

COOPERATIVE LEARNING AND COLLABORATE TOOLS - A WIN/WIN SITUATION

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ABSTRACT Through the use of cooperative learning techniques and collaborative tools, a systems analysis and design class, divided into five groups of four students **each**, was able to complete **professional** models and documentation for the analysis of five university systems in one **semester's** time. This included feasibility studies, studies of the existing systems and user requirements for new systems. CASE technology software provided students with tools to facilitate system/data modeling, produced **professional documentation**, and enhanced group discussion, problem solving and decision making. Cooperative learning enabled student groups to perform rigorous exercises and tests that were 4-5 times harder than individually assigned problems, developed effective teamwork among group members and enhanced group synergy.

INTRODUCTION With the reception of a NSF grant¹ in 1993, The University of Tampa developed a laboratory of networked SUN machines to provide a Computer Aided Systems Engineering tool (Software Through Pictures², StP) for the analysis, design and implementation of systems. In **addition**, the grant was later expanded to include the implementation of a formal groupware meeting room (using VENTANA's GroupSystems³ and LOTUS Notes) to assist in the collaborative efforts of a systems analysis and design class. In **addition**, cooperative learning techniques were employed to encourage and enhance the collaborative tools. In the following, the results of this endeavor are related along with problems encountered on the way.

CASE/GROUPWARE APPLICATIONS: During the fall semester of 1995, the CASE tool and cooperative learning techniques were used to **successfully** analyze and model five team projects in a Systems Analysis & Design class of twenty students:

1. Student/advisor access to student records over school's LAN: This system would allow a student and/or advisor to sit down at a terminal connected to the university's LAN, sign on and obtain the latest version of the student's personal school records. **The** student records are maintained on an administrative HP minicomputer in a proprietary database.
2. On-line advising and registration system: This system would allow an advisor to access class schedule **information**, tie into the student record access system above, and generate a proposed class schedule (in a file) with the student present. Later, the student would sign on to the LAN, retrieve the preselected class file and use it for registration on the HP administrative computer.
3. Residence Life: This system will allow residence life personnel to input student roommate requests and automatically match compatible students for housing assignments. In **addition**, **the** associated database formed would give better demographic **information** of the student population than the present manual methods.
4. MBA admissions and information system: At present, it is very **difficult** for MBA program administrators to develop timely and accurate reports on our MBA program inquires, students, and



status. This system will track students from initial MBA inquiry and admission through program participation and graduation. Reports will be generated routinely and on demand for tracking the MBA program.

5. Transcript evaluation system: When students transfer to this university, their transcripts must be analyzed to determine what credits will transfer and which courses correspond to existing university courses (this applies to international universities as well as domestic ones). With this system, the process will be automated and a database of corresponding courses will be built up.

PROJECT PROBLEMS: Between the time that the NSF grant was applied for and received, The University of Tampa experienced declining student enrollment and financial difficulties until the Fall of 1995. During this time period, a Superbowl raffle and reception of a senior class gift aided in purchasing the CASE tool, the C/C++ development tool, the SUN server and 2 workstations. A Hewlett Packard gift provided a 10BaseT hub to set up the initial network. With the recovery of enrollment in 1995, the university was able to complete the financial matching portion of the NSF grant.

The NSF grant was for laboratory equipment only. With the lack of funds, the co-project directors and several upper-class students had to learn the SUN SOLARUS operating system and CASE tool on their own. Luckily, the SOLARUS OS is a UNIX system and one of the project directors was reasonably knowledgeable in that area. In addition, the local SUN Systems Engineer spent a day and a half with us getting the systems operational and networking.

The CASE tool, Software Through Pictures, came with volumes of user manuals that were very good for learning the system. However, we did have to rely on the system developer's HELP desk to bring the StP system up initially. In fact, a HELP desk person from IDE in California was given system root privileges and he logged on over the Internet directly into our server and trouble shot startup problems. From then on, a well written tutorial guided us through the system functions.

Another problem area occurred in SYBASE, the database management system utilized by StP. At one time, the system would not allow new databases to be initialized. After considerable research in the StP user manuals, it was determined that the system disk was full and not utilizing a newly installed, secondary, 1G hard disk. This was corrected and then it was discovered that SYBASE maintains a log file of all transactions, which resulted in a huge file containing every transaction attempted for a year and a half! This file was promptly purged and is now monitored monthly.

