Corporate Cartooning

the Art, Science and Craft of Computer Business Simulation Design

Contents

Introduction

Bellman et al (1957) when describing the design of what is regarded as perhaps the first computer business simulation for business training, suggested that *"Making models, mathematical or otherwise, of complex systems is an art with a small amount of science to guide one."* Over the last fifty years, not only have computers changed dramatically but the design of computer simulations for management development and business training has evolved. Even so, the design process still has a significant artistic element (as exemplified in the use of *Corporate Cartooning* in the title). However, in this book, I not only attempt to explore the art of simulation design but also the science and craft elements of design. With a degree in electrical engineering, it is not surprising that I look at computer simulations as a series of interlapping and overlapping dynamic systems. Also, with marketing and manufacturing management experience, I bring these disciplines to business simulation design with a focus on fulfilling learning (customer) needs and wants and *leanness* in design and use.

What are we simulating?

At first this seems a silly question but in fact it is an important question to answer as it directly impacts the design of a simulation to deliver learning. One answer is that we are simulating a business or part of a business. This answer causes one to focus the simulation design on a simulation model that replicates the economic, operational and financial aspects of the business.

The alternate answer is that we are simulating the experience of working through business problems and through this work develop business wisdom, the ability to make good decisions and run a successful business. This second answer means that we are trying to simulate the cognitive processes associated with business management and through this develop critical thinking skills. This means that the design focus is on learning and extends beyond the simulation model to encompass the learning process and the structural aspects of the simulator. It is what I try to do when designing and using a business simulation.

Business Models

But having said that, the simulation model is an important component of the simulation and this means that it is important to realise there are different types of business models.

Three types of models are commonly used by business – those for financial (planning and budgetary control), those for management science (operational research) and those to provide business learning – the subject of this book. For each of these, not only are the purposes different but also their characteristics and design are different. Because of this, before exploring the use of models for business simulations for learning I will review Financial and Budgetary Control Models and Management Science/Operational Research Models to help clarify how these differ from simulation models used for business learning.

Financial and Budgetary Control Models

These are the types of simulations that most people are familiar with and have built using spreadsheets. They are used to improve the effectiveness and efficiency of financial planning and budgetary control.

When I first became involved in business modelling in the late 1960s it was to help design a budgetary control model. Each month, a senior accountant in the GE department where I was working would spend two and a half days using an electric calculator to analyse performance against budget. After I helped a junior accountant develop a simple BASIC program, all that was necessary was for a secretary to enter data and twenty minutes later the budgetary control report was complete. The first time that the program was used, it was run in parallel with the previous month's manual calculation and the two differed! This resulted in the junior accountant being teased. (She was a very attractive young woman from the southern USA – a real Southern Belle). But on checking, the error was in the manual calculations done by the senior accountant and he was very unhappy and worried as it was these reports that he had provided to the senior management.

Where models are used for financial planning they allow management to investigate possible outcomes of their plans in an easy and quick way. In the early 1970s I was advising major British companies design financial models.

The budgeting model (Figure 0.01a) takes results from business and analyses these against the budget to produce variance reports.

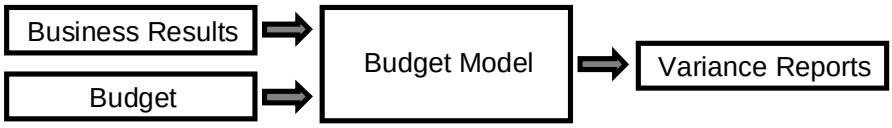


Figure 0.01a: Budgetary Model Structure

The planning model (Figure 0.01b) is different with plan inputs and forecasts (market sizes, costs, etc.) that are processed by the model to produce a plan.

Figure 0.01b: Planning Model Structure

Usually, for both budgeting and planning, only the accounting and operating flows are modelled. But these can be complex when the organisation has many products or markets and multistage value chains. Normally, both budgeting and planning models are deterministic rather than stochastic. (But, advanced planning models may be stochastic, where the forecasts have distributions of values.)

