

APPLICABILITY OF GROUPWARE FOR COMMUNICATION IN DIFFERENT PROJECT ENVIRONMENTS - A CASE STUDY

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The BSCW groupware was used for coordination of different types of projects: lectures, exercises, diploma work and industrial R&D projects. To one part with success to another part without success. The results were analysed in terms of complexity of information and intensity of communication necessary. Projects based on complex information with need of intense communication turned out to be well suited for application of BSCW. For other projects simple e-mail, organisation software or e-learning shells may be better.

INTRODUCTION

Web-based Groupware is basically a powerful tool for communication between the participants of projects or learning groups for different types of applications. It provides a structured file system, synchronous and asynchronous communication, e-mail facility and organizational tools. BSCW, which is well suited for e-collaboration in relatively small working groups, can be used for this purpose amongst other groupware. It has almost no functional built-ins but it provides a high degree of flexibility in different respects like organization of the operating surface and file up- and downloads. We have been using this groupware for several years in different user groups:

- Lectures and exercises at the Swiss Federal Institute of Technology (Course Materials and Sustainability)
- Lectures and student projects at the University of Basel (within the Framework Man-Society- Environment MGU)
- Diploma works
- Worldwide international research and development projects

Different motivations led to the introduction of a web-based project environment. Lectures and projects at ETHZ and University of Basel are regular courses which were offered by one of the authors (WH) on BSCW. For diploma works the BSCW was a good means to conveniently become locally independent and to provide a working shell where different documents were easily accessible. For industrial research projects the web-server based solution was chosen mainly to collect experience with such tools. Although this list contains a variety of different groups of users, it turned out that the issues critical for success or non-success of a project were rather common to all user groups.

DESCRIPTION OF THE INVESTIGATED PROJECTS

Details of the investigated projects are summarized in Table 1 in terms of aims of projects and project characteristics. The numbers refer to the numbers indicated in Figure 2. It should be mentioned that all projects were performed by a small to medium number of persons involved

(about 5-30) who were all in a relatively advanced phase of their (academic) education or had a higher level professional background. We have only very little experience with larger working groups. We think that the results can be applied also to larger groups as long as there is a substructure allowing a break down into smaller groups. We could envisage, however, some difficulties to apply our results to larger groups which cannot be structured (e.g. basic university courses with more than 100 participants).

Nr., refers to (Fig. 2)	Aim of the Project	Characteristics
1	International research in material mechanics to develop a method for fracture characterization in a technical alloy.	Loose collaboration between world widely spread working groups (about 30 persons totally). Face –to- face meetings every half year with distributed written presentations and reports. Each group can act autonomously and some competition between the groups exist.
2	In-house coordination of different partial projects belonging to one large project in a Swiss research institute (materials research).	Strong coordination needs, face-to face meetings every two weeks. Participants work on one place, most data on LAN available. Projects to about 50% with obligations (delivery date, data, reports) towards customers
3	Evaluation and interpretation of stress corrosion data in a stored in a data base	Many data to be analysed and structured. Less than 5 people involved, however intense data exchange necessary. Face- to face meetings every 2 weeks.
4	e-learning course on renewable energies (University of Basel)	Informations available as html, pdf or word-files with links to relevant sites. BSCW mainly for coordination purpose. Face-to face meetings every 3 weeks
5	Project course on implementation of renewable energies in less developed countries (2 semester event at University of Basel)	Joint collaboration between students and external interested parties. About 25 participants. The project was subdivided into four sub-projects by the students. Results time critical. Face-to face meetings every week.
6	Regular course on materials and sustainability (lecture, exercises, case studies) at ETHZ	Lectures, exercises, case studies, requires inclusion of actual data available via the web. About 15 participants, Face-to face meeting weekly.

