

# Developments in Business Simulation and Experiential Learning, Volume 25, 1998

TEAM WARE™

## AN ONLINE MODERATED CLASS DISCUSSION FACILITY AND BEYOND

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### ABSTRACT

In this paper we discuss the development of an electronic class room discussion facility to train students in the use of electronic meeting rooms for decision-making and problem-solving. This system can be used for other experiential learning exercises such as role playing and negotiation exercises. The paper focuses on the development of a discussion facility for meetings held in the same room. Other types of similar online systems are discussed and their implications reviewed. We also discuss the application of such tools for distance learning systems.

### INTRODUCTION

Peter Drucker, in "The Coming of the New Organization<sup>1</sup>", states that organizations will be "flatter" consisting mainly of knowledge workers, who work out of geographically dispersed operating units. The work will be done mainly in task-focused teams, where specialists from various functions work together as a team for the duration of a project. Teams may not even be comprised of people who are in close proximity geographically. Modem technology is providing ways such that people from around the globe collaborate for the duration of a task and then proceed to other tasks or projects.

Such a trend is evidenced in the recent reorganization of Chrysler Corporation where the traditional "chimney stack" based organization was forsaken for platform based teams built around classification of automobiles such as small-car team, mid-sized car team. Several other companies, most notably IBM, Boeing and others have also adopted this form of management. The interested reader is may refer to the article by Drucker for further references.

Keeping this prediction in mind, we try to develop an experiential training tool to help students conduct discussions, make decisions and hold virtual meetings in the organizations of the future.

One can identify two classes of goal-based activities performed by people in-groups: Communication and/or Interaction among people and decision making/problem solving. Communication involves sending information of some kind from one member set (one or more) to another. Interaction on the other hand may be thought of consisting of one or more (in fact several) such communications over time. The communication and interaction between groups in an organization is a vehicle to assist the group in some higher-order activity such as decision-making or problem solving. However the nature and form of communication and interaction among groups in the process of decision-making is more specialized than the general form of electronic communication. Group Decision Support Systems (GDSS) is the term coined for such systems and is the subject of ongoing research in many institutions, particularly, the University of Arizona and the University of Minnesota. Several software products were spun off from this research, most notably from Lotus Corporation and Ventana Corporation.

Group Decision Support Systems (GDSS) combine communication, computer and decision technologies to support problem formulation and group decision-making electronically. A GDSS aims to improve the process of group decision making by removing common communication barriers among members of a team, providing techniques for structuring decision analysis, and systematically directing the pattern, timing and content of discussion<sup>2</sup>. A large body of research is available in this large and

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<sup>1</sup> This article became the most reprinted HBR article in its first year.

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<sup>2</sup> DeSanctis and Gallupe (1987).

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rapidly growing field<sup>3</sup> and one may refer to Nunamaker et al. (1989) for a review of the research issues in this field and experiences with such a system at IBM.

It is imperative that students during the course of their education in business, be trained in the art and science of making decisions, communicating and interacting electronically. It is conjectured that by removing such communication barriers within an online class discussion facility, we will enhance group interaction and help students focus on the task at hand: problem solving and decision making. By altering the communication process, a greater degree of change is imposed by the technology on the process of communication and interaction and hopefully on the decision itself. Similarly, negotiation is a powerful paradigm which can be successfully applied to model decisions; resolve conflict, focus on future outcomes and other related matters, which may be incorporated into such a system.

It is now a well known fact that retention of learned material may be improved considerably by drawing the student into discussions in the learning process. As a result several instructors have incorporated this idea into their lectures and have moved away from the traditional lecture delivery format by breaking a class down into small discussions groups, which are then facilitated by the instructor. The methodology for conducting a group discussion in a classroom is universal, and much the same across disciplines. As most instructors will attest to the difficulty of forming and composing of the discussion teams in each classroom and that it determines the success of the method. Team incorporation is thus an essential component of modern learning and business practice. The online-moderated classroom facility looks to supply a rich distance learning environment in an affordable way.

Finally by restructuring the team interaction environment it is conjectured that:

1. More effective team formulation by basing selection on some pre-determined criteria.
2. Instructors will remain better informed on the status of the group discussions and negotiations.
3. Richer learning experiences gained through the removal and/or lessening of the sampling bias.

In this paper, we will focus on the issues that are raised in designing such an environment for students

at Mankato State, our experience with moderating such a system, functionality's that are pertinent to the system and the future course of development.