Management Science/Operational Research Models

These models are used to investigate a business problem and as such are the heart of Management Science (Beer, 1967).

The first major operational research model I created (in 1968) was to investigate production-scheduling logic. We were in the process of computerising a GE department's manufacturing control system. I had prototyped this to allow us to short-circuit the development for the key materials scheduling system. Part of this prototype was a forecast of future inventory levels but, unfortunately, we found that the actual inventory levels were *always* greater than the forecasts – there was something wrong with the scheduling logic. Eventually, after several months, it was decided that I should attempt to model the complete system. This was a stochastic model (Figure 0.02) that allowed me to

investigate several scheduling assumptions (Hall, 1975). From this investigation I identified the problem with the existing logic and suggested several solutions.

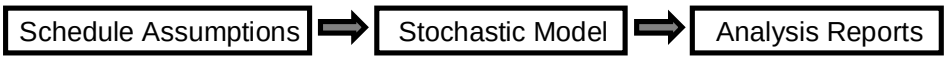


Figure 0.02: Scheduling Logic Investigation Simulation

Here a model is developed that *behaves as exactly as possible like* the real system and *"great care is taken to ensure that the simulation model is descriptive of the real system"* (Anderson, et al 1994, p 556). Thus, Management Science/Operations Research simulations attempt to replicate the real-world situation as accurately as possible. As a consequence the model is likely to be very complex and include operational research and economic models. Further, in order to ensure *photo-real* accuracy these models are built from the bottom up.

Simulation Models for Learning

In 1969, I moved back to the UK to launch the UK's first interactive corporate modelling system (PA300). As part of this I decided to create a management game (business simulation) (Hall, 1994) to enthuse business people about this very new technology and the use of financial models. (I was asked regularly what a financial model was as, at that time, the word *model* was associated with curvaceous young women.) Over the years I have realised that the design of simulations for learning is very different from designing operational research simulations even though they have similar structures.

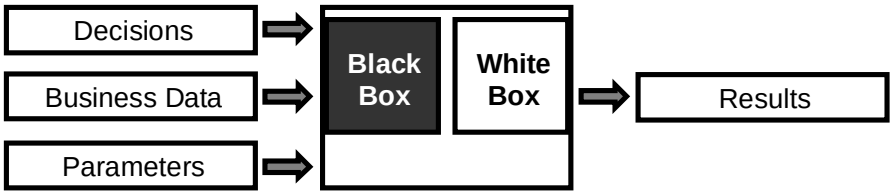


Figure 0.03: Learning Simulation Structure

A simulation model for business learning combines aspects of budgeting & financial models and management science models. Like budgeting and financial simulations, the simulation model will include accounting and operational flow models (White Box Models – Figure 0.03). Additionally, like management science/operational research models, a business simulation for learning will include operational research and economic models (Black Box Models – Figure 0.03). However, as the purpose is learning rather than management science, the operational research and economic models are generally simplified and stylised as explained next and should be designed top down from learning objectives and constraints.

Why Corporate Cartooning?

Eisner (1985) uses the term *sequential art* in the context of the comic (strip cartoon) but McCloud (1993) refines the definition for comics to *"juxtaposed pictorial and other images in deliberate sequence, intended to convey information and/or to produce an aesthetic response in the viewer"*. With business simulations we are looking at how sequences of interactions with mathematical algorithms (models) are used to derive didactic responses from the participating learners and to provide an engaging experience – an experience that delivers learning.

Why are business simulations are the mathematical equivalent of the cartoon or comic strip?

Simplified and Stylised.

The people and situations drawn in a cartoon strip are simplified and stylised representations of reality. The large heads and small bodies of the characters in Peanuts do not rob from our enjoyment and understanding of the strip (Harvey, 1994). Because of this stylisation, Lucy is not any less real than most little girls. Rather, for Lucy, this

stylisation and simplification reveals the essentials of little girldom, as we are not confused with superfluous detail. Peters et al (1998) suggest for simulations *"the design process of a (business) game is based on three principles, namely, reduction, abstraction, and symbolization"*. Similarly I (Hall, 2001) suggest that "*a well-designed business simulation is a stylised and simplified replica of the real corporate world that reveals defined business essentials"* – the essentials that are required for learning. As with the cartoon strip, this stylisation and simplification has important implications in terms of cognitive load, speed of assimilation and focus.

