a given system (e.g. theoretical views, background information). These educational activities are aimed at building up competence on the part of involved persons (e.g. project management, users, software developers). Competence is the basis for independence. Independence might improve conditions for software ergonomic projects by making the client capable of "asking appropriate questions at the appropriate time".

4 Conclusion

Software ergonomic projects can vary considerably with regard to problems encountered and budget. A way to understand the variation in behaviour of clients is to view them as being at a certain stage of evolution as proposed by Ehrlich and Rohn (1994) and Nielsen (1994). On the basis of the organisation's stage a usability consultant may predict a client's behaviour and the occurrence of stereotypical problems. This may help them to be prepared for acceptance-related activities, e.g. to take additional expenses caused by acceptance-related issues into account.

To our mind, there are different ways to further explore the presented approach. First, we

may collect and classify "war stories" from commercial software ergonomic projects, building up more than just anecdotal knowledge about problems we might have to face. Second, we may find ways to reliably determine the stage a client is in, in order to anticipate problems linked to this stage. Third, we may further discuss methods for changing clients, i.e. changing their stage of evolution. Fourth, we may evaluate software ergonomic projects referring to the client's stage of evolution to understand more about the circumstances under which certain software ergonomic methods are or are not successfully applied.

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