Table 1: Summary of the projects investigated

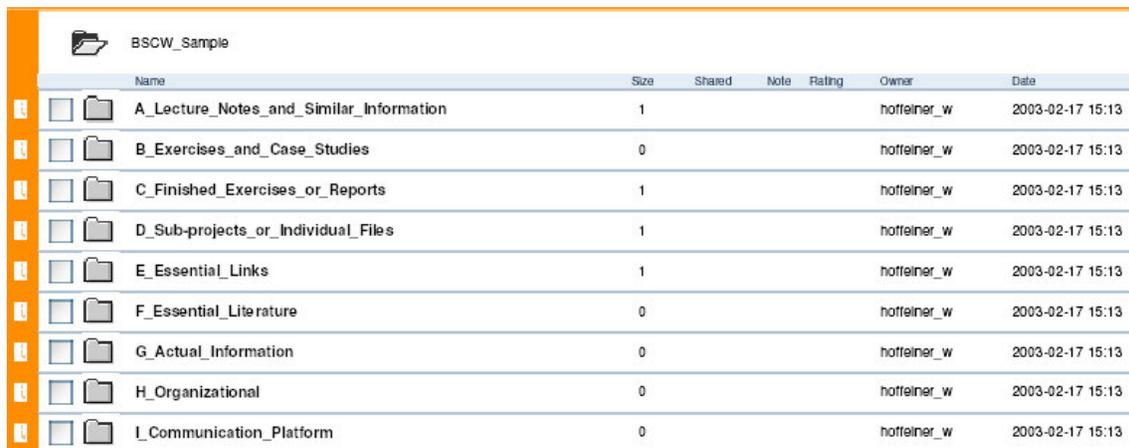
TYPICAL SET UP OF USER INTERFACES

We would like to elaborate firstly on reasons for the choice of BSCW. For our applications we were not looking for a well developed e-learning and course administration shell. We were rather looking for a web based collaboration platform with high flexibility applicable to relatively small groups (< 50 participants) with a high educational background. The basic requirements are listed in the following (not according to priorities).

- Simple, not sophisticated, established groupware (no experimental environment)
- Stable system (server, software)
- Flexibility in creation of user surface and document administration
- High user autonomy (flat hierarchy)
- Wide range of MIME-types up- and downloadable
- Development of project well documented
- Communication features
- Language adaption
- Implementation on MAC and MS-basis possible
- No advertisement pop ins (requirement from US-users)

- Well supported
- Availability of a toll free experimental environment

Besides technical advantages the fact that this type of groupware is extremely well supported at ETHZ (NET 2001) and the University of Basel (URZ 2002) was the main argument for our BSCW decision. The basic organisation of the user interface for a student-type project is shown in Figure 1.



Name	Size	Shared	Note	Rating	Owner	Date
A_Lecture_Notes_and_Similar_Information	1				hoffeiner_w	2003-02-17 15:13
B_Exercises_and_Case_Studies	0				hoffeiner_w	2003-02-17 15:13
C_Finished_Exercises_or_Reports	1				hoffeiner_w	2003-02-17 15:13
D_Sub-projects_or_Individual_Files	1				hoffeiner_w	2003-02-17 15:13
E_Essential_Links	1				hoffeiner_w	2003-02-17 15:13
F_Essential_Literature	0				hoffeiner_w	2003-02-17 15:13
G_Actual_Information	0				hoffeiner_w	2003-02-17 15:13
H_Organizational	0				hoffeiner_w	2003-02-17 15:13
I_Communication_Platform	0				hoffeiner_w	2003-02-17 15:13

Figure 1: Typical Organization of a BSCW Surface for an Educational Project

Lecture notes and relevant technical information as well as texts and information for exercises and case studies can be found in sections A and B. The students place their exercises or reports after having finished them into section C where each student has a separate file for this purpose. In order to become familiar with the BSCW and also to have an own space individual files can be opened in section D even with limited access to other participants. Information mandatory for later exams is filed in sections E and F. It belongs to the responsibilities of the manager to maintain these two sections and to actualise links whenever necessary. Actual information (e.g. newspaper articles with direct relation to topics currently considered or information on relevant events) is placed in section G. This section functions like a white board. Links are not necessarily maintained. Organisational issues (dates, excursions, announcements, etc.) can be placed into section H. The communication platform (section I) is the place for asynchronous information, feedbacks and comments.

The structure of commercial or non-educational projects is usually rather similar. The main differences are that A and B contain relevant technical information of the project. Deliverables are placed into section C whereas section D is the area of sub-projects. Synchronous collaboration can be performed with the tools of the address book and the calendar.

The organizational scheme presented is considered as a proposal only which we found to be suitable for many of our projects.

EXPERIENCE

We would like to summarize our experience with the six projects in the following table 2. We have taken the first two columns from table 1 and placed our comments in column 3.

Nr., refers to (Fig. 2)	Aim of the Project	BSCW experience
1	International research in material mechanics to develop a method for fracture characterization in a technical alloy.	No need for real collaboration, interactions confined to a two weeks period before and after the regular meetings (half year period), mainly by e-mail. Elements of competition between the different groups, very traditional participants. Average age high → No success of BSCW
2	In-house coordination of different partial projects belonging to one large project in a Swiss research institute (materials research).	No real need felt by participants to develop a hyper-structure over the file structure given already in the LAN. → No success of BSCW.
3	Evaluation and interpretation of stress corrosion data in a stored in a data base	Medium complex information (databases plus evaluation, comments, links etc.) to be communicated for comments and rearrangement. Need for frequent information exchange. Participants convinced of advantage of BSCW from the beginning. → Success of BSCW.
4	e-learning course on renewable energies (University of Basel)	Medium complex information to be communicated by a tutor. Only occasional communication necessary. BSCW used, however, only with negligible value. → No success of BSCW.
5	Project course on implementation of renewable energies in less developed countries (2 semester event at University of Basel)	Medium to high complex information to be distributed. Communication needs within the project groups high. Participation of external actors necessary. → Success of BSCW
6	Regular course on materials and sustainability (lecture, exercises, case studies) at ETHZ	Similar to 5, but only one group and no external actors. → Success of BSCW.