The next section raises some issues relating to the design of such a discussion facility and discusses the framework for the development of such systems. In the section labeled system description, we briefly describe how the system works, discuss some of the design issues, method for selecting teams, the communication flows in the system. As of today, stage 1 of the project is complete, which is described in the said section. We also discuss the future plans for improving the system to address all the different types of GDSS systems referred to in the discussion in the framework section. Lastly, we conclude this paper by reiterating some of the tenets on which we base the validity and usefulness of this project.

### Framework

DeSanctis and Gallupe (1987) developed an early framework for the study of GDSS. They classify group support into three levels. *Level I GDSS*, provides features to remove communication barriers in the group. Examples are large screens, voting management, anonymous input and message exchange. *Level II GDSS* provides decision modeling and group decision techniques such as multi-attribute utility methods, risk analysis, automated Delphi and negotiation support. *Level 3 GDSS*, provides machine-induced communication patterns such as automated parliamentary procedures. These levels are not necessarily cumulative; a GDSS can provide machine-induced communication patterns (level III) without necessarily having any level II decision modeling techniques. Robert Johansen of IFTF<sup>4</sup> further extended the framework for GDSS proposed by DeSanctis and Gallupe as shown in Figure 1.

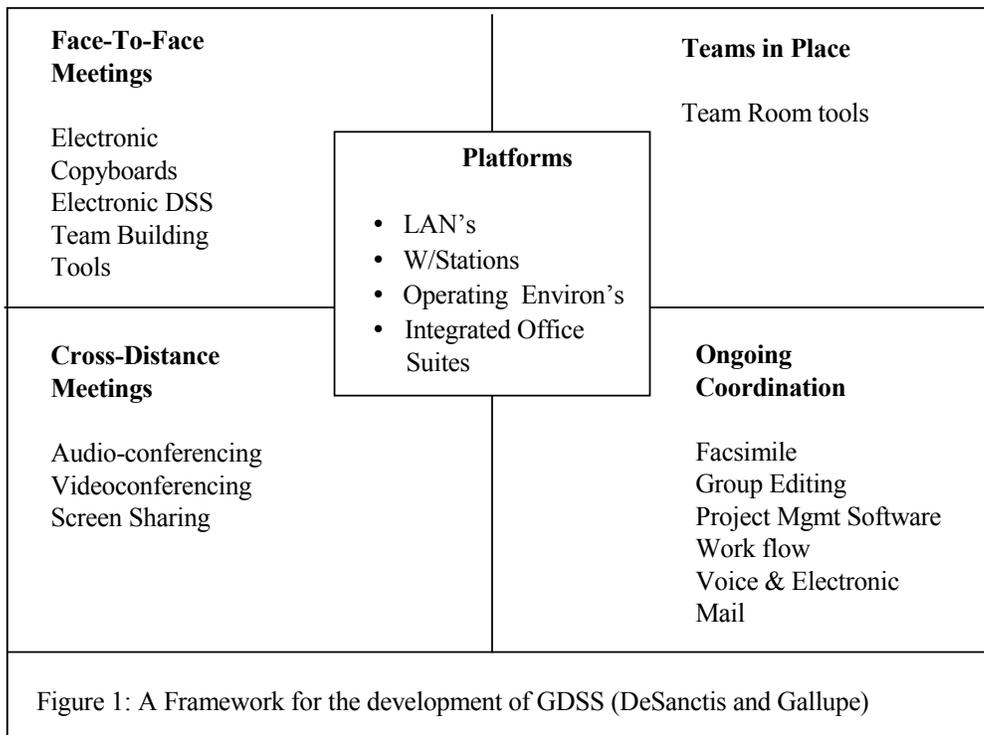
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<sup>3</sup> Nunamaker et al. (1987)

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<sup>4</sup> Institute For The Future, Menlo Park, CA

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From this figure we see that one dimension deals with time and other with the place. Thus we have Face-to-Face meetings where group member congregate in an electronic meeting room. Face-to-Face meetings are the most common place and support in-class discussions in our context. In providing the participant's opportunities to speed up, introduce or change content in a named or an anonymous manner, this technology aims to improve the outcomes of the discussion. By removing barriers to communications, all voices in a class are equal and thus the discussion becomes more goal-oriented and task-centered. The Northeast quadrant, Teams in Place, occurs when members use a common facility at different periods in time. The asynchronous nature of this dialogue enables members to participate on their own timetables. In the context of a classroom, this is particularly useful for moderating help sessions in projects and other assignments. In this system members in each team can leave messages for others as to the progress made and answer's to questions posed. Such teams can be characterized as closed membership, tightly coupled groups.

