

Chapter 1: Types of Simulation

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Introduction

This chapter describes the different types of *model*-based simulations, their characteristics and manner of use and describes the six simulations that I will use as my main case studies (Product Launch, DISTRAIN, Modern Banking, SMITE, SEED and Prospector).

The business simulations described here provide learning where teams of managers work on a business problem, simulated by a computer and coached by a tutor. These allow participants to experience and explore a simulated problem in a practical and pragmatic manner. They include business games, management games, planning and process simulations, simulations exploring management techniques and computer enhanced role-plays.

The term business or management "game" was used at their inception when the idea of the "War Game" was perceptively transferred to the field of management development (Andlinger, 1958). Although one does not question the seriousness of war games (especially when they use live ammunition), the term game in management development can suggest a non-serious activity. To avoid this connotation, I prefer the term business simulation.

The Basic Simulation Process

Typically, the training session has three stages (Figure 1.01).



Figure 1.01: Basic Simulation Process

After a short briefing participating managers are split into small groups (of three to six depending on the simulation). These familiarise and prepare for the activity. Next, the major segment of time is used for simulation – running all or part of a virtual business. Finally, the groups of learners combine to compare, discuss and review their results.

The most common types of business simulations involve participants operating a whole or part business for several periods. Each period, decisions are submitted to a simulation model that computes their impact and produces results that are returned to the participants for them to analyse before making the next decision (Figure 1.02).



Figure 1.02: Decision Cycle

In this way the business is run for several simulated months or years (Figure 1.03). This allows participants to apply their business knowledge to a dynamically "real" problem in an accelerated manner and without risk (except to their ego's!).

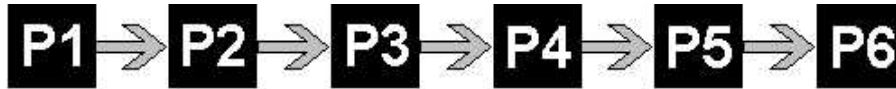


Figure 1.03: Simulating several periods or stages

The duration of each decision-cycle period (Figure 1.02) depends on the simulation. For a complex simulation, the decision-cycle may last several hours. For a simple simulation the decision-cycle may be a few minutes. Often, the course of the simulation the time allocated to each decision-cycle shortens (so period P1 is longer than period P6) and this helps ensure that the work pressure is maintained.

For company training normally six to eight periods are simulated but on academic programmes twelve or more periods may be simulated. A simple simulation may run in as little as two hours but a complex one may last several days and a very complex one several weeks. I have found that durations of a day or less are the most popular for company training and deliver ample learning.

Types of Simulation

Having developed over sixty computerised business simulations and researched many more I have found that simulations can be divided into six categories (Figure 1.04) (with Total Enterprise Simulations divided into four sub categories.) Each of these categories address different training needs and raise different design and usage issues.

Simulations can also be classified based on whether there is interaction between groups of learners and whether the trainer or the learners use them.

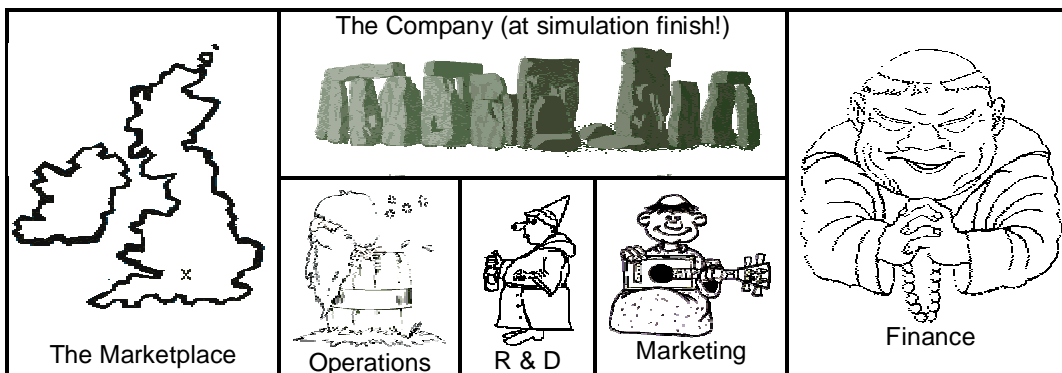
- 1) Total Enterprise Simulations
 - a) Strategic Management
 - b) Appreciation - Acumen
 - c) Tactical Management
 - d) Totality Simulations
- 2) Functional Simulations
- 3) Concept Simulations
- 4) Planning Simulations
- 5) Process Simulations
- 6) Other Simulations

Figure 1.04: Simulation Types

Interactive simulations are those where groups of learners interact with each other in the marketplace. Non-interactive simulations are those where each group of learners is independent. This may be because the situation modelled (such as a production facility) would not normally have these interactions or because the model simulates competition. I call simulations where the trainer enters decisions in to the simulations on behalf of the learners – Tutor-Mediated simulations. In contrast, where the learners make use of the simulator themselves, are Direct Use simulations.

Total Enterprise Simulations

These simulations involve modelling all or most business functions (marketing, finance, operations and R & D) and are often described under the blanket category of "total enterprise" simulations or management or business games. They date back to 1957 when a group at the Rand Corporation (Bellman et al, 1957) created what is perhaps the first computerised business game (simulation).



