AN ALTERNATIVE TO PC AND INTERNET BASED SIMULATIONS: THE INTERNET INTEGRATED MODE

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ABSTRACT

Business educational simulations have passed through a series of generations of development beginning with hand scored games, progressing through mainframe simulations, PC based simulations and then Internet based simulations. This manuscript describes a hybrid approach which blends PC based simulations with Internet based simulations to benefit from some of the strengths of each.

INTRODUCTION

Early business simulations were hand scored, e.g., Marketing in Action (Day, 1962). When mainframe computers became common among universities, faculty began developing computer scored simulations, most written in some variation of the FORTRAN language (Cotter, 1973, Faria, et. al., 1974, Jensen and Cherrington, 1973). Some of the hand-scored simulations were converted to computer scored versions with increased complexity (Day, 1968). Simulation input for computer scored simulations was via punch cards and simulation output was printed on large central printers. Later in this era, terminals became available which allowed users to enter input directly into the computer obviating the need for punch cards (Fritzsche, 1977).

With the advent of personal computers (PCs), some mainframe simulations were converted to run on PCs, (Cotter and Fritzsche, 1986) and new simulations were developed specifically for PCs (Anderson, et. al., 1999, Thavikulwat, 1991). Most of these were written in some variation of BASIC with a few written in a variation of C. While some simulations were run on a single PC, the more common mode was the development of an administrator's program to run on one PC with several player's programs running on additional PCs. Input was entered by players via PC and normally saved on floppy disks which were read by the administrators PC. Floppy disks were later replaced with flash drives. Simulation output was saved to the same floppy disk or flash drive for student viewing on-screen or printing on individual printers connected to their PCs. The computer interface evolved from rather rudimentary DOS operating systems to sophisticated graphical user interfaces (GUI) interfaces, first introduced by Apple and later joined by different editions of Windows.

The advent of the Internet, made possible by the ubiquitous PC, is having a significant impact on simulation operating modes. Internet based simulations represent the fourth generation of business simulations. Internet based simulations offer a number of advantages for users. They are PC independent, accessed via a web browser, available anywhere an Internet connection is available, and are easily updated on a server rather than on a number of PCs. As with earlier simulations, some PC based simulations have been ported to the Internet along with some new simulations being developed solely for the Internet (Wolfe, 2003, Anderson. However converting a PC based simulation to an Internet based simulation is not a trivial exercise.

BLEND OF PC AND INTERNET MODES

An interesting alternative is to blend the PC based and Internet based modes in what we will refer to as the Internet integrated mode. In this mode, an administrator's program is installed on a PC and player's programs are installed on other PCs. PC location is unimportant as long as each PC has access to the Internet. The Internet serves the connection point for the PCs and provides the storage point for all files that require access by both programs. This includes both player decision files and all simulation output files. A description of the process of running an Internet integrated simulation will help understand the differences among the three modes.

To initiate a competition in the Internet integrated mode, the administrator creates the initial historical files needed by the players to begin the simulation as usual. The files are then distributed to their respective company folders located on the administrator's PC. Then the administrator creates a set of unique folders on a server connected to the Internet. This should be accomplished by accessing a menu item in the administrator's program. After the fold-

ers are created, access files for each player team must be created and delivered to each team either via email or flash drive. This again should be accomplished using a menu item in the administrator's program or it may be included in the process that creates the folders on the server. The access files should be encrypted so that the player's cannot determine what server is being used or how the correct team information is accessed on the server. All information sent between the PCs and the server must also be encrypted using either https or SFTP. This prevents unpleasant surprises from lurking hackers. When the player's receive the access files, they should place the files in their "company folder". This should be accomplished using a menu item in the player's program. Just prior to providing the access files to the players, the administrator should upload the historical files to the server using a menu item or button in the administrator's program. The files are compressed into a zip archive as they are being uploaded.

After the historical files have been uploaded and the players have their access files in place, they are ready access the server to download the historical files and begin to plan for their competition. The files are downloaded using a menu item or button in the player's program. The download process unpacks the zip archive for the team and places the files into the correct folder for access via the player's program. After the files have been downloaded, the players use the player's program to view the simulation output or print it. When the players have analyzed the historical files and created a decision set for the first period of play, the decision set file is created using the players program. The decision file is then uploaded to the server using a menu item or button in the player's program.

When it is time to run the simulation, the administrator downloads the player's decision files using a menu item or button in the administrator's program. The simulation is run and the output is transferred to company folders via a menu item or button. The simulation is then uploaded to the server using a menu item or button with the output being compressed into a zip archive as before. The process continues as before for as long as the competition is run. It should be noted that copies of all decision files and simulation reports are kept on both the respective player's and administrator's PCs.

The Internet integrated mode is a bit of a hybrid which offers some advantages over the PC and Internet modes of operation.
1. Input and output files are sent over the Internet eliminating the need to use a physical medium to transfer company decisions and simulation output.
2. Player's programs can be designed to upload decision files when they are created removing the possibility that player's will forget to submit their decisions on time after decision files are created.
3. Each player can have a copy of the player's program on a PC and download the simulation output independently. This allows the players to access and work on the simulation as their time allows. Any player on a

team can create a decision file and upload it to the server providing a backup when the player normally responsible for entering decisions is not able to respond in time.
4. Players and administrators may be located anywhere in the world with files flowing back and forth as long as an Internet connection is available. This allows players to be in different locations and still contribute, e.g. a player on a trip can download the output, communicate with fellow players via email and even upload the decision set after entering it if needed.
5. Software can be downloaded and a competition set up in a short period of time, usually less than half an hour for those familiar with the simulation software.
6. If the administrator is using an executive panel or other external parties to evaluate the simulation competition, each panel member can download the simulation output using a copy of the administrator's program to provide complete, timely information regarding the simulation.
7. Converting a simulation to an Internet integrated mode is considerably easier than converting it to an Internet mode.
8. If the Internet goes down, the simulation can be designed to revert to flash drive or floppy disk mode until the Internet is restored if the players and administrator are located in the same area. Thus no time is lost.
9. The simulation administrator maintains full control over the starting conditions for the simulation.
10. The simulation administrator controls when the simulation will be run.
11. The simulation administrator has full control of the parameter settings and a rich set of parameters can be included in the simulation.

CONVERTING A PC BASED SIMULATION

Some requirements for converting a PC based simulation into an Internet integrated mode include:
1. A reliable server is needed to store decision and simulation output. This may be provided by an Internet service provider.
2. Secure connections such as SFTP or https must be used to protect passwords.
3. The administrator's program should be configured to allow users to easily create the required files on the server to implement a competition.
4. Both decision and output files should be uploaded and downloaded by simple menu or button commands.
5. Provisions should be made to revert to flash drive mode in the event the Internet fails.

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