TOTAL ENTERPRISE SIMULATIONS AND THE INTERNET: IMPROVING STUDENT PERCEPTIONS AND SIMPLIFYING ADM1NISTRATWE WORKLOADS

E. Brian Peach, The University of West Florida
Richard G. Platt, The University of West Florida

ABSTRACT

This paper reviews various approaches for the transmission of decision data used in Total Enterprise Simulations, and discusses the advantages of using the Internet for data transmission. Specific techniques and software used in a successful implementation of using the Internet for Thompson & Stappenbeck's Business Strategy game are reviewed and conclusions about the benefits and limitations of using the internet are discussed.

INTRODUCTION

Faria (1990) estimated that 95% of AACSB schools and 86% of all business schools were using business simulations. Business simulation usage was highest in the policy and marketing areas. Usage continues to increase and was recently estimated at over 97% (Faria & Nulsen, 1996). Policy courses typically use what are termed "total enterprise" (TE) simulations that require making decisions from a top manager point of view and the strategic integration of decision variables from all major components of an organization (Keys, 1987). Typically, the periodic decisions made by students are submitted on floppy disks at a stated time. The decision is processed and the students then must return to pick up their disks with the results. This places a burden on the students to make extra trips. The use of floppy disks also introduces the possibility of disk errors and other problems related to portable data storage media.

The increasing complexity of business simulations and level of student competency places additional skill requirements on game administrators (Render & Stair, 1987). Although using the Internet is becoming more familiar to many of us, using it as a support mechanism for submitting business simulation decisions may well exceed many business simulation administrators and/or users capabilities. Fritzsche and Cotter (1992) initiated discussion of the benefits of the Internet for ABSEL members. Since then others have suggested using the Internet as a support mechanism for exercises (e.g., Leonard & Leonard, 1996), or for courses such as marketing (Wilson and Maxham, 1997; Krishnan, 1997), or even for a business simulation (Teach, 1997). However, no real specifics were ever provided on a successful use of the Internet for submitting business simulation decisions and returning results to students.

This paper describes an effective process for using the Internet to transfer decisions to the game administrator and results back to the students in an efficient and dependable manner for the widely used Business Strategy Game, 4th edition (Thompson & Stappenbeck, 1997). The same procedures could be used for any typical game.

Background of Data Entry for Business Simulation Games

In the early days of business simulations, students turned in a written copy of their decisions, and the data were entered by the game administrator. This placed an additional workload on the administrator and opened up the opportunity for students to claim there were data entry errors. Concern about this led to calls for simpler data entry approaches (Fritzsche, 1978). Some schools began to use mainframes or Local Area Network (LAN) based games to eliminate the need for instructors to enter the data. This adds the requirement, however, that students use terminals attached to the mainframe or

LAN. In most cases, this means students have to use the business school's computer lab.

With the advent of microcomputers, direct data entry gained in popularity (Fritzsche, 1987). Direct entry placed responsibility for accuracy on the students. It also allowed students to make decisions at any location with compatible computers. Although direct data entry allows students to make decisions independent of class schedules, they must dill make arrangements to turn the decision disks in to the instructor and reclaim their disks after the decisions are processed (Fritzsche & Cotter, 1990).

There are also additional logistics challenges for students making and submitting decisions. At our campus, most students fall in the 'non-traditional' category, in that they work and have families and live at some distance from the campus. Usually they arrange their schedules so that they are only on campus one or two days a week. Thus, for many students, submitting or retrieving decisions can require substantial extra travel time, even if one of the two events is scheduled to coincide with a class period.

In addition, in many computerized business simulations, participants are grouped into teams that make periodic decisions across a variety of business variables. This requires all group members be present to participate in the decision making process. Groups often meet at the home of a team member with a computer, either because it is more convenient, or because they can work at times when the computer lab is closed. These meetings are frequently late at night shortly before the decision is due, requiring special trips to deliver the decision disks in a timely manner.

Problems Derived From Using Diskettes

It is likely that any game administrator will find that over the course of a semester, problems with disks will be experienced. There may be disk errors such that the decision data cannot be read. The disks may not be turned in on time presenting the instructor with the dilemma of contacting the students and waiting for new disks or proceeding without the team's missing decision. Delaying processing will adversely impact students who expect results at posted times, but processing a decision without a team's disk can seriously impact that team's performance.

A second serious problem with diskettes is the problem of computer viruses. As many students use computers for their game decision that are not subject to university security precautions, it is almost inevitable that some disk will eventually contain a computer virus. Undetected, these viruses have the potential to crash the game administrator's computer, or even worse, they might erase the administrator's computer hard drive rendering its contents useless.