Cartoon 1.01: Elements of a Total Enterprise Simulation

In Cartoon 1.01 I was particularly pleased to represent Finance by Brother Bead - the bead counter (rather than bean counter).

I find it useful to divide Total Enterprise simulations into four categories - strategic management, business appreciation (business acumen), tactical management and totality simulations. This separation allows one to link the simulation to development needs, the experience and knowledge of participants. This focus ensures that participants do not waste time exploring irrelevant issues or finding the simulation too complex or too simple and minimises simulation duration.

Strategy Simulations

These simulations cover the strategic management of business. The simulation model tends to be reasonably complex and, consequentially, the simulation needs to last one or more days. They may be run in a single session, spread over a course or run on a spare time basis over several months.

As the simulation is concerned with strategic management it covers the management of a "total enterprise". Decisions cover marketing, finance, operations and product design and development. However, the emphasis, in terms of the number of decisions made, is usually on marketing, product development and finance. Operational decisions are abridged and focus on capacity and system improvement. Commonly, to focus on the long-term, each period simulated represents a whole year.

To constrain complexity (and so duration) the tactical operation of the business (scheduling, material supply, distribution, etc.) is often done automatically by the simulation model and so few or no decisions are made in these areas.

Because of the subjects covered, these simulations are most appropriate for middle to senior management development. But, they are also used to integrate general management courses designed for "high-flying" junior management.

Finally, to explore business development strategy adequately, these simulations should involve interactions between groups of learners.

Global Operations is an example of a strategy simulation.

Appreciation/Acumen Simulations

These simulations are designed to show business people how a business operates, develop business acumen and basic financial knowledge. The simulation models are generally of intermediate complexity and typically the simulation lasts a day.

Besides running as a single session, they can be spread throughout a course, with one or more periods simulated each day. However, their lack of complexity means that they are, usually, not challenging enough to be used on a distant learning basis. But, they can be used on a stand-alone basis.

They involve the management of a total enterprise with decisions covering marketing, finance and operations. The financial decisions may be rudimentary although financial consequences are emphasised. To test financial understanding, participants may be asked to prepare their own accounts from sales demand figures. Each period simulated usually represents either a year or a quarter's trading.

These simulations are designed for junior to middle management, management trainees, supervisors and functional specialists. However, running in an accelerated manner they can be run with more senior management and on assessment centres.

Finally, because the market strategy issues addressed by these simulations is less complex than for Strategy Simulations, they can be non-interactive (with competitive action simulated by the model). However, to enhance enjoyment and engagement these simulations are often interactive where all groups of learners compete in the same markets.

Two of the case study simulations - Modern Banking and DISTRAIN - are Total Enterprise Appreciation/Acumen simulations.

Tactical Simulations

These simulations cover the tactical management of a business. In contrast with strategic simulations that focus on the external environment, these concentrate on the internal management of the business.

The simulation model is usually complex, especially concerning factory and financial measures of the efficient operation of the business. Marketing aspects may be quite simple with emphasis on the efficient use of resources, budgetary control, cash flow and meeting customer demand. Because of their complexity, these simulations usually at least a day.

They allow participants to experience in the day-to-day operation of a total business. Reflecting this, each period simulated may represent a quarter or even a month's trading and, to concentrate on operational aspects, the results provided may be on a sub-period basis. Thus a simulation with a quarterly decision cycle might produce monthly results and one with a monthly cycle might provide weekly or even daily results.

To constrain complexity and focus on strategic issues, strategy and appreciation-acumen simulations, usually, are deterministic and, often, do not include inflation. In contrast, Tactical simulations may include stochastic (random) elements, operate in an inflationary economy and involve tutor or simulation initiated crises.

As described later (Role-enriched simulations) to increase the depth of the experience these simulations can be extended by having tutors role-playing customers, suppliers, bankers, labour union officials etc.

Like Appreciation Simulations these simulations may be interactive or non-interactive between groups of learners .

Management Experience is an example of a tactical simulation with its focus on the efficient operation of the business.

Totality Simulations

I use this term to describe those simulations that attempt to replicate, in detail, the entire operation of a "real" business. They combine the characteristics of strategy and tactical simulations. This reality and scope means that these simulations are very complex with dozens and, sometimes, more than a hundred decisions made every period. This complexity means that they take considerable time to run and their scope may mean that they lack the focus necessary for efficient use of learners' time.

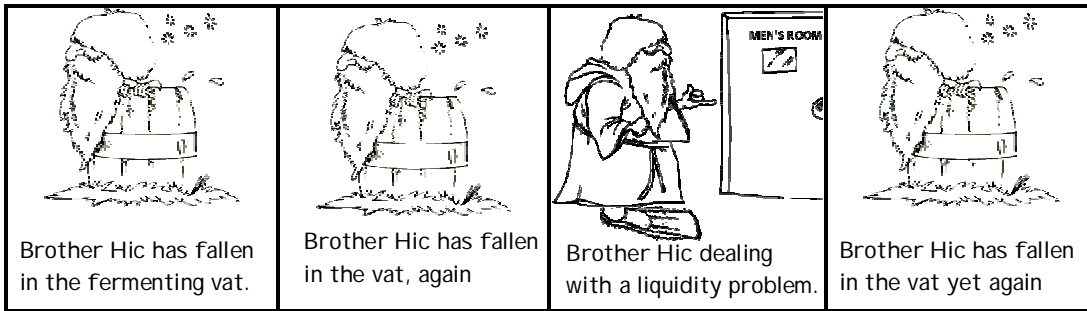
Often these simulations have been developed for use in an academic environment, where their use is spread over one or more terms or semesters and where student time is not at a premium! The duration and lack of focus means that they may not be suitable for management courses (Hall, 1995a). But, if run over several months, with managers working in "spare" time, they may provide useful learning.

