A SPREADSHEET BASED BUSINESS SIMULATION GAME

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ABSTRACT

The spreadsheet approach described in this paper simply implies that all computations for the simulation are performed as spreadsheet formulas in Excel rather than as sequential statements in a procedural language such as Basic or C. This approach is not intended to change the way the simulation works, but rather to give the game administrator convenient access to all data and computations.

INTRODUCTION

As microcomputers have grown in speed and capacity, applications which were impractical on earlier microcomputers have become feasible on the newer machines. Business simulation games are an example of an application that requires a very large number of computations, but clearly such simulations have been performed on microcomputers for quite some time. However, if you add the inefficiencies imposed by the spreadsheet format, the resulting memory and recalculation requirements become overwhelming and pre-Pentium microcomputers stagger under the load. Today's microcomputers have changed that picture, it is now possible to "cram" a large multi-team total enterprise simulation into one Excel spreadsheet which will operate very nicely.

Certainly there have been earlier business simulation games in spreadsheet format (e.g. The Business Strategy Game by Thompson and Stappenbeck and STRAT-PLAN by Hinton and Smith). This paper re-evaluates spreadsheet based business simulation games in the light of current microcomputer technology. Furthermore, the fact that business simulation games CAN be performed in spreadsheet format does not really justify their use and this paper will discuss the advantages and disadvantages of spreadsheet based business simulation games.

THE COURSE

The particular business simulation game discussed here is used in a semester capstone course in which student teams compete during in a 4-year (16-quarter) game. The students are graded each year on written planning reports, the performance of their company, and year-end PowerPoint presentations. The course emphasizes teamwork, planning, and oral and written communication. The course provides students with experience in applying the knowledge from previous courses, in using technology, and in meeting deadlines.

THE GAME

The business simulation game used in this course is a two product manufacturing game with 29 decision variables including production, marketing and financial decisions. Each section of the game may include up to 10 student teams. Students are provided with an Excel workbook that they use for planning and for creating decision files. The decision files are sent to the instructor and the output reports are received from the instructor via a network.

The game software is an Excel 97 workbook comprised of 20 worksheets including data, computation, and report worksheets. Data worksheets include system, control, decision, and history data. Calculations for all the teams (for the current period) are performed in the demand, productivity, cash balance, bond rating, stock price, and results worksheets. Output worksheets include the updated history data and the formatted reports for the game administrator and the student teams. The menu bar is customized to provide commands that execute Visual Basic program

modules which automate data handling and enable the game administrator to start the game, to view or edit any data file, to view or print any report, and to run the game. Running the game simply entails reading the necessary input files into the spreadsheet and writing the resulting output files directly from the spreadsheet.

OBSERVATIONS

The business simulation game described above has a disk size of 900K bytes. On a 486 microcomputer the recalculation delays are unacceptably long, but on a 200 MHz. Pentium microcomputer with 64K bytes of RAM the delays are still evident but not distracting. So, having established that a spreadsheet based business simulation game can operate satisfactorily, the following observations discuss the advantages and disadvantages of using it.

The primary advantage of a spreadsheet based business simulation game is that absolutely all data, all intermediate results, and all and final results are available to view, to compare, and to graph. For example, all the factors that influence a team's demand can be readily viewed and compared with other teams. Or all the factors that affect the cost per unit produced can be analyzed to determine efficiency of a team's production plan. Furthermore, all formulas are "live" so the administrator can change the value of any variable or parameter and immediately observe the result. While this benefit is especially helpful during construction of the simulation game, it is also useful for instructors who like to perform "what-if" analysis as they change the value of control or environmental variables during the game. The counterpoint to these benefits is that simulation games written in Basic or C can certainly be programmed to provide all the intermediate totals you want, and, in fact, many instructors may prefer to see only the final results rather than being inundated with all the intermediate calculations.

The primary disadvantage of the spreadsheet approach is that the spreadsheet is not as efficient as a compiled program. Having all calculations always available for viewing requires that all the cells containing these formulas be formatted and be recalculated frequently – the formatting takes space and the recalculation takes time. In general, a spreadsheet is designed to allow for maximum user interaction, resulting in a lot of overhead (space and time requirements) which would be unnecessary if intermediate results were calculated but not displayed.

The spreadsheet approach allows the user to have free (i.e. not under programmed control) interaction with the data and calculations. This could be viewed either as an advantage or a disadvantage. On one hand, the user can view and manipulate all data and calculations, but on the other hand, there is greater opportunity to mess things up or at least to get lost while scrolling through a worksheet. The user must be knowledgeable in Excel and in the spreadsheet itself to successfully navigate through the spreadsheet without programmed help. Furthermore, if copy protection is an issue, spreadsheet formulas are generally open to the public while formulas in a compiled program are hidden.

Finally, Excel offers a well-known interface for students and the instructor. The instructor operates all aspects of the game in Excel and the output to the students is in Excel. Whether this is an advantage or disadvantage may very well come down to a matter of personal preference. While some instructors may have a certain devotion to the use of spreadsheets, other instructors may be less enamored with spreadsheets and probably do not have much use for a spreadsheet based business simulation game.