Deliberate Sequence leading to Denouement

The cartoon strip leads, frame by frame, to the ultimate denouement, Gestalt, or Aha (described by Harvey as *"the punch line"*). Likewise, the business simulation takes the participants through a series of steps to one or more Gestalts and in doing so builds learning and tension over time. Just as each frame in a cartoon strip must relate to the one before and the one after and add to the experience and the design of a learning simulation must take into account how the steps link together and how each add to and deliver learning. It is the thoughtful relationship between the simulation's stages that moves simulation design from *just* replicating reality to *meaningful* learning.

Fun, insightful and, at times disturbing

The strip cartoon is engaging and *fun* but also insightful and at times disturbing. Again the computer simulation must be engaging (Quinn, 2005), challenging and insightful. Its design must not just be focused on cognitive development but also must address the issues of affection (Hall & Cox, 1993). As a corporate user stated recently about their use of a simulation "*Throughout the training, there were never problems with people checking email, voicemail and so on. Most would work voluntary through lunch on their (virtual) business*" (Schneider Electric facilitator, 2006) – and this observation was about sales people (who in my experience regard email and voicemail in the same way as Peanut's Linus van Pelt regards his security blanket)!

Memorable

The strip cartoon is memorable. I still remember clearly, a Peanuts cartoon from the mid-1960s showing *the gang* dancing around a Maypole. From frame to frame the pace of the dance becomes more and more frenzied. Until, in the last frame, the gang is trapped against the Maypole entangled in the ribbons. All are crying "Mayday", referring both to the date of the activity and the international cry for help! – a very, very clever and insightful visual/verbal joke. Again, the deep cognitive processing engendered by participating in a simulation ensures that the activity is memorable. (Practice by doing provides a 75% retention rate compared with the lecture's 5% retention rate (Motorola University, 1996).) Recently on a trip to Egypt I met a person who had taken part in my Benson and Hedges Management Challenge more than twenty-two years earlier – he remembered the event well *and* what he learnt from it!

Based on Knowledge

Just as a cartoon relies on knowledge and understanding of the world, the business simulation relies on some understanding of business and prior learning. For example, the Dilbert cartoons are most meaningful to people with reasonable (or unreasonable) business experience. Likewise, with business simulations the scope and the content of the simulation must relate to the learners – their prior learning and needs.

Are Constrained

The computer business simulation has constraints just as the strip cartoon has constraints. For the strip cartoon (Harvey, 1994), the constraint is space - the number of column inches (or centimetres) that can be dedicated to the strip by the newspaper. For the business simulation, the major constraint is duration - the amount of time that can be budgeted for the activity (Hall, 2003). For the strip cartoon, the space constraint has meant that the comic strip has evolved from complex realistic drawings to simple and

stylised drawings (Harvey, 1994). In a similar manner the computer business simulation is evolving from designs that focus on developing a complex representation of reality (the model) to one where the design focus is on learning purpose and short duration (Hall, 2005) – the purpose of this book.

Emulation of Real Experience

Perhaps an ultimate reason is the statement from Eisner (1985) who writes, "*In the main comics are a representational art form devoted to the emulation of real experience".* It seems to me that changing one word in this statement – the word *comics* to the word *simulations* so the statement reads, "*In the main **simulations** are a representational art form devoted to the emulation of real experience"* (Hall, 2008). For simulations, although the desire is still to *emulate real experience*, the representation is mathematical and interactive rather than graphical and verbal.