Once these problems were resolved, the students involved and one of the project directors instructed the rest of the class in the use of the tools and system.

SUMMARY The implementation of an NSF grant for collaborative CASE and Groupware technology has been discussed along with the classroom results obtained from the SUN lab and GroupSystems formal meeting room. Problems encountered in the implementation of this grant are discussed, along with their solutions.

Appendix A CASE TECHNOLOGY

The CASE tool selected was Software Through Pictures (StP) by Interactive Development Environments, Inc. This software is installed on a SUN Microsystems' Spare 20 server networked via a 10BaseT hub, using TCP/IP, to 9 Spare 5 workstations. The computers were installed in a classroom so they were readily available for use during and after class.

StP was chosen as the CASE tool due to several recommendations received from other universities using it. The tool provides syntax and semantic checking and links various analysis and design tools together for cross checking. StP has also been upgraded since our original proposal to include object oriented modeling capabilities.

StP provides the following tools for system analysis and design:

- a. Data Flow Editor, DFE, (DeMarco/Yourdon or Gane/Sarson methodology) - for the development of data flow and control flow diagrams
- b. Data Structure Editor, DSE, (Jackson methodology) - for development of entity relationships
- c. Structure Chart Editor, SCE
- d. State Transition Editor, STE
- e. Control Specification Editor, CSE
- f. Matrix Table Editor, MTE, - generic, semantic-free table editor.
- g. Object Management System, OMS, - provides services for creating, updating and deleting objects in the StP Repository. Among these services are:
 1. Persistent Data Model
 2. Query Language
 3. Application Programming Interface (API)
 4. Type Extension.

APPENDIX B: GROUPWARE SYSTEMS

The groupware software selected was GroupSystems, by The University of Arizona and Ventana Corporation and LOTUS Notes. GroupSystems and LOTUS Notes are installed on eight 486 IBM microcomputer networked together on a Novell Ethernet. These computers are installed in a formal meeting room equipped with an overhead projector (attached to the facilitator's computer), screen and copyboard (a white board that allows you to seize, by computer, anything written on it). GroupSystems consists of the following tools for facilitating group meetings and brainstorming sessions:

- a. Meeting Manager - supports session leader and group by initiating activities, accessing files, printing reports, and saving session reports.
- b. Agenda - assists in planning and running meetings. Agendas for common type meetings can be saved as templates for later meetings.
- c. Electronic Brainstorming - tool for gathering anonymous ideas and comments in response to a question or another person's comment.
- d. Categorize - allows cut and paste functions for refining, rearranging, consolidating and categorizing items and comments saved in a file.
- e. Vote - allows participant voting by rank order, multiple choice, agree/disagree, yes/no, true/false, 10-point scale, or allocation.



- f. Topic Commenter - anonymous commenting on topics in electronic file folders for review by the group.
- g. Group Dictionary - provides for the development of common terms to be used by the group.
- h. Alternative Evaluation - using criteria, allows "what-if" scenarios to evaluate different weighings of the criteria.
- i. Policy Formation - development of policies, statements or action plans by an iterative process of review and revision.
- j. Survey and Questionnaire - provides methods of gathering and organizing data.
- k. Group Outliner, Writer, Matrix - allows the group to collaboratively develop tree or outline structures; create, edit and annotate a common document; and establish relationships between rows and columns **in matrix** form.

LOTUS Notes is tied to GroupSystems to provide data storage and access capabilities to a group's data over LAN connections or across telephone lines.

REFERENCES

1. National Science Foundation Grant #DUE-9351774, dated June 14, 1993.
2. Structured Environment: Using the StP/SE Editors, Release 5, by IDE, February 1994. StP Core: Object Management System, Release 1, by IDE, February, 1994.
3. "GroupSystems: The Basic Tools," "GroupSystems: The Advanced Tools," and "GroupSystems: GroupSystems for Windows and LOTUS Notes," marketing brochures from Ventana Corporation, 1995.
4. Live satellite broadcast on September 12, 1995 by the National Technological University entitled "Cooperative Learning in Engineering Courses" and presented by Karl A. Smith and Richard M. Felder.

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