Further complicating the submission process, our university provides the policy course at a satellite campus. This adds a logistic challenge to the game that may, if students experience problems, distract them from the expected learning of the simulation.

Partial Solution Using LANS

With the introduction of local area networks (LANs) in the late 1980s, LANs provided a solution to some of the existing data entry problems described above and added a new level of convenience for both students and game administrators. LAN data entry allowed the students to submit their decision data from any computer connected to the LAN. This eliminated the problem with bad decision disks, and as well as the potential problem of transmitting viruses.

The game administrators also benefitted from LAN data entry. The decision data were stored on the LAN file server and the administrator just downloaded the decision data. Once downloaded, the administrator no longer had to swap data disks, eliminating a very time consuming manual process.

However, the LAN data entry solution still presented several significant limitations. The first limitation was inherent in the solution. To use LAN data entry, you have to use a computer connected to the LAN. Many students have computers at home and these are not connected to the LAN and therefore, cannot be used for data entry unless the school supports remote access to the LAN and the students understand how to use that remote access. Even when remote access to the LAN *is* provided, there is a limited number of modems providing access to the LAN and the demand on these connections during periods of peak usage often results in long delays in gaining access to the LAN. Finally, a third limitation in the LAN data entry solution is the reliability of the LAN itself LANs are subject to failures. They are not designed to be fault tolerant and require the attention of highly skilled personnel to recover and restart the LAN in the event of some form of network or hardware failure.

Internet and Data Transfer

Many of these problems can be solved by using the Internet to transfer decision data to the instructor and to return the results to students. The very nature of the Internet creates opportunities not available through previous networking technologies. The Internet is a continuously operating network. It was originally designed to be a fault tolerant system for the Department of Defense (Comer, 1995). As a fault tolerant network, the reliability of the Internet far surpasses the availability of conventional LANs in that if one node of the Internet becomes non functional the Internet addressing algorithms automatically reroute messages to other network paths. This fault tolerance provides a more stable environment than most campus LANs.

Further, there are many alternative entry points to the Internet. Many campuses provide their students with dial up services to the campus computing infrastructures. However, just as for LANs, these access points often become clogged during periods of peak usage and deny students access. The Internet is accessible not only from campus networks, but also from private Internet service providers such as the regional Bell operating companies, MCI, and GTE as well as a large number of Internet Service providers (ISPs). The single largest provider of private computing support, America Online (AOL), also provides access to the Internet. The multiple sources students have for access to the Internet far exceed access sources to the majority of campus computing networks.

File Transfer Protocol (FTP)

The submission and return of student decisions requires that data files be transmitted over the Internet. The software necessary to accomplish this is called a File Transfer Protocol (FTP). Popular FTP software such as WS_FTP and CuteFTP make the transfer of files easy for users and the actual mechanism is transparent to the user.

In technical terms, FTP is a protocol used to transfer files between two machines connected to the Internet. FTP works in conjunction with, not in replacement of, the standard Internet protocol, TCP/IP, used for web surfing. FTP provides for the smooth coordination of file transfers, not the actual exchange of network packets which is done by the TCP/IP. FTP also differs from electronic mail in that E-mail is inherently character based. FTP fills the niche where files must be transferred from one site to another in their exact, original (e.g., binary) form. FTP allows the exchange of binary files including executable programs, word processing document files, and other file types such as business simulation data files.

Transferring files over the internet using FTP is an example of a client-server relationship. A client-server relationship is a cooperative partnership between software applications running on two different computers. Each software application has its own processing to perform in conjunction with the accomplishment of the joint objective. In the

case of FTP, there is an FTP server machine running the FTP server software (used by the instructor) and an FTP client machine running the client software (used by the students). It is the cooperative, synergistic nature of this relationship that facilitates easy transfer and storage of binary files between the two computers located anywhere on the Internet.

Description of Project

Like any information systems project, this project consisted of several distinct phases:
- Software selection
- FTP server installation and setup
- FTP client selection and testing
- Student FTP account and software disk creation
- Instructor file setup
- Pilot project operation

Hardware and Software Selection

The project began with the objective of using the Internet to provide mutual benefits to both the students and the business policy professors. The Internet, FTP, and microcomputers were all familiar concepts to the project leaders. However, the operation of an FTP server was a new challenge which was compounded by the added restriction of ensuring that the FTP client software provided to the students was legally licensed. The first step was to identify an FTP server program (called a daemon) that was available for the Windows 95 (Win95) environment and that had either a free-use policy for educational institutions or a reduced fee educational license.