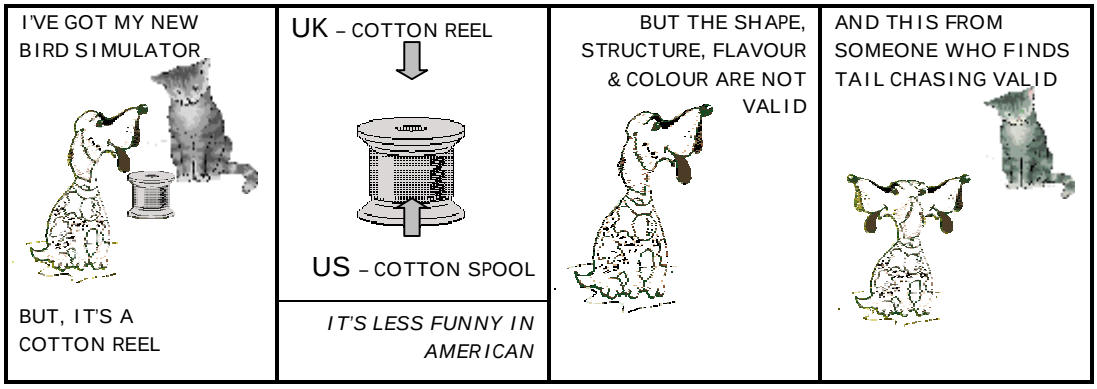
Thus I believe that the business simulation is the **mathematical equivalent** of the strip cartoon or comic and that by applying cartoon design concepts to business simulations we can better understand the *art* of simulation design.

Why not Corporate Cartooning?

There is an alternate design philosophy for business simulations where the emphasis is on the *reality and complexity* of the simulation model. It is exemplified by statements like these - *"management simulations are valid pedagogic tools provided they are complex and realistic"* (Miller & Leroux-Demers 1992) and another authors claim *"Designers of business simulations all have the common objective of making their model as realistic as possible"* (Decker et al, 1987) and *"Ideally, all gaming techniques strive to obtain a 100% realistic copy of the objective system being simulated"* (Chiesl, 1979). But to critique this design philosophy or artistic style let me explore two experiential learning situations – *"Simulation: the reel problem"* and *"The cat, the kitten, the naked man and the hysterical bird".*

Simulation: the reel problem

Consider how a kitten *hones* its hunting skills using a cotton reel (or spool) or catnip mouse (Cartoon 0.01). (In the context of prior learning (point 5 above), for my American readers I had to include in the cartoon (comic) strip a frame that explained the English cotton reel equated to the American cotton spool!)



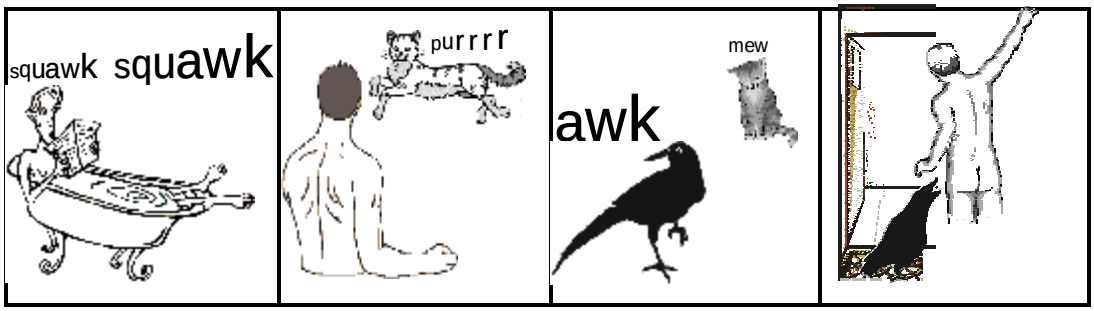
Cartoon 0.01: Simulation: the Reel Problem

The kitten has no problem accepting that this is a valid and effective way of learning how to hunt. In other words, the cotton reel's psychological validity and verisimilitude is acceptable – *but might more real experiential learning be better?*