Functional Simulations

These simulations focus on a specific functional area (sales, marketing, operations etc.) (Biggs, 1990). However, although the decisions focus on the functional area, the universality of money means that financial aspects are still important.

These simulations are complex and usually last a day or more. Multiple decisions are made each period but, unlike most other simulations, these are of differing level of importance. To explain, general management simulations (involving the management of a total enterprise) represent a horizontal slice across the organisational structure. Therefore, most decisions have a similar level of importance and require the same level of managerial effort. In contrast, functional simulations take a vertical slice through the organisation. As a result some decisions are of strategic importance, some of tactical

importance and some are operational necessities. (As in the real world, these operational necessities can occupy a disproportionate amount of managerial time.)



Cartoon 1.02: The Functional Liquidity Problem

Because of this, the time-base of the simulation may be complex. For instance, my TEAMSILL, production management simulation involves first making decisions to set-up the factory (strategic planning) and following this the decisions associated with running the factory (scheduling, material supply, etc.) are made. The factory set-up decisions are made once, at the start of the simulation. The factory scheduling decisions are made, repetitively, each month.

By its nature sales and marketing management involves competition and therefore, certainly at a tactical or strategic level, interaction between groups of learners is necessary. However, other functional areas usually do not require this interaction and can be run as stand-alone non-interactive simulations where the participants make direct use of the computer. Commonly these non-interactive simulations are stochastic, have varying levels of business information available and possibly, operation on a "real-time" basis.

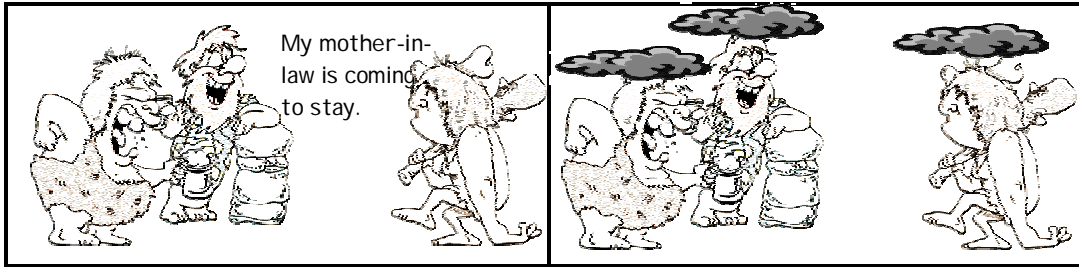
Although, financial measures are important, it must be said, that sales and marketing staff are often financially naive. This may need to be reflected in the design of a marketing function simulation. For instance, the financial results may be limited to the calculation of profits. As a result cash flow, profitability and liquidity issues are not covered. The overlap between marketing and general business strategy, means that total enterprise, strategy simulations often cover the same learning issues as strategic marketing simulations. Consequentially, simulations that focus on marketing management often focus of the tactical issues of market segmentation and the promotion mix rather than the strategic issue of business portfolios. (How these balance with each other and support the generation of profitability, growth and the survival of the business.)

The SMITE case study simulation is an example of a functional simulation and addresses the issues facing a sales manager. Because of the nature of sales management, SMITE is interactive with several groups of learners competing to win business.

Concepts Simulations

These simulations focus on specific business issues and concepts (Leach, et al, 1983). This might be the launch of a new product (Product Launch simulation), the operation of a simple factory unit or basic statistical concepts. To be a viable learning tool these simulations must be simple and involve making only three or four decisions each period. These are short, two to four hour, simulations where groups of learners enter decisions into their own computer, receive and analyse results. In this manner they run a simulated business for six to a dozen simulated periods in a very short time.

These are used to reinforce a topic, test participants' understanding and provide a change of pace. The topics covered and the managerial levels of the participants vary widely. Because of the need for short duration and because the situation modelled is simple, these simulations are not interactive and involve learners using the simulation directly (Direct Use).



Cartoon 1.03: The Mother-in-law Concept

The Product Launch simulation is an example of a Concept Simulation and it focuses on the Product Life Cycle and the patterns associated with it (pricing, promotion, volumes, profit and cash flow).

Planning Simulations

These involve the preparation of a business plan using a "What-If" model (Malik et al, 1997). For example, this might be long-range market diversification plan or the development of an annual budget. The process allows participants to apply what they have learned and explore the dynamics and interactions that exist in business. The process differs from the previous simulations as time does not (usually) move forward as groups of learners make decisions. Rather, they move purposely from plan-to-plan building understanding.

