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COMPUTER PACED PROJECT MANAGEMENT SIMULATION

Jeremy J. S. B. Hall, Hall Marketing, London

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 computer. During it the tutors modify the database to stimulate and tailor learning.

The PROTEST simulation

PROTEST is a general purpose computerized simulation-game designed to run on a fast PC compatible microcomputer with a hard disc, colour display and printer. The PROTEST software is data-base driven that allows it to be customized to a specific project scenario and course structure. PROTEST is computer paced and runs in "real time". Participants make direct, independent use of the PROTEST software using microcomputers in their syndicate rooms.

THE ACTIVITY

The PROTEST simulation is divided into several sessions where the access is provided to the software to do specific tasks. Between these sessions access to the computer is denied and participants reflect and prepare for the next session. This structure separates the active experimentation and concrete experience phases of the Experiential Learning Model (KoIb 1975) from the reflective observation and abstract conceptualization phases. It is particularly important during the latter stages, where the project is being simulated in real time and participants are being pressurized into "fire-fighting".

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.

SOFTWARE FUNCTIONALITY

The PROTEST program is built as a series of objects that can be classified as into the following:

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.

The glossary of terms ensures that participants use common terminology.

Project management support is provided for the current management activity. It explains the activity, suggests factors that might be considered and the other activities involved.

Management issues help is based on the current project situation. It is provided to stimulate thought on the wider implications of the team's results and what actions might be necessary.

Project management support is provided for decision-making and management issues are raised based on analysis of team results.

PRACTICALITIES

To an extent PROTEST represented a case of 'deja vu" for A Planning Experience (Hall 1972) was a real time project management simulation. Although it was used successfully several times, hardware considerations (Honeywell 6000 Time-Sharing) made it marginally viable in operational terms.

Today's hardware does not provide such constraints. Rather the problems are those of the wholistic learning process. Where participants make direct, personal use of microcomputers, the social and psychological problems (Coote et al 1985) can be considerable. Computer pacing and the learning support system address these problems. Although, it is too early to decide whether PROTEST overcomes these problems, early indications are promising.

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BIOGRAPHY

Jeremy Hall owns Hall Marketing a firm specializing in developing, running and supplying simulations for management training. He holds a degree in Electrical Engineering and is currently pursuing, part time, research into computer aided management education at Imperial College, London.

Jeremy worked for General Electric in the USA. Honeywell Information Systems and Ashridge Management College in the UK before setting up his own firm

He developed his first computerized management game in 1970 and since then has developed more than three dozen business simulations covering a wide range of learning objectives.