The FTP server software selected was the WAR FTP Daemon from JGAA (www.jgaa.com). Its license allows it to be used for no charge for educational purposes. The FTP client software posed an additional problem. Students would be using a variety of hardware platforms (e.g., 386s, 486s, Pentiums, etc.) as well as operating systems

(Windows 3.1, Windows 95). Because there was no universally available hardware platform or software configuration for the students, the FTP client needed to be available in versions that would work on any hardware configuration that would run Windows 3.x or Windows 95. The FTP client selected was the WS FTP program from Ipswitch. The license for WS_FTP also allows the software to be used for educational purposes without charge (www.ipswitch.com).

The third step in this phase of the project was selection of an FTP server to maintain the files transmitted by students. Although the students would not use the FTP server very often, students frequently wait until the last possible moment to complete their game decisions. The microcomputer selected to be the FTP server machine needed to be capable of handling access by multiple teams concurrently. An Intel 486 microcomputer already connected to the Internet via the university's campus wide area network (WAN) and having its own IP address was selected. The FTP server machine ran the WIN95 operating system which satisfied the requirement for simultaneous access by multiple teams.

FTP Server Installation and Setup

The WAR FTP server provides a very automated setup procedure. However, there were some special requirements administrators must set up during the process. The server administrator must know the IP address of the machine hosting the FTP server. Further, the reliability requirements of the project required configuring the server's WIN95 operating system so that every time the server machine started, the FTP server software automatically started, loaded the proper configuration files, and then waited for defined users to attach to the server. This was necessary in case a power failure or some other event caused the computer to reboot. In addition, an uninterruptable power supply (UPS) was placed on the computer to add reliability.

After installation of the server software, it was necessary to create user ids and passwords for every policy simulation team. These user ids uniquely identified each policy team and determined their level of access to server resources. Some FTP servers permit the use of anonymous FTP access permitting anyone limited access to portions of the FTP save hard disk data files without supplying a password. Since the project involved student grades, the decision was made to prohibit anonymous access to the server and to require all users to provide a valid user Id and password. Without a valid user id and password, the FTP software denies the user access to the FTP server system resources. As a further security precaution, the server administrator created a separate simulation directory for use by all of the teams, and individual team directories for each student team. Each team's password restricted access to just the team directory and data files assigned to that one team. No team could access the data files belonging to another team.

FTP Client Selection and Testing

Once the FTP server was installed, configured, and operational the project moved to configuration of the student FTP client software, or in other words, preparing individual FTP disks for the teams. Again, because students used different types of computers, the FTP had to be able to run on any possible PC compatible computer configuration. Thus, an early design decision constrained the client software to the simplest possible configuration. The decision was made to use the 16-bit version of the WS_FTP client, since this version would run on any 386,486, or Pentium hardware platform and it was compatible with both Windows 3.1 and WIN95. While the 16-bit version of WS_FTP was not the latest version, it would run in any of the required hardware and software combinations.

An essential step at this point was the testing of the client software in all anticipated environments. There were four campus computing labs, each with different hardware and software configurations. In addition, the students might access the game FTP server by dialing in to the campus WAN from a remote location. Finally, some students use other service providers. Before providing the client software to the students, the project administrator tested the client software in each of these environments to insure that the software performed as intended.

Student VFP Account and Software Disk Creation

Each student team received a software disk containing the 16-bit WS FTP software, which had been set up by the game administrator to automatically find and attach to the FTP server used for the simulation. All that was required was for the students to initialize the software on their individual team diskette by entering their team's user id and password. This software could be used from any campus computing lab, or it could be used from a remote location using a third-party Internet service provider. If the students chose to use CompuServe or AOL, then each of these providers furnishes its users with their own FTP software and the students could not use WS FTP. In this case, the students would provide AOL or Compuserve's FTP software with the policy game FTP server IP address, the team user Id, and the team's password, and they would connect with the simulation FTP server.

Instructor File Setup

The policy game administrator had a special user id and master password to gain access to the simulation FTP server. The special user id and password provided access to the directories and files for all teams. Therefore, the game administrator could use FTP transfer to download the decision files from the game FTP server to another computer. The game administrator then used this separate computer to process the game decisions. The only requirement for this was that the game administrator's computer must be also connected to the Internet.

When setting up the execution of the BSG, the game allows the administrator to specify a directory path to retrieve the data files for processing decisions. The default path is the A: drive, but that was changed to read from the hard chive. Once the instructor used FTP to download student decision files, the game then accessed the decision files directly from the administrator's hard drive. Upon completion of the simulation run, the administrator reversed the process and uploaded the student data files to the team directories on the FTP server. From there the student teams downloaded their output.