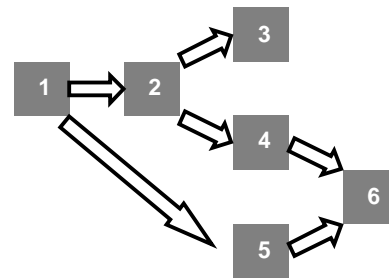


Figure 1.05: Planning Simulation

Although the overall process is the same as Figure 1.01 (preparation, simulation and review) the time allocated to analyse and plan is not set, the number of plans is not predefined (but may be restricted) and, usually, time does not move forward when the decisions (assumptions) are entered and a plan produced. When I developed my Financial Analysis simulation I found that until I restricted the maximum number of plans that could be produced, some groups of learners tried to test all possible plans. This meant that the learners spent all their time on experimenting and concrete experience and no time on reflection and concept formulation – in other words they did not learn!

This process is illustrated in Figure 1.05, here an initial plan is produced (1). This is then used as the basis of a second plan (2). In turn, this is the basis of two further plans (3 & 4). However, the team reconsiders and returns to the first plan to prepare a new plan (5). Finally, this plan, in association with an earlier plan (4) is used to produce the final plan (6).

They involve an exploration process that involves discoveries as the simulation progresses and where (hopefully) careful examination reveals more and more. This exploration process means that Planning Simulations must be designed so each group of learners can decide to meet different objectives and produce a different plan. This diversity and divergence ensures productive discussion during the review session as each group of learners defend and promote their suggested plan. (In a sense planning simulations are the *quantitative* equivalent of the *qualitative* case study.)

Planning simulations are of particular use where managers need to understand the business implications of the topic. For instance, a manager may have learned about the composition of the Profit & Loss and Balance Sheet and how various Financial Ratios are calculated. For this knowledge to be of practical use, the manager must understand how managerial actions impact these and the business implication of the results of these actions.

Planning simulations can be at a Strategic, Tactical or Operational Level. Strategic planning simulations involve learners preparing a plan covering several years. Tactical planning simulations involve learners preparing a plan for the next year's operation on, typically, a month-by-month. For example, a tactical plan might be for the manufacturing function and include capacity planning, master scheduling, inventory planning, cost and cash flow forecasts. Operational planning simulations plan in the short term, perhaps a month or week ahead on a daily basis.

The S.E.E.D. simulation is a strategic planning simulation but because of the need to emphasise the need to balance the quality of the plan with being fast to market, the simulation involves producing a limited number of What-If plans on a period-by-period basis.

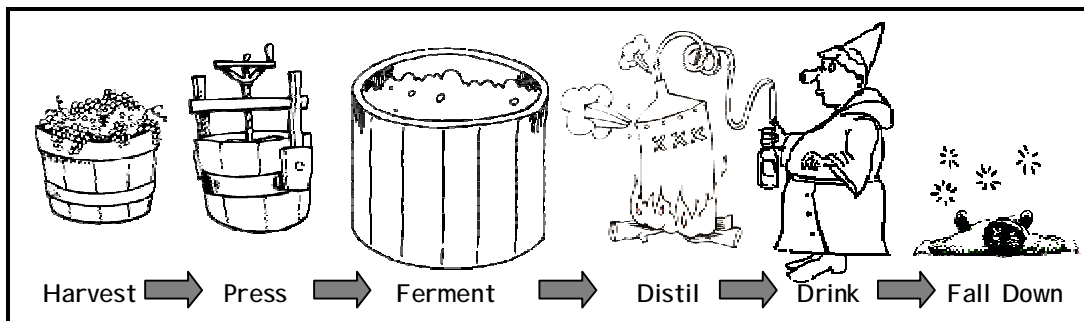
Process Simulations

These are simulations that involve the practical use of mathematical techniques such as statistical forecasting, inventory planning, analysis of sales performance etc. They emphasise that the use of a quantitative technique or analysis method is only part of the task. Practicalities must be considered when, the results are interpreted and quantitative and qualitative issues balanced.



Figure 1.06a: Process

A process simulation involves taking different sets of data through a business process to find patterns, discuss implications and produce forecasts or outcomes. Each data set illustrates differing situations and, associated with the written brief, have a degree of ambiguity (requiring qualitative interpretation and ensuring discussion and reflection).



Cartoon 1.04: The Druids' Revenge Process: from sunshine to moonshine

(One of my claims to fame was the publication of an article on amateur wine making in the computer industry press (Hall, 1973) – admittedly it was about the construction of a model to assess the financial return of making your own wine!)

After running the simulation the results are justified and discussed in a review session or a simulation model used to simulate future reality (see Figure 1.06b).



Figure 1.06b: Process Outcome

The simulator provides computational support and "encapsulates" the skills of technical staff, so participants concentrate on discussing the practical issues rather than "doing arithmetic". This increases learning productivity and a process simulation need last only a few hours.

Prospector simulation is an example of a process simulation where the participants explore a stage-gate process and ends with the simulation of "real-world" outcomes. Here the process involves searching for suitable projects, obtaining additional information about these, exploring prices, bidding and, for the successful bids, negotiating delivery

and payment terms. During the simulation, the learners build a portfolio of projects and, finally, delivery outcomes and profitability are assessed.