The next two quadrants of the box pertain to discussions occurring across a certain distance among group-members. Clearly the last two types of group systems are applicable in case of distance learning.

Central to most GDSS is an electronic board for displaying a subset of the messages exchanged by members. A problem that multimedia distance learning systems thus far have had, is that these systems have not been interactive. Most multimedia systems integrate audio, text and video into lectures, which are then broadcast as a television signal. However such systems cannot integrate student input/interaction into the system. The Internet and the worldwide-web offer the opportunity for developing truly interactive systems. The Internet abounds with instances of real-time broadcast of text and audio signals and active web pages. However, the "bandwidth" associated with this computer network does allow the transmission of large segments of real-time video.

In this paper, we discuss ways and means by which we can deliver a multimedia lecture across distances, while at the same time keeping the experience truly interactive. In the paper we propose, students at remote stations are provided with input via two different channels. By providing dynamically refreshed screens in an internet browser, coupled to real time audio stream we can integrate audio conferencing with screen based interaction. Given the distance learning initiative in Minnesota and ITV, producing a television signal for a class is relatively straightforward. Thus, the instructor-moderated information destined for the live screen at the center of a room may be broadcast

as a television signal. This television signal may be received by a student on his television set which serves the function of an electronic whiteboard, thereby enhancing the meeting presence for each individual.

### SYSTEM DESCRIPTION

The proposed system provides location (and in some situations) time independence. This is critical to the distance learning environment, which many institutions are actively pursuing. Also, location independence is important to those institutions, which are severely constrained by the physical resources available. Discussions may occur during class time—either within or without the physical classroom at distributed locations if facilities are not available or in a distributed learning environment. Additionally a rich discussion can occur outside of the prescribed class time, allowing more effective use of office hours or training/help sessions. This facility is also useful to instructors/students who are traveling during the prescribed session. In short these systems help to ease scheduling problems.

The instructor originates the process through a traditional server based application. The actual discussions are facilitated through a series of client server applications and/or applets. This application is used during the discussion setup and team formulation stage of the discussion. Server--based databases are queried to assist in the team building process: i.e. queries on grades, previous team membership, location of team members, etc. Students sign in and their identity is checked against the stored class rosters. This validation process is completely automated. Upon successful validation the student is assigned to a team and is given an individual number.

The student based view of the systems is fairly straight forward: a text field for message entry, a scrollable text area for incoming and outgoing messages, radio button to choose message destination (either team or instructor), and a team-shared whiteboard for display of all messages. Students may modify the shared whiteboard as desired. The instructor can also modify, as well as introduce images to the whiteboard. The whiteboard image, is mixed with video images by the television mixing/editing crew.

The instructor view of the system is comprised of a series of frames.

- Frame 1: Team selection (with member ID)
- Frame 2: Log of selected team activity
- Frame 3: Message text field to send out & radio button of destination
- Frame 4: Video Image of himself and the class.

### Design Issues

The following are some of the issues that are raised in the study and implementation of such a system.

1. The facility must accommodate a wide variety of discussion and information exchanges. We intend this electronic meeting place to be an all purpose forum where:  
Discussions are held online to help with students in the distance learning program.
2. It must be a teaching tool to introduce students to the methodology of electronic group discussions and familiarize them with concepts such as GDSS, Negotiation Support Systems, etc.
3. The system should serve as an electronic meeting room where students can conduct a discussion based class with adequate support from the instructor and communication systems.
4. Since we have multiple groups within each facility, tools for tracking information exchange within and between groups must be incorporated into system administration tools.
5. From a research perspective to study the effectiveness of the facility as a Communication! Interaction tool, we need to track each thread of conversation both within a group as well as between groups. Since classes are medium sized groups the volume of messages is high and such tracking has to be executed by an electronic support tool built into the system.
6. Since multiple groups are involved here, the task of facilitating discussions takes on a new dimension. It becomes a superhuman feat to simultaneously manage each discussion if there are three or more groups. Given that each discussion will undergo a divergent and then a convergent phase, the task of facilitating will also require electronic support.

7. As a distance learning tool, the facility needs to support both the social needs of the students as well as information delivery and course content delivery. The student needs to belong to the class and feel the presence of the other students in the same learning environment. The student should be able to communicate real-time with the instructors and/or classmates.
8. Other features of electronic meeting rooms and GDSS, such as agenda setting tools, problem formulation tools, Online analytical tools etc., are to be incorporated into the system.

