

# **Group Collaboration Efforts in Information Systems Projects**

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## **Abstract**

Group projects play an important role in information systems development. Due to various reasons, successful completion of complex group projects depends on effective collaboration among group members. Despite the continuous improvement in methods and techniques for group projects in the past decade, collaboration among members of groups is often impaired, resulting in group or individual problems and diminished overall performance.

This paper presents the findings of a study on group collaboration among project team members working in information systems projects. The study includes a review of literature and a survey of members of IS group projects conducted at St. Cloud State University during the period of 1993-1994. The paper concludes with discussions of success factors.

**Key words:** Group Decision Support Systems, group collaboration, process losses, electronic meeting, groupware, world-wide-web, Internet, Intranet, newsgroup.

## **1. Introduction**

Group projects play an important role in software development. Due to resources and time constraints, successful completion of complex group projects depends on effective collaboration among group members. For a variety of reasons, however, collaboration among members of project groups is often impaired, resulting in group or individual problems and diminished overall project performance. Ultimately, in order to improve effectiveness in information systems development, creative solutions are needed to minimize these problems and to increase the satisfaction and the success of group collaboration efforts.

## **2. Group Collaboration Productivity And Process Losses**

MIS professionals spend a significant portion of their time working in project groups, with varying degrees of success. For a variety of reasons, these group efforts are often not entirely satisfactory in terms of team communications, member satisfaction and task outcomes. Numerous studies have been done to study group productivity in information systems development. Early studies in this area suggested that the chief programmer team model was the most efficient development team organization [1, 5]. However, a recent study by Phan et al. [6] noted that this model has become less popular in modern development environment due to team member's resentment to being too dominated by the chief programmer. Furthermore, tools to support groups collaboration was mostly limited to electronic mail, telephone calls, meetings, video conferencing.

Modern tools such as electronic bulletin boards, conference disks, and electronic meeting were rarely used. A study of group collaboration by George et al. [4] studied the decision quality, member satisfaction and degree of consensus for groups that followed a meeting agenda and groups that did not. In these experiments, groups of four and five members were studied. Groups that followed an agenda were less likely to reach consensus but produced results of greater quality. Major factors that influence group productivity and satisfaction such as group size, anonymity, tools, etc. were also studied. In general, without the use of a groupware tool, larger groups tend to generate more ideas than smaller groups but members in larger groups tend to be less satisfied [9]. With the use of the Electronic Brainstorming System (EBS), larger groups consistently generated more ideas and their members were more satisfied than those in smaller groups [3]. The use of internet newsgroups for group discussions was also studied by Valdies and Jazwinski [10] who reported that while participants liked the anonymity at the newsgroup while at the same time feeling of a sense of community.

Other studies have also been done to identify group process losses that hinder the effectiveness of group meetings and group collaboration efforts in the workplace. Valacich, et al. [9] summarizes several major process losses commonly occurring in group work:

- \* Unequal air time: In larger groups, the unbalanced allocation time available for each participant to speak.
- \* Production blocking: Reductions in group production that occur because only one member of the group can speak at a time.
- \* Evaluation comprehension: Fear of negative response to ideas that are shared with the group.
- \* Free-riding: Tendency of some group members to rely on others to carry the discussion or solve the problem.
- \* Cognitive inertia: Tendency of a conversation to continue along a given course.
- \* Socialization: Spending of group time socializing rather than working on problems and solutions.
- \* Domination: Domination of topic, opinion or discussion time by one or a few individuals.
- \* Failure to remember ideas: Tendency for members to forget comments or ideas made by other members.
- \* Incomplete data analysis: Failure to use data that is available.

While this set of common problems affects all project groups, there are additional process losses affecting group performance. It is reported that many internal IS group project gatherings are ad-hoc or impromptu. Duration of these gatherings are often unpredictable. Due to poor project management, differing time schedule, and procrastination, group members occasionally work overtime to catch up with team and project deadlines.

### **3. Methodology**

The purpose of this study was to study the problems and success factors in project group collaboration in IS development projects. It is expected that the differences in findings with those of previous studies will provide new insights in group collaboration efforts in IS development.

3.1 Study design. In this study, students enrolled in various Management Information Systems and Systems Analysis and Design II classes were grouped into teams of two to six members to work on IS projects which covered various stages of the Systems Development Life Cycle (SDLC). After the projects completed and submitted, the reports were presented, discussed, and evaluated. Participants also evaluated the contributions of other members in their team. The group collaboration study ended with a survey of team members regarding the problems, success and satisfaction of team efforts.