Other Simulations

This class covers other simulations such as those that help role-playing activities such as sales negotiation, where a planning simulation is linked to a total enterprise simulation or a functional simulation or where the simulation has a defined branching structure.

Figure 1.7 illustrates the structure of a **simulation-enhanced role-play**. Here the models (represented by the dark rectangles to the left and right of the motif) are provided to the two parties in the negotiation to provide information as the negotiation progresses. (The intersecting circles suggest the interactions between the two parties.)

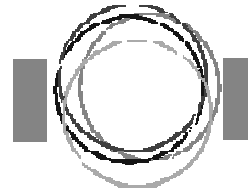


Figure 1.07: Enhanced Role-plays

Where there are separate financial models for the two parties negotiating little or no time is added to the negotiation. But, the separate financial models ensure the negotiation has reasonable financial complexity and focuses on the financial implications of the agreement. This overcomes the problem of "invented" financial constraints and ensures a "win-win" result.

Figure 1.08 illustrates the structure of a simulation where each team have access to a **Decision Support System** to support them with managing their (virtual) business or functional area. Here, the participants use this to forecast the impact of possible decisions and analyse results.



Figure 1.08: Decision Support

When satisfied, the participants submit their decisions to the Main Simulation. After processing, the Main Simulation sends the results back to the Planning Simulation for the participants to analyse before they investigate the next decisions. The example (Figure 1.8a) where a Planning Simulation (or Decision Support System) is added to a simulation is, I believe, only judicious when the main simulation is complex.

A second form of hybrid simulation (Figure 1.09) is where a planning simulation links to another simulation so that learners make a plan (budget) and then implement it.



Figure 1.09: Hybrid Simulation

Role-Enriched Computer Simulations

Conventionally, computer simulations for management development and business training involve learners interacting with a computer based model where the model takes the learners' decisions and assesses the impact (Figure 1.10a). However, provided the computer simulation is suitably designed, the learning process can be enriched by having the learners interact with trainers role-playing customers, buyers, senior management, etc. (Figure 1.10b).

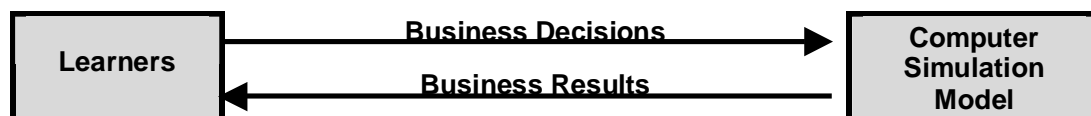


Figure 1.10a: Conventional Simulation Process

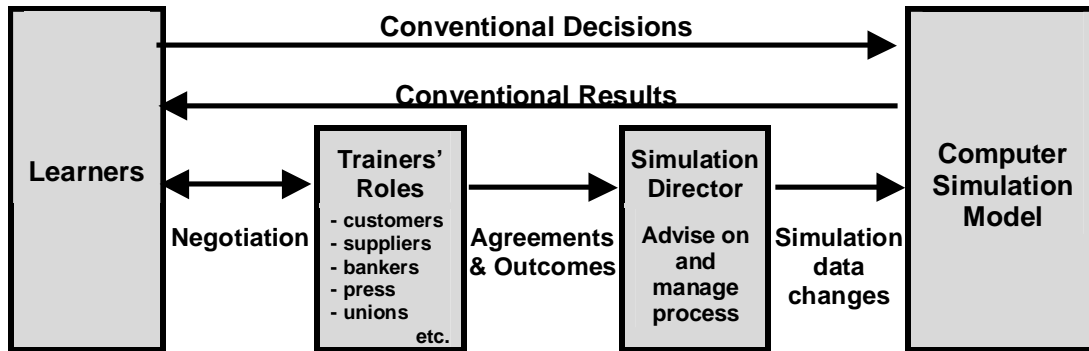


Figure 1.10b: Role-Enhanced Simulation Process

Although one of my simulations (Management Experience) is commonly used conventionally (Figure 1.10a), it was originally developed for use in a role-enriched way. This means that the simulator design facilitated and provided for trainers interacting with the learners and the outcomes of these interactions changing simulation data. In this way, the negotiated outcomes and agreements are incorporated into the simulated environment and business situation.

Management Experience has been used with trainers (and senior client managers) role-playing these roles:

- § **Customers**
- § **Suppliers**
- § **Senior Managers**
- § **Bankers**
- § **The Press**
- § **Labour Unions**

The following describes these roles and some of the areas of negotiation.

Customers: One market sector involves the learners bidding for contracts on a sealed bid basis. But individual contracts can be negotiated with the negotiation covering price, currency, delivery schedules and payment terms etc.

Suppliers: Raw materials are affected by inflation but the learners can negotiate material costs, payment terms etc. with suppliers and the negotiation with suppliers can include continuity of supply and JIT schemes.

Senior Managers: The business simulated in Management Experience is a subsidiary of a large company and this allows learners to interact and negotiate with senior parent company managers and present their plans and budgets to them.

Bankers: Interest rates depend on whether loans are long or short-term and company liquidity but learners can negotiate interest rates, loan conditions, etc.

The Press: Management Experience automatically produces a *Financial Newspaper* providing market research (prices, contracts won etc.), comparative financial results and, as appropriate *editorial comments*. But learners can interact with the press, who will, as appropriate (mis)quote the learners.

