

Developments In Business Simulation & Experiential Exercises, Volume 22, 1995

A DEMONSTRATION OF PROMODEL

Robert E. Bateman, Integrated Systems Technology
Kevin Field, PROMODEL Corporation
Onur Dulgeroglu, PROMODEL Corporation

ABSTRACT

Advances to the state-of-the-art in simulation software have made stochastic modeling more accessible to business school students and faculty. Students are learning to build computer simulation models at an earlier point in their academic program, often in courses that included only manual simulation exercises or spreadsheet problems in the past. Even more promising from a teaching perspective is the capability that advanced simulation software gives faculty to quickly create example models that reinforce the concepts to be covered in class. These models can range from simply illustrative to highly interactive.

INTRODUCTION

Business students have traditionally received far less exposure to simulation models than their engineering counterparts. Survey courses in operations management or management science, where simulation is generally introduced, have often provided an initial exposure but seldom any hands-on familiarity with modeling. Actual development of computer simulations has typically required mastery of specialized programming languages. Since simulation is generally only one of several analytical techniques covered in introductory courses, time constraints have often limited student learning experiences to simulation exercises done by hand or with simple spreadsheet models. Because recent advances in simulation software have made the technique easier to use, however, growing numbers of students are learning to construct significant models during a one or two week introductory module. (Bandy, 1995)

The improvements that have made it easier for students to learn simulation also facilitate use of dynamic models as a teaching tool to reinforce management concepts. Faculty members can now create models quickly to illustrate topics covered in class.¹ More advanced models may be

used to allow students to make their own management decisions and experience the results of their choices in a real world scenario. Some parameters might also be changed interactively to give students an understanding of decision making in an environment of uncertainty.

THE PROMODEL SOFTWARE

ProModel is a simulation tool designed to support rapid and accurate modeling of manufacturing systems.² Managers and engineers in industry have found this software package easy to learn, because it uses an intuitive graphical interface based on Microsoft's Windows and familiar modeling elements such as locations, resources, processing steps, etc. These same features have made ProModel a popular package for teaching the fundamental principles of simulation model building in the classroom.

Model development in ProModel is graphical and straightforward. Icons representing work locations are selected and placed on a layout window, at which point specific information about the work location (capacity, downtimes, queuing logic, etc.) can be identified. Entities, resources and transporters are defined in similar fashion. Processing steps can also be specified graphically and different part routings, including probabilistic assignments, can be selected from a menu of common rules. An integrated statement and expression builder speeds construction of complex decision logic, statistical distributions and other advanced elements by moving the modeler through easily understood dialog boxes.

Both the modular approach of ProModel and its streamlined model merging feature facilitate an approach in which models can be constructed in phases. A model consisting of several processing steps can be constructed from available data on locations, part entities and arrival rates in a

¹ NSF recently awarded funding for development of a manufacturing engineering curriculum that will use simulation as a tool to illustrate production concepts throughout the program

² ServiceModel and MedModel are similar software packages designed for modeling of service industry and health care environments, respectively

Developments In Business Simulation & Experiential Exercises, Volume 22, 1995

matter of moments. Mobile resources, alternate routings and probabilistic processing times can be added during initial model definition or at subsequent stages. The level of statistical reporting for each system element can be defined and changed easily.

Model verification and validation in ProModel is facilitated by an interactive debugger, on-screen variables, event tracing, high quality graphics and detailed output statistics. Coupled with automatically generated result charts and sound capabilities, custom graphics using clipart and bitmap backgrounds can bring simulation presentations to life. The ability to define work shifts and specify run lengths by date adds both precision and realism. Multiple replication statistics enhance learning of the principles associated with stochastic events.

SCENARIO BUILDING

ProModel contains a run-time interface (RTI) that allows the instructor to develop a controlled decision making environment. Students can make decisions regarding such parameters as location capacities, processing times, number of available resources, etc. prior to running the model. Because this feature allows changes to be made via a separate interface using simple edit dialogs, students need have no previous simulation experience to use the model as a learning tool.

The RTI also provides an experimental environment in which students can define and simulate multiple scenarios at the same time, allowing them to compare the performance of the system under various situations. Alternate scenarios can be saved and processed in a batch run for later comparison. Animation can be toggled on or off to facilitate faster execution during this process. Location status and the current value of logic expressions can be accessed at any point during these simulation runs.

INTERACTIVE LEARNING

ProModel also supports interactive subroutines. Although subroutines are normally called by events happening within the model, interactive subroutines may be activated by the user at anytime during the simulation run. This powerful feature allows the student to make controlled

changes to the system parameters during the simulation. By choosing the desired subroutine from the Interact menu, a student may elect to alter these parameters and dynamically change any decisions made in the simulated system (processing times, routing decisions, number of resources, available locations, etc.). Any induced changes in system behavior can be dynamically reflected on the screen during the simulation run, with user-defined statistics calculated by the model.

One of the most significant advantages of this approach is that it allows students to learn in a dynamic environment that simulates the day-to-day challenges of management and the unpredictability of real life.

REFERENCES

Bandy, D.B. (1995). Teaching Simulation in an MBA Management Science Course. *Proceedings of the Conference on Business/MIS Simulation Education*. 65-69.

Graham, A.K. et al. (1994). Model-Supported Case Studies for Management Education. *Modeling for Learning Organizations*.

BIOGRAPHIES

Rob Bateman is with 1ST, a consulting group supporting educational program development at PROMODEL Corporation. Prior to joining 1ST, he served in administrative and project management positions with the U.S. Department of State. Rob holds an MBA and is currently a doctoral candidate in Public Administration.

Kevin Field is a member of the development group at PROMODEL Corporation, where he is involved in feature design and testing. He is currently completing an MS. in Manufacturing Engineering. His professional interests include hierarchical modeling and use of simulation games in teaching manufacturing management.

Onur Dulgeroglu is a member of the software development team at PROMODEL Corporation, where he has been involved in the creation of simulation interactivity features. He holds a B.S. in Industrial Engineering and an M.S. degree in Systems Analysis. His interests include visual interactive modeling and intelligent algorithms for prescriptive simulation.