Table 2: Summary of BSCW experience with the different projects

Table 2 shows successful and un-successful BSCW projects. In projects rated as successful BSCW was accepted by the participants as a valuable tool providing an added value compared to traditional procedures and it was actually used by them. In projects rated as unsuccessful BSCW was not used and communication either took not place or it remained restricted to e-mail conversion.

EVALUATION OF THE RESULTS

For the evaluation of the results we have analysed complexity of information and intensity of communication.

Complexity of information is understood in this article as a measure for number of different file types, necessity of actualisation of documents, necessity of comments, necessity of asynchronous and synchronous communication etc.

Intensity of communication is understood in this article as a measure of how often an interaction with BSCW is necessary for the user to participate in the project.

Although statistical evaluations what kind of groupware functionality is usually employed (Appelt 2001) exist, there is currently not enough statistical information available to put these two terms on an absolute scale. We therefore based our rating on a semi-quantitative relative scale which we however do not see as a restriction to our interpretation. More investigations

would be necessary for an objective classification of the two terms “complexity of information” and “intensity of communication”.

Figure 2 summarizes the results in a two dimensional plot. It can be seen that the three successful BSCW projects 3,5,6 are located relatively close together in the upper right quadrant of the diagram, whereas the un-successful projects 1 and 2 show a different nature. Project 4 is something in between which is also compatible with the experience.

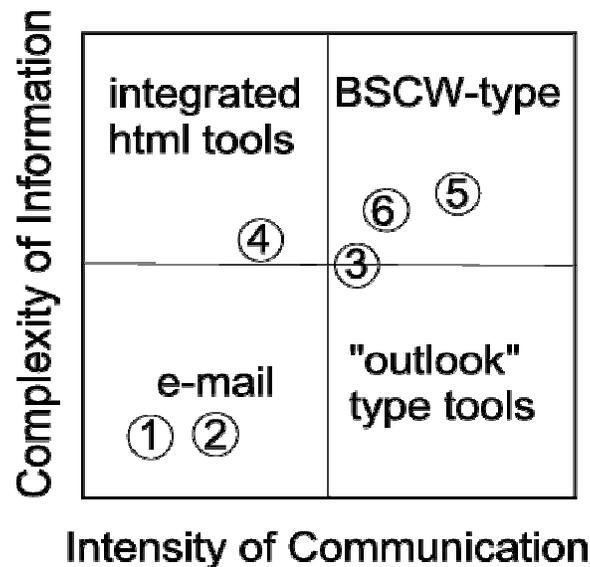


Figure 2: Mapping of the investigated projects in terms of complexity of information and intensity of communication.

We also tried to distinguish between different areas in figure 2 according to most appropriate e-project tools. Projects which do not need complex information to be intensively exchanged between the participants do not need specific support. They can be accommodated by e-mail, fax or phone. For high communication needs of simple information, traditional office organization software is sufficient. Traditional e-learning is very often based on distribution of hypertext documents to students, exams and organisational items. The communication between the participants is usually not very intense. These needs seem to be better covered by commercially available e-learning platforms (called integrated html tools in figure 2). The boundaries between the areas in figure 2 serve only as rough guidelines. The main criterion deciding on success is finally the acceptance of a tool by the participants and the enthusiasm of the project manager. In the following we would like to list a few crucial points which should be taken into consideration by the BSCW-manager to keep a project successfully running:

- Give un-experienced participants time to get familiar with the software
- State clearly that it is almost impossible to damage data
- Start with simple operations (e.g. downloads/uploads of files)
- Explain very early that the attribute “Expert” in BSCW has nothing to do with “controlling supervisor”
- Use “wake-up” e-mails to trigger interest for looking into the server
- Accept modifications of the structure proposed by the majority of the participants whenever possible

- Only use synchronous communication very well prepared
- A groupware can only manage distribution of information but REGULAR FACE TO FACE MEETINGS ARE MANDATORY.

CONCLUSIONS

The increasing accessibility to net-technologies in the last 2-3 years in education (computer-rooms, easy laptop access, networking in several class rooms, radio networking, video labs etc.) and the density of data transfer even at home (XDSL) make the use of groupware for project coordination increasingly attractive. But even with all these possibilities some rules must be observed to make groupware a success. Basis for decisions which tool should be used (only e-mail, organizers, e-learning shells, groupware) must be an analysis of type and density of information exchange. Groupware allows a flexible organization of flow of information but it requires information transfer at elevated rates between the participants. <the projects described here have a small to medium amount of participants (5-30). One could easily imagine that for higher amounts of participants the situation changes and that significant restrictions on flexibility could be the consequence.

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