Labour Unions: As for raw materials, labour rates are automatically inflated but this is negotiable and besides labour rates the negotiation can include holiday and pension entitlement, working hours, and flexible working. If appropriate, the factory can be shut down by a strike.

Continuum of Learner/Trainer Systems

Simulations can be classified according to the use of a tutor, his or her position in the decision cycle and whether the simulation is used by an individual (lone) learner or a small group of learners.

Tutoring Levels

There are three levels of tutoring – untutored, mentored and tutor managed. Mentoring represents the first level of tutor involvement. Here the trainer acts as a (largely) passive resource answering questions. Above this, the trainer takes a very active role in the simulation proactively identifying problems, coaching and challenging the learners.

When a simulation is **untutored** the learner or learners are on their own as there is no person available to coach and challenge them. This means that the tutoring must be built in to the software. Where the simulation is **mentored** there is less need to build tutoring into the software but it is advisable to build in stimulants to encourage the learners to ask for mentoring. Where the business simulation is **tutor managed**, the simulation must provide information to help the trainer manage learning – a Tutor Support System.

A recent project involved multiple groups of learners spread around the world. To ensure that each team had access to support they had a senior manager acting as a mentor. Unfortunately, one senior manager was not available. Although the team did perform the lack of a mentor *trebled* the amount of time they had to spend on the simulation.

Learner Grouping

People can learn as individuals or in small groups (teams). However, the nature of business learning and management development – the learning provided by simulations – means that, in my experience, learning in small teams of three to five participants is far, far better. Even though it is cheap, where there is no mentoring or tutor management, learning is likely to be much less effective and consistent than for individual, untutored learners – (however, if learning is not effective learning is not efficient).

Simulations Typed by method of delivery

Simulations can be classified according to the role of the tutor and his or her position in the decision cycle.

- ◆ Tutor Mediated
- ◆ Direct Use
- ◆ Decision Support

Tutor-Mediated Simulations

With tutor-mediated simulation, the teams' decisions are submitted via the tutor to the computer (Figure 1.11). Usually, but not always, these simulations are interactive with a team's actions not only influencing their own results but those of the others via the marketplace. Here the tutor is placed directly in the decision cycle, so he or she can scan decisions and analyse results. This allows the tutor to decide which teams need help and coach them proactively. This ensures that learning is managed, consistent and effective.



Figure 1.11: Tutor Mediated Simulations

These are the oldest form of computerised simulations and have been available since the late 1950s. Since that time, they have run on three generations of computers (mainframes, computer time-sharing and microcomputers). The introduction of the microcomputer solved the logistic problems of the mainframe and the high costs of computer time-sharing.

This approach is common for all forms of interactive total enterprise simulations and for interactive functional simulations.

Strengths & Weaknesses of Tutor-Mediated Simulations

The trainer is central to the process and so is fully aware of the decisions and results and so is able to identify coaching needs and manage the learning process.

Often, they only require a single computer and printer so they can be run anywhere (such as a hotel).

Participants do not need to be computer literate and no time is wasted while they learn how to use the software. (The trainer is the only person who needs to know how to use the computer and this skill can be gained before the course.)

An administrative load is placed on the trainer and if more than four teams are taking part an administrative assistant may be needed.

Participants may expect to be using computers and may feel deprived if they can't!

There may be a short time while decisions are processed where teams are idle. However, a well-designed simulator minimises this.

Interactive simulations require decisions being made synchronously. In other words, all teams submit decisions simultaneously. This means that slower teams may be rushed and faster teams underworked. But this problem is minimised if the teams are chosen carefully.

Modern Banking, DISTRAIN and SMITE are Tutor-Mediated simulations.

Direct Use Simulations

With these simulations, the teams enter their decisions directly into the computer (Figure 1.12). Usually, but not always, they are not interactive and a team's actions do not influence the other teams' results.



Figure 1.12: Direct Use Simulations

As shown, the tutor is outside the decision cycle. This means that it can be difficult to see which teams need mentoring (coaching and challenging). Because teams make direct use of the simulator, these simulations can be very short (just a few hours) and address simple concepts. Because of their simplicity they often need minimal coaching.

The direct use approach is suitable for non-interactive total-enterprise, some functional, concepts, process and planning simulations and enhanced role-plays.

These simulations require a computer and printer for each team and so have only become viable with the universal availability of the microcomputer. (Although some, prescient, use occurred in the 1970s using computer time-sharing.)

Strengths & Weaknesses of Direct Use Simulations

To an extent the strengths and weaknesses of direct use simulations are the opposite to those of tutor-mediated simulations.

The administrative load is placed on the teams and, if the simulation is run in a single room, a single trainer can manage eight teams.

Participants expect to use computers.

Direct use simulations do not require decisions being made synchronously. In other words, teams submit decisions at different times. So slower teams make fewer decisions and faster teams more. Teams need not be chosen with as much care as for tutor mediated simulations.

The trainer is peripheral to the process and so may not be fully aware of the decisions being made. This means that he or she is may not be able to identify coaching and learning management needs.

Ideally, the simulation requires a computer and printer for each team (plus a spare). Although computers are likely to be available printers may not (although they are now cheap enough to be bought especially for the training event).