The cat, the kitten, the hysterical bird and the naked man

Many years ago I spent a hot, summer afternoon digging my garden and decided to relieve my aching muscles by soaking in a bath. Sitting there luxuriating, I heard a load squawking – a bird was obviously having a nervous breakdown in my garden. Except I

then realised that the sound was from inside the house – immediate action was required. I got, naked and dripping, from my bath and went to investigate. At the corner of the L-shaped hallway was my adult cat lying on his side with a broad grin on his face. From around the corner I heard the bird. On looking round the corner, I saw a very large hysterical blackbird and our kitten in complete role overload. Obviously the adult cat had caught the bird and brought it undamaged to enable the kitten to *hone* her hunting skills. Taking the cat under one arm and the kitten under the other I shut them away. But what could I do about the bird …….?



Cartoon 0.02: The cat, the kitten, the hysterical bird and the naked man.

Happily or unhappily, the bird was by my front door and, the solution I chose was to reach over the bird and gently open the front door. I am not sure of which was my major worry - someone walking past in the street seeing me naked or my naked state and the bird's very, very, very sharp, yellow beak.

Obviously, my adult cat had decided that it was necessary to teach the kitten to hunt. Except, of course, the kitten was not ready to deal with the immersive reality of a large, live, black bird with an exceptionally sharp beak. This story illustrates how over-complex, unfocussed reality can overload the learner (in this case the kitten). However, the facilitator (the adult cat) learned. From that point on he honed the kitten's hunting skills by sitting on the back of a chair and twitching his tail for the kitten to try to catch.

If a kitten has no problem accepting a cotton reel (or spool) as an adequate replica of a mouse or small bird surely a person can accept stylised and simplified business reality – and in my experience running simulations more than two thousand times this is true. Yet, those who argue for realism suggest that this and complexity is necessary for humans to relate to the learning (Prensky, 2005). In my experience both on training courses and with cats, excess realism (and hence complexity and lack of focus) is confusing, causes role overload (French & Caplan, 1972), take too long, includes irrelevancies and leads to bad learning. This is perhaps best illustrated when one is planning a journey – would you rather use an aerial photograph (the most real) or a road map (stylised and simplified)? A more practical view is needed – the purpose of this book.

Simulations as an Art Form

Besides drawing parallels with business simulations and cartoon or comic strips, one can draw parallels with Fine Art Movements (Hall, 2009). And this parallel may be more acceptable to those who feel that a comic strip parallel diminishes the *pedagogic seriousness* of simulation design and use.

In Fine Art terms, a realism focus parallels the fifteenth-century *Naturalism*, nineteenth-century *Realism* and twentieth-century *Superrealism* movements for painting. Arguably, Corporate Cartooning parallels painting's *Impressionism* and in particular *Post Impressionism* (where there is *"a focus on design and structure"* (Little, 2004)). Finally, there are *"Serious Game"* simulations that are grounded in video games and, perhaps, parallel painting's *Expressionism* and on occasion *Mannerism* by concentrating more on style (fun) rather than content.

By drawing a parallel with painting one can also explore the aesthetic and emotional aspects of simulations. Just as for paintings, where realism is seen by some as aesthetic pleasing, for business simulations realism is also seen by some as *"intrinsically motivating"* (Raybourn, 1997). Just as the professionally trained artist designs in the aesthetic and emotional aspects, the engagement aspects of business simulations must be designed in.

But, business simulations are not just to be looked at like a painting - they have a functional purpose and here there is a parallel with Architecture where design movements range from *Baroque* to *Functionalism.* Where Baroque *"is dominated by movement – whether physical, emotional or spiritual"* (Chilvers et al, 2001) and as such parallels the simulation reality movement's focus on the simulation model exactly replicating the behaviour of the *real world* and the Serious Games' focus on fun. Functionalism is exemplified by *"form follows function"* (Sullivan, 1896) and Wittgenstein's contention that *'meaning lies in use'* (quoted by Melvin, 2005). Equally, for simulations, there must be a concern with and focus on the functional design for learning.