### System Description-Stage 1

We propose to implement the system in stages. In the first stage we envision an online, real time, dynamic, moderated classroom team discussion facility. This facility is geared towards the type of facility in quadrant I of the framework for GDSS described above.

Many instructional environments revolve around interactive team-based discussions. Traditionally such discussion environments have been plagued with a variety of difficulties that limit their usefulness. The primary goal of Stage 1 of this system is to help address some of these problems:

- Location dependence — teams are limited by physical proximity. It is very difficult to facilitate effective distributed/distant team discussions. Hence, to begin with we address the design and implementation of a facility that is location dependent
- Random/non-random team formulation — frequently teams are formulated based on random chance or based on previous team involvement. Such team formulation criteria limit diversity and foster group-think. Previously team formulation, based on individual performance characteristics have been unmanageable in most environments.
- Introvert vs. extrovert-personality differences limit productivity on team and/or individuals on team.
- Monitoring is difficult-during the discussion/negotiation it is difficult for the instructor to monitor and direct the focus of the discussions which threatens the quality of the learning experience. It is difficult to discover, monitor, and react to free-riding within the teams.

Currently only a small sample of the team discussions and findings are selected. Cross-team learning from the discussion is weak at best. It is unclear if this sample accurately reflects the discussions that occurred. This small sampling also causes lack of motivation for students in the learning environment since the likelihood of being selected is low.

### Team Selection

Since student performance information is privately available to the instructor, more flexible/better team selection mechanisms are possible. Thus:

1. Teams may be (truly) randomly formed.
2. Fixed teams may be chosen based on criteria decided by the instructor.
3. Teams may be formed in either an anonymous or a named manner.
4. Team composition based on class standing or past performance on class assignments and test.

If physical proximity is desired by the instructor this can be allowed. If physical proximity is not relevant to the discussion or negotiation, the system can span distances trivially. In addition, while forming the teams the instructor may (optionally) set a prescribed discussion duration that can be strictly enforced. The instructor would also typically broadcast to all teams the topic of discussion as well as the chosen team environment (open discussion, negotiation, beer drinking, etc.) This is accomplished through the mechanism described below. As students are added to their teams they are informed of their team number as well as their individual number on the team (i.e. a student is informed that they are person number 2 on team 7.)

At this point the student teams are formed and the online, moderated discussions begin. All interactions are done in real time: real time discussions occur, real time monitoring occurs, real time direction occurs, real time evaluation occurs, etc. Contributions originate from each team member *as well as* the instructor. Each person's discussion window and view of the shared team whiteboard dynamically changes: no refreshing of screens is necessary. The screens are automatically refreshed. This is accomplished through a combination of Internet, Intranet, and client-server technologies.

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### Communication Flows

One of the most important contributions of Teamware is the flexibility and controllability of communication flows within the team environment provided.

#### *Instructor to Student*

1. Complete Broadcast: An instructor may send message to entire class. For example the instructor may simultaneously inform all teams the topic of the discussion.
2. Team Broadcast: An instructor may send messages to an entire team. For example an instructor may refocus a particular team which has misunderstood the instructions or has gone off track.
3. Individual Number Broadcast: Instructor sends message to all individuals sharing the same individual number. For example an instructor may send a message to the individual number 2 on each team across the class informing them of a negotiation tactic to be used.
4. Individual Communication: Instructor sends message to a single individual on a particular team. For example an instructor may send a message to a single individual urging them to take a more active goal in their team's discussion.

#### *Student to instructor*

1. Team Question/Comment/Finding to Instructor: Such messages that originate at the team level are delivered to the instructor.
2. Private Question/Comment/Finding to Instructor: Such messages that originate at the individual level are delivered to the instructor without the knowledge of the rest of the team.
3. Intra-team Monitoring/Communication: The instructor monitors Intra-team communication with or without the knowledge of the team.

#### *Student to Student*

1. Inter-team Communication: Student messages are broadcast across the teams automatically. Source of message may either be identified by Individual number (i.e. Receiving from #1.....) by name (i.e. Receiving from John Doe:.....)

### FUTURE DEVELOPMENT

In this section, we shall outlay the projected future development of this project. The project described above is already underway (starting October 1997). All efforts described within are being developed in-house under the supervision of Dr. Paul A.