Participants need to be computer literate and time may be wasted while they learn how to use the software (although this is minimised by a well-designed simulation).

The computer in the syndicate room may change team behaviour and reduce the time spent on discussion and reflection. (A well-designed simulation will be designed to minimise inadequate discussion and reflection.)

Product Launch, Prospector and SEED are Direct Use simulations.

Decision Support Simulations

These simulations combine features of both Tutor Mediated and Direct Use simulations with both the teams and the trainer using computers (Figure 1.13).

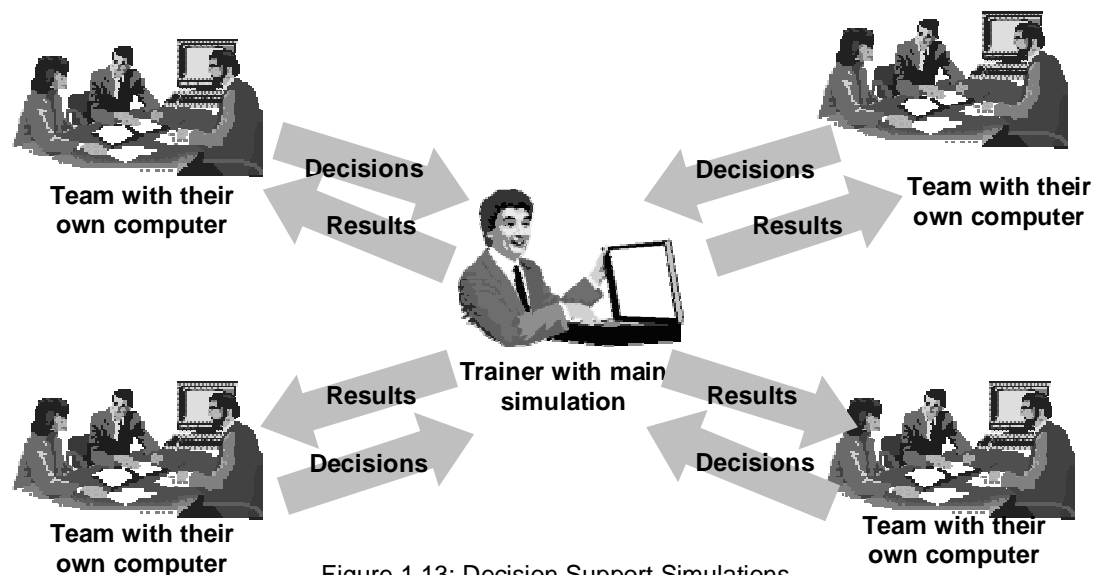


Figure 1.13: Decision Support Simulations

The teams use their computers to enter decisions, review results and (optionally) analyse *what-if* plans. The trainer takes decisions from each team (on memory sticks or via a network) and feed these into the main simulation that assesses the impact and generates results that are returned to the teams. These simulations are appropriate where the simulation is complex and hence involve a large number of decisions and results.

Strengths & Weaknesses of Decision Support Simulations

To an extent the strengths and weaknesses of direct use simulations combine those of tutor-mediated and direct use simulations

Summary of Key Features of the different types of simulations

SUMMARY OF KEY FEATURES				
Simulation Type	Duration	Mode	Team Size	Use
APPRECIATION	1 day	TM & DU	4 or 5	S
STRATEGY	1 to 2.5 days	TM (& DSS)	4 or 5	S & M
TACTICAL	1 to 2.5 days	TM & DU	4 or 5	S & M
TOTALITY	2 days plus	TM & DU (& DSS)	4 to 8	M
FUNCTIONAL	1 to 2.5 days	TM & DU (& DSS)	4 or 5	S & M
CONCEPT	2 to 4 hours	DU	3 to 5	S
PLANNING	2 to 4 hours	DU	3 to 5	S
PROCESS	2 to 8 hours	DU	3 to 5	S
ROLE PLAY	1 day	DU	3 to 5	S

Figure 1.14: Key Features

NOTES:

Duration: Typical figures are shown. The actual duration depends on the simulation, participant experience & knowledge, manner of use and any supplementary tasks.

Mode: Indicates the tutor's role in the simulation. Tutor Mediated (TM), Direct Use (DU), Decision Support Simulations (DSS).

Team Size: Is typical and based on workload, knowledge needs and team behaviour.

Use: Shows whether the simulation can be run as a single, continuous session (S) or in multiple sessions (M). Usually, very short simulations are only suitable for single session use. Long, very complex simulations may only provide learning if run in multiple sessions.

Business Simulation Case Studies

Through out this book I will draw on my experience with the design and use of a range of computer simulations. Each address different needs and is different in terms of complexity and novelty. Simulation specifications in term of target audiences and learning addressed are shown in Appendix 1.