3.2 Survey questionnaire. Two brainstorming sessions with former project members were conducted during the Spring Quarter of 1993 to produce a list of possible problems that project members encountered while working in groups. The final list of these problems was used to develop the questionnaire. Items in the survey fell into three areas: (1) collaboration problems that groups faced in group projects, (2) team members' satisfaction resulting from the group collaboration, and (3) the level of overall project success accomplished by collaboration. Respondents were asked about the frequency of occurrence of the problems that they encountered in group collaboration efforts by selecting one of the five choices: never, rarely, sometimes, usually, and always. They were also asked to rate their satisfaction level ranging from worst (lowest) to excellent (highest).

3.3 Conducting the study. During the three quarters of Spring 1993, Fall 1993, and Winter 1994, 175 participants assigned to 36 IS project groups were surveyed. The duration of these IS projects ranges from 2 to 6 weeks. Participants were told in advance that the anonymous survey responses would be confidential. The survey ended with 171 responses, a 98 percent return rate. Group sizes had an average of 4.6 team members and a median of 5 members. Data collected were tabulated and analyzed using Statistical Analysis System (SAS) available on the University's VAX computer.

### **4. Findings**

Overall, the results showed positive feelings toward group collaboration (Table 1). Sixty one percent of respondents indicated that they were usually or always satisfied with their groups, fifty six percent of the responses indicated their level of satisfaction ranged from high to highest, and 87% of the response declared that the success of their group efforts ranged from good to excellent.



**Table 1: Group Success.**

Group success indicators	Number of responses	Percent
<b>Satisfaction Frequency</b>		
Rarely and Never	10	6.0
Sometimes	56	33.5
Usually	76	45.5
Always	25	15.0
<b>Satisfaction Level</b>		
Very Unhappy	4	2.3
Unhappy	10	5.8
Average	61	35.7
High	73	42.7
Highest	23	13.5
<b>Level Of Group Success</b>		
Poor	2	1.2
Average	20	11.7
Good	77	45.0
Excellent	72	42.1

**Table 2: Frequency of Reported Problems in Group Projects.**

Problems	Frequency	Percent
<b>Production Blocking</b>		
Sometimes	38	22.2
Usually	10	5.8
Always	1	0.6
<b>Self Evaluation Comprehension</b>		
Sometimes	23	13.5
Usually	4	2.3
Always	0	0.0
<b>Evaluation Comprehension By Others</b>		
Sometimes	47	28.0
Usually	10	6.0
Always	0	0.0
<b>Free Riders In Group</b>		
Sometimes	47	27.5
Usually	24	14.0
Always	10	5.8

**Table 2: Frequency of Reported Problems in Group Projects (continued.)**

Problems	Frequency	Percent
<b>Cognitive Inertia</b>		
Sometimes	65	38.2
Usually	40	23.5
Always	4	2.4
<b>Socialization</b>		
Sometimes	84	49.1
Usually	29	17.0
Always	14	8.2
<b>Domination</b>		
Sometimes	63	37.1
Usually	30	17.6
Always	3	1.8
<b>Group Forgot Ideas Contributed</b>		
Sometimes	53	31.0
Usually	10	5.8
Always	1	0.6
<b>Failed To Use Data For Analysis</b>		
Sometimes	52	30.4
Usually	10	5.8
Always	0	0.0
<b>Difficult To Find Convenience Time</b>		
Sometimes	59	34.5
Usually	53	31.0
Always	27	15.8
<b>Problems With Member Backgrounds</b>		
Sometimes	42	24.6
Usually	15	8.8
Always	4	2.3
<b>Conflict Of Personalities Among Members</b>		
Sometimes	23	13.5
Usually	15	8.8
Always	3	1.8
<b>Members Were Too Defensive</b>		
Sometimes	34	19.9
Usually	4	2.3
Always	2	1.2

**Table 3: Problems in Group Collaboration - Cited as Sometimes, Usually, or Always a Problem.**

Problems	Percentage of respondents
Convenient meeting time	81
Socialization *	74
Cognitive inertia *	64
Domination *	56
Free riding *	47
Failure to remember ideas *	37
Failure to use data for analysis *	36
Different backgrounds among team members	36
Evaluation comprehension *	
for others in the group	34
for self	16
Production blocking *	29
Personality conflicts	24
Personal defensiveness	23