Pilot Project Operation

The first night of class, the teams received their introduction to BSG. In addition they received their FTP client disk, their team user Id and password, and a detailed set of instructions. The teams operated the simulation and prepared their decisions just as they would have if they were using disks to transfer decisions. However, once their decisions were recorded on their data disks, the students used the FTP client software to transmit their decision files to the FTP server. Once the deadline for submission passed, the game administrator began the processing sequence.

The actual processing sequence was to check the game FTP server to ensure that all teams had submitted new decisions. This was done by checking the date of files on the server. In some cases, the game administrator determined that decisions had not been submitted, and contacted a team member who then was able to quickly transfer the current decision to the game FTP server. The decisions were then downloaded to the hard drive of the computer used to process the decisions. After the processing the results were then uploaded back to the FTP seiver where students could access and download their results data.

Operational Experiences

For our classes, we typically have 12-16 teams. It was significantly easier and faster to process the data off the hard drive as opposed to inserting and removing 16 disks to input the data, and the same 16 disks to place the results on them. There were no problems with viruses or data errors. Critical problems such as not having a decision disk turned in on time or having an unreadable disk went away. However, no computer based simulation (in our experience) goes for an entire semester without some problems. We certainly had some, even using FTP to submit decisions. In several cases, students who were supposed to transfer decisions either forgot or had computer problems. We were able to contact a team member and quickly obtain the necessary data without having students drive in to the campus (a recurring theme when we used disks). The data transfer works much better for our satellite campus, saving students multiple trips to the main campus to deliver or recover decision disks.

On the down side, we were once again reminded of the truly limited computer skills of a small minority of our students. We found that it is important to have user friendly FTP software. The instructional materials must be clearly written and include step by step instructions. And finally, it may seem obvious, but the FTP software MUST be tried on a variety of computer platforms that students are likely to use. We had a number of dry runs in testing our procedures and software, and before the semester started found that some procedures that worked in our computer lab would not work on other computers. By rewriting and establishing universally applicable procedures, we undoubtedly saved ourselves some grief

**CONCLUSIONS AND
RECOMMENDATIONS**

We strongly recommend that any instructor with access to a server consider using FTP for submit-

ting any course work as well as business simulation decisions. The procedure is relatively painless (once established) and may well save many hours of time for both faculty and students.

REFERENCES

Aase, Jarle, War FTP Daemon Version 1.65 [FTP Server] (www.jgaa.com).

Corner, Douglas E. (1995). The Internet Book, Prentice-Hall, Englewood Cliffs, NJ.

Faria, A. J. (1987). A survey of the use of business games in academia and business. Simulation & Games.. 18, 207-224.

Faria, A. J., & Nulsen, R. (1996). Business simulation games: Current usage levels a ten year update. Developments in Business Simulation and Experiential Learning. 23, 22-28.

Fritzsche, D. J., & Cotter, R. V. (1992). Benefits of Internet computer networks for ABSEL members. Developments in Business Simulation and Experiential Learning. 19, 5 1-53.

Fritzsche, D. J. (1987). The impact of microcomputers on business educational simulations. Simulation & Games. 18, 176-191.

Fritzsche, D. J. (1978). Let's simplify the administrative requirements of computerized educational simulations. In S. C. Certo & D. C. Brenenstuhl, (Eds.), Exploring experiential learning: simulations and experiential exercises, 39-43.

Fritzsche, D. I., & Cotter, R. V. (1990). Guidelines for administering business games. In J. W. Gentry, (Ed.), Guide to Business Gaming and Experiential Learning: 74-89. East Brunswick, NJ: Nichols/GP Publishing.

Keys, J. B. (1987). Total enterprise business games. Simulation and Games, 18(2), 225-241.

Krishnan, B. C. (1997). Marketing on the Internet: A pedagogical exercise. Developments in Business Simulation and Experiential Learning. 24, 190-191.

Leonard, N. H., & Leonard, T. L. (1996). Internet scavenger hunt. Developments in Business Simulation and Experiential Learning. 23, 171-172.

Render, B., & Stair, Jr., R. M. (1987). Microcomputer technology in schools of business. Interfaces, 17(5), 92-102.

Teach, R. (1997). The design of an Internet game. Developments in Business Simulation and Experiential Learning. 24, 336-343.

Wilson, E. I., & Maxham, J. G. ifi. (1997). Internet experiential learning in the principles of marketing classroom: A pedagogical approach. Developments in Business Simulation and Experiential Learning, 24, 261-266.

WS_FTP [FTP Server] Ipswich, Inc. (www.ipswitch.com)