Simulation	Duration	Description	Type
Product Launch	2 hours	Basic Marketing Concepts	Direct Use
Modern Banking	1 day	Banking Appreciation	Tutor Mediated
DISTRAIN	1 day	Distribution Appreciation	Tutor Mediated
SMITE	2 days	Functional Sales Management	Tutor Mediated
S.E.E.D.	6 hours	Entrepreneurial Planning	Direct Use
Prospector	6 hours	Commercial Aspects of Winning Projects	Direct Use

Figure 1.15: List of Simulation Case Studies

Product Launch

This is a short simple simulation exploring basic marketing, financial and team-working concepts. It is designed for a wide range of learners and uses. Participants range from college & MBA students through junior managers and specialists on marketing and financial appreciation course through to all levels of staff at business conferences. Participants launch a new fast moving consumer product (the *Souper Hot* self-heating soup). Reflecting the short (two hour) duration the simulation involves just three decisions

(price, promotion & production level). During the simulation, participants manage the *self-heating soup* over the Product Life Cycle (making decisions for eight simulated quarters). The simulation used an existing *shell* program to speed development.

I have included this simulation not only because it is a very short simulation (two hours) but also because it is also one of my oldest simulations and as such illustrates how as a new set of managers join the population they still need to understand basic concepts. The age of Product Launch means that it started life running on Computer Time-Sharing where participants used typewriter style terminals to enter decisions and receive results. These terminals were *dumb* and the processing was done remotely (in Bethesda, Maryland or Cleveland, Ohio). The terminals communicated with the computer over ordinary telephone lines (to switching centres) at a massive 30 characters per second. In 1980, I transferred Product Launch to Tandy Model 1s, Apple IIs and Commodore Pets. This retained the original model but changed the IO (Input/Output) so that results were displayed or displayed and printed. Later (1983) I moved Product Launch to Tandy 3s and Apple 3s and the following year to MSDOS. In 1995 I used it to prototype a new architecture. Although this involved using the same model, the new architecture allowed me to extend functionality with multiple versions and an online help system.

Modern Banking

This is a total enterprise simulation that allows participants to manage a complete commercial bank. Participants take over a bank managing two market sectors (retail & commercial) using two levels of staff (junior & senior) making decisions about interest rates, promotion, staffing levels and quality & productivity improvement. The simulation is designed for junior through middle managers, graduate employees and functional specialists (making decisions for six to eight simulated years). The simulation used an existing *shell* program to speed development. There were several design issues associated with the design of this simulation. First, the accounting structure and financial focus of a bank is different from an industrial/commercial company. Specifically, instead of the Income Statement being the focus, the Balance Sheet is the focus. Secondly, there was a very tight schedule - budgeted design time 35 days. Thirdly, the simulation had to be calibrated to provide a challenging balance between growth and capital adequacy (bank soundness).

DISTRIN

This is a total enterprise simulation that allows the exploration of the issues associated with a distribution company. It was developed as an extended version of the Distribution Challenge simulation to allow sales people from a major manufacturer to better understand the issues facing their customer (making decisions for six to eight simulated years). There were three issues associated with the design. First additional decisions (and complexity) had to be added to an existing simulation without lengthening it. Second, the simulation had to be recalibrated to reflect the (lower) margins in the sponsor's industry. Third the simulation was to be run by client staff. The simulation used an existing *shell* program *and* simulation to speed development. I will discuss the design implications of these in detail later.

SMITE (Sales Management Interactive Training Experience)

This is a complex functional simulation comprehensively addressing the issues associated with hiring, deploying and developing sales people. Originally developed in association with Cranfield Business School with an industrial sales environment and custom, propriety, consumer version was developed for Kraft Foods. Participants manage a territory consisting of approximately 100 areas each of which have different potential and characteristics. Teams recruit and deploy a sales force where each person differs in terms of selling skill, product knowledge, customer knowledge, personality and morale. When managing the sales force, participants needed to identify strengths and weaknesses and decide whether this was because of the sales person's patch, workload, personality or skills and decide how to correct problems through changing the patch,

developing skills or by terminating employment. To help with this the simulation provides financial measures at four levels – the territory, by region, sales person or area.

S.E.E.D. (Strategic Exploration of Entrepreneurial Directions)

This provides an in-depth exploration of an entrepreneurial opportunity. It involves creating the marketing, financial and operational plan together with the market research and an exploration of entrepreneurial purpose. The plan is created over five to seven simulated months and the simulation used an existing *shell* program to speed development. To explore marketing, finance and operations in sufficient depth there were a wide range of decisions and the model would be complex. Further, the sponsor required the simulation to last no more than six hours and this short duration cause some major design problems. S.E.E.D. is a combination of a Planning simulation and a Process simulation as it involves both creating an entrepreneurial plan and learning about the business planning process.

Prospector

This provides a detailed exploration of a *stage-gate* process where participants build a portfolio of projects. Initially, participants search for projects that complement the portfolio, will be profitable and risk free. At the next stage gate they quality projects further by obtaining more detailed information about the project, client needs and the client. Next they explore tendering against *virtual competitors*. And, finally, progress projects to negotiate payment terms and the schedule. At the end of the simulation the portfolio of projects is executed and the actual profits, durations and project completion time are assessed. Instead of stepping a business through several time periods, projects are progressed to an appropriate stage. In developing the project portfolio, participants will return repeatedly to the first stage to search for additional projects and to other stages to progress a project forward. This novel structure meant that no *shell* program existed to speed development. Further, unlike the other simulations that are *deterministic*, Prospector is a fully *stochastic* simulation where the projects and their characteristics were generated on a random basis.