\* Noted by Valacich, et. al.[9]

Despite this good news, problems in information systems group collaboration are evident as presented in Table 2. Note that the total frequencies do not add up to 100 percent since this table only lists the percentage of respondents who cited the frequency of problems as sometimes, usually, or always. Respondents who did not strongly identify the problems (seldom or never happened) are not listed. Chief among these are the difficulty in finding convenient times for group members to gather and minimizing socializing activities. Difficulty in finding convenient times for group meetings was noted in 81% of the responses and was cited as frequently or always a problem by 47% of the respondents. Furthermore, spending time socializing during group meetings exists in 74% of the responses and was cited as frequently or always a problem by 25% of the respondents. In addition, 19% of the respondents indicated the frequent problem of group domination from one or more members, 20% of respondents reported frequent occurrence of free-riders in group work, 26% of the respondents reported frequent problems of cognitive inertia, 34% indicated the frequent problem of fear of negative response to ideas shared with the group and 6% indicated the frequent problem of production blocking. A few problems reported by Valacich et. al. were not positively identified by team members (Table 3.)

Based on Spearman rank correlation tests of hypotheses,  $H_0: r = 0$  (ie. there no correlations between group size, process loss factors, etc. on group's success and satisfaction levels) with  $p < .05$ , this study found no correlations between group size and group success nor satisfaction level. These results contrast with the productivity and



satisfaction findings of previous studies by [1, 3, 4, 5, 9] mentioned before. However, satisfaction and success levels with group collaboration were found correlated to each of the following factors:

- \* Group members possess common background for the assigned task ( $p_1=.0001$  and  $p_2=.0001$ )<sup>1</sup>,
- \* Conflict in personalities is minimized ( $p_1=.0001$  and  $p_2=.0001$ ),
- \* Individual members do not fear negative evaluation of their ideas by the group ( $p_1=.0001$  and  $p_2=.0002$ ),
- \* Everyone contributes a fair share, with no free-riders ( $p_1=.0001$  and  $p_2=.0002$ ),
- \* Individual group members are open minded and are not too defensive ( $p_1=.0001$  and  $p_2=.0038$ ),
- \* No individual member allowed to dominate and dictate the work of the entire team ( $p_1=.0001$  and  $p_2=.0200$ ),
- \* There is plenty of convenient time to get together for group work ( $p_1=.0001$  and  $p_2=.0386$ ),
- \* Group utilizes all relevant data available, no relevant ideas omitted ( $p_1=.0021$  and  $p_2=.0029$ ),
- \* Group discussion does not go too long in a given course ( $p_1=.0881$  and  $p_2=.0165$ ), and
- \* Socialization during group gathering is minimized ( $p_1=.0233$  and  $p_2=.1897$ ).

### 5. Improving Group Collaboration

Better group collaboration is needed to improve the productivity, efficiency, success and satisfaction on group projects. While principles for effective group collaboration in the work place and classrooms have been well documented, certain basic, but often overlooked, elements can and should be introduced into the project group process. These include setting aside group discussions, learning of key project management practices such as good planning, scheduling, division of tasks, coordination, and quality assurance. Further, rules and expectations of project participation must be spelled out in advance to maintain fairness, prevent free-riders, reduce socialization, and improve individual learning and contribution. Group members need to identify factors that can diminish group effectiveness and learn how to deal with them. Finally, project manager and team leaders should be seen as supportive to the group effort and willing to intervene, if necessary, or if invited, to help the group overcome or progress beyond process losses and personnel problems. They should also take actions to prevent project schedule slippage by enforcing project checkpoints and milestones.

Since many group collaboration tools have proven beneficial, opportunities for process improvement also exist through use of computer assisted group collaboration tools. With the proliferation of internet/intranet based technology (such as Newsgroups

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<sup>1</sup>  $p_1$  is the p value for correlation test between the observed factor and the satisfaction level and  $p_2$  is the p value for correlation test between the observed factor and the success level.

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## 6. Conclusions

This study has confirmed some suspicions, challenged some existing knowledge, and noted successes in group collaboration and synergy in information systems development projects. As well as previously identified process losses in group work, factors relevant to group collaboration were identified. Clearly, opportunities exist to facilitate and enhance group collaboration in information systems projects.

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