ABSTRACT

The problems, uncertainties and dynamics associated with project management make it an ideal topic for simulation. Provision of computer pacing, real time operation, knowledge support system and centering the simulation on a data base provides the realism and flexibility necessary to stimulate and provide learning. The appropriateness of this approach is demonstrated using the PROTEST project management simulation. A demonstration that links software functionality to the use of PROTEST on a course for experienced project and commercial managers.

INTRODUCTION

The PROTEST - Project Management Simulation (Hall 1993) was developed as the leitmotiv of the Winning and Managing Major Projects (WAMMP) course run by the GEC Management College, Dunchurch, England. This, one week, training course is designed to immerse participants in all phases of the pursuit and delivery of a large commercial project. It involves investigating a business opportunity, negotiating and bidding for it, planning the project and managing its implementation. The course is designed for both project engineers and managers and the marketing and commercial staff responsible for obtaining the business.

The WAMMP course is almost completely experiential in nature. It has very few sessions that, formally, involve knowledge input. Because of this, the target audience is executives who must have experience and knowledge of large projects. These participants work in teams of five that are formed ensuring each has a mix of knowledge and experience.

The first stage of the course involves negotiation, with tutors role playing customers, sub-contractors etc. After this, PROTEST is used to investigate the project in detail, plan and schedule it. After finalizing the budget, the project is simulated with participants evaluating progress, replanning and rescheduling. The simulation phase is on a real time basis, paced by the project is simulated with participants evaluating progress, replanning and bidding for it, planning the project and managing its implementation. The course is designed for both project engineers and managers and the marketing and commercial staff responsible for obtaining the business.

The Sessions

These are: INFORMATION GATHERING, NETWORK DEFINITION, PLANNING & BUDGETING, SIMULATION 1, SIMULATION 2, SIMULATION 3.

Information Gathering replicates the real world need to define fully the project’s tasks, accurately estimate durations and evaluate risks. This involves interrogating a database. At the end of the session participants should have basic but not necessarily complete information about the project.

Network Definition involves defining the relationship between the tasks and organizing them into work packages for reporting and budgetary purposes. This leads to an initial project schedule and indication of resource needs and costs.

Planning and budgeting involves deciding resource needs, scheduling them and tasks. It leads to the preparation and finalization of a project budget that will be used to measure and evaluate progress.

The simulation sessions involve progressing the project to completion. During each session a mandatory number of periods must be simulated. For each of these periods, tasks can be scheduled, the current position analyzed, the project replanned before the next period is simulated. Simulation involves the software determining whether tasks are complete, starting new tasks (provided there are sufficient resources and preceding tasks are complete), accumulating costs and reporting on problems. Between each simulation session, teams prepare for the next session.

Computer Pacing

Computer pacing is particularly appropriate for the simulation of operational activities such as project management or factory operation. Activities where key issues are time management, the ability to think under pressure and manage proactively rather than reactively.

Computer pacing is provided at a macro level by dividing the simulation into several sessions during which specific management activities are enabled and where access is limited, by the software, to the defined period.

At a micro level, computer pacing is provided by two mechanisms - real time operation of the simulation software and a limited management resource”. Real-time operation involves the automatic simulation of individual periods. However, recognizing that participants do not think in accelerated real time, periods can be simulated before the mandatory time. This allows a buffer of time to be created to allow participants to think, replan and behave proactively.

The “management resource” mechanism involves decrementing management time whenever participants use the software to analyze, plan or simulate and incrementing it at the start of each session and period. If management time is exhausted only restricted actions are allowed.
The PROTEST program is built as a series of objects that can be classified as into the following:

SOFTWARE FUNCTIONALITY

STANDARD NETWORK ANALYSIS
PERIOD SIMULATION
INFORMATION & PROJECT MANAGEMENT
LEARNING SUPPORT SYSTEM

Standard Network Analysis

PROTEST can handle any CPM/PERT network of up to two hundred tasks with multiple resources, resource & cost profiles, working in four currencies. Based on this network analysis, time-tables, GANTT charts, resource histograms, cost and cash flow analysis are produced.

The project is defined in a master database that allows tailoring to a very wide range of project management training purposes. This tailoring extends to defining which software objects are used and which language is used for text and messages.

Period Simulation

As previously defined, period simulation progresses the project one period.

Information & Project Management

During the initial information gathering, project definition and planning sessions a series of routines, coupled with the standard network software, provides information retrieval and budgeting.

Once work starts on the project participants interrogate project status, instruct tasks to commence and, uses the standard network software to re-analyze and replan.

Learning Support System

Since teams use their own microcomputers, in their own syndicate rooms, they are divorced from the tutors. The learning support system provides knowledge support as part of a Participant Support System (PSS) (Hall 1993). (The analysis and decision support elements of the PSS are provided by the network analysis software and the behaviour monitoring element is addressed through computer pacing).

Besides the PSS there is a Tutor Support System (TSS) (Hall 1993) that provides a record of team progress. This is used to measure progress, ascertain learning needs and provides a means of explaining results. Finally, on the completion of the project this information is used to help teams and the tutors prepare for the review. The identification of learning needs leads to the tutor customizing a team’s database. This provides new challenges and ensures that participants make efficient and effective use of their time. This approach is discussed by Hall & Cox (1993) in terms of a system dynamics learning model and the “managed response” of the simulation.

Knowledge Support

The knowledge support system surrogates the tutor by supplying help on:

SOFTWARE USE
TERMINOLOGY
PROJECT MANAGEMENT
MANAGEMENT ISSUES

The purpose of software support is obvious. However, the purpose of the others may require explanation.