Mullaseril and Dr. John A. Kaliski, aided by students from the Management Information Systems program. The first project is being implemented using Java as the programming platform. The program is being developed on a Windows NT platform. The phase 1 development is devoted primarily to building the real time text-based framework of the moderated team discussion facility.

### Stage 2

In the next stage of development we focus on the design of a system that falls within the purview of quadrant 3 of the framework for GDSS. In other words a system that is geared to enable discussions by students at remote locations. To enable such a system, we need to incorporate video and audio components into the electronic whiteboard. We have two alternatives to pursue:

1. Using the Internet to broadcast video clips of the classroom to the students. The technology for broadcasting video clip on the Internet is still evolving. However, success has been noted particularly in the area of streaming video. Application of this technology presently limits us to a postcard-sized window on the user computer screen. However, the costs are minimal and the students will have the video clips in their line of vision. It is predicted that in the near future, when video compression technologies are mature, the broadcast of video signals over the Internet should be relatively straightforward and common place.
2. Using television signals to broadcast video clips of the classroom and whiteboard. This method can be implemented with today's technology. However, this method is more expensive and labor intensive. However, most university systems have some sort of agency within it that is concerned with the documentation and production of television programs based on course offered by the university system.

The agency on campus that is responsible for producing television footage of classroom activity in Mankato State University is ITV. This agency is involved in the broadcast of classroom television content for both the university system in Minnesota and the high school system. They have considerable experience in the production and broadcast of such programs. Our initial interaction indicates that it is feasible

to produce a signal that contains the electronic whiteboard and video clips of the classroom and instructor. This method does not burden the computer network resources and provides appropriately sized images of the classroom and the whiteboard.

Introduction of decision making tools, In this stage we will develop appropriate tools for decision making. In addition to tools mentioned above such as problem formulation and modeling, negotiation support system, etc., we will incorporate Online Analytical Processing (OLAP) tools for accessing and processing information. OLAP is a front end tools for data warehouses, which help managers slice data in ways that were not envisioned when designing the database it accesses. Most OLAP systems have graphical user interfaces that allow users to see data both numerically and in a variety of graphical representations. OLAP tools also contain statistical tools to summarize data, perform advanced analysis on the data. This allows the decision-makers to immediately test various hypothesis and hunches that may be thrown up during the discussions. In addition to these tools we will investigate the use of expert systems that train users on the methodology and process of negotiation and decision making.

### Stage 3

This stage will deal with those systems that are time independent. In other words we will develop systems that will deal with “Teams in place” and “On Going Discussion” groups that belong to quadrant two and four of the framework for GDSS. Since these discussions are not “live”, we cannot easily adapt systems developed for face-to-face meetings and meetings occurring at remote locations at the same time, for this purpose. Research in these areas is scant and we have very little results to go by. Hence this is an area that needs to be thoroughly researched.

We feel these systems are important to investigate as in teaching, a whole lot of learning happens outside the classroom and outside class hours. By providing these tools we will afford students a forum for discussion, tools to enrich the discussions and a moderator to set the structure for these discussions, which is very important especially when dealing with undergraduate students.

## CONCLUSIONS

Installing a group discussion facility is fraught with obstacles. If the audience or target group for which it was designed does not perceive the tool as user friendly, the product will fall into disuse.

According to Orlikowski<sup>5</sup>, the two main determinants for the success in the use of groupware are: Corporate Culture and people’s perception of the product. Thus according to her, if the unwritten rules of behavior, the reward structure and the tenets of getting ahead in a firm does not support cooperation, the effective use of group-ware is diluted. This result may be safely extended to the academic world. In the classroom, students will generally gravitate towards group assignments because of its inherent labor saving rewards. However, students are naïve when it comes to understanding group dynamics and making effective use of it.

This causes friction among students if they perceive that all members of the group are not contributing equally. Similarly, if students are graded according to their individual worth, their goal then becomes to stand out personally and cooperation though verbally promoted is not practiced.

In conclusion, we may state that this system promises to an effective tool for Business education in the future. The systems described above are based on the tenet that by removing communication barriers within a group by an online class discussion facility, we will enhance group interaction and help students focus on the task at hand: problem solving/decision making. By altering the communication process, a greater degree of change is imposed by the technology on the process of communication and interaction and hopefully on the decision itself. By restructuring the team interaction environment we have more effective team formulation, Instructors will remain better informed on the status of the group discussions/negotiations and overall it results in a richer learning experience.

## REFERENCES

Available from the authors.

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<sup>5</sup> “The Duality of Technology: Rethinking the Concept of Technology in Organizations”