Beyond Reality - Engagement and Learning Functionality

Beyond *reality*, simulation design must take into account *engagement* and *functionality* (learning) (Hall, 2009). Here, the reality axis ranges from complete reality to surrealism, the engagement axis ranges from a mere focus on content to fun and the learning-functionality axis ranges from where immersion in the *real world* is regarded as sufficient to provide learning to where the design takes into account learning purpose, learning process and learning support (Figure 0.04). Throughout this book I will be revisiting this three dimensional model to ensure the relevance and design quality.

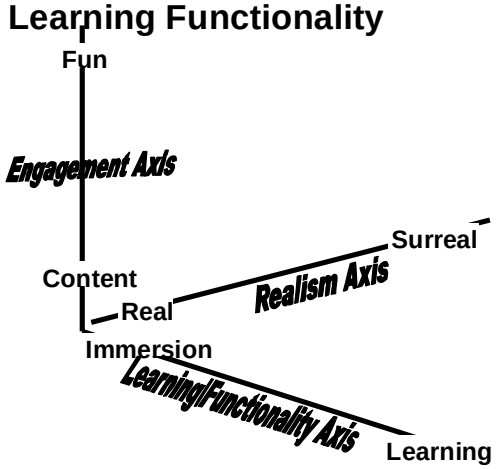


Figure 0.04: Design Dimensions

Beyond Reality: the balance between reality and learning

Like most good models, simulations can provide better a learning experience than a real-world experience. But first consider how you plan a road trip. Do you use a road map or an aerial photograph? The road map is simplified and stylised and focused on purpose and the aerial photograph is the most *real* representation of the geography. Of course, focus on purpose means that a model has limited use. For example a road map showing stations is not the best way to navigate London's Underground (rapid transit) system. Yet up to Beck's Map (1933) the map of London's Underground was topographically correct. In 1933 and despite opposition (Garland, 1994) a stylised and simplified map came into being – a style that became the standard for the world's rapid transit systems. (You may wish to compare planning a journey using the 1905 map **http://homepage.ntlworld.com/clive.billson/tubemaps/1905.html** and the 1936 map **http://homepage.ntlworld.com/clive.billson/tubemaps/1936.html**!) Just as you chose a map based on the type of journey that you are planning, you need to design a simulation based on learning objectives and the learners. Despite both modelling a whole business, a simulation to allow junior staff to explore how a business works will be very different from one that allows senior management to explore the strategic development of business.

Beyond Reality: the balance between reality and engagement

When things are going right the real world is very engaging but when they are not it is not. For simulations (as discussed in Chapter 4) managing feelings is crucial and involves moving away from thoughtlessly replicating reality. I remember an over lunch discussion

with two professors about their experience using a simulation. During their use, they uprooted learners from one team and moved them to another and justified this as being *"real"*. Wondering about the effect of this on the learners' motivation, attitude about the simulation and view of the training course, I asked the professors whether they would ever do the same thing again – the answer was a resounding NO. However, for adult learners relevance is a key motivator and this means that the simulation must replicate real-world issues and problems appropriately. But equally, relevance means that the simulation should not replicate real-world issues that are superfluous, as the learners will see these as a waste of time. Also, overly complex simulations and simulations that are beyond the learners' knowledge base are demotivating. (You may wish to think about planning a London Underground journey using the 1903 map!) In the context of over complexity, one ongoing problem I faced when running simulations for clients was that the client commonly over estimated the capabilities of learners and as a result I was faced with trying to simplify, ease pressure and *comfort* the losing teams!

Beyond Reality: the balance between learning and engagement

One major benefit derived from simulation use and a design necessity is engagement. But, it is possible for this to be at the expense of learning (Cryer, 1988; Jones, 1989; Lundy, 1984). Thus simulation design must balance learning (cognitive development) and engagement (affection). This is paralleled in cartoons with the need to balance clarity and intensity (McCloud, 2006). McCloud describes clarity as *"making reader comprehension your ultimate goal"*. As such it parallels directly the goal for simulation's - learning. McCloud describes intensity as those elements of a cartoon *"which add contrast, dynamism, graphic excitement or a sense of urgency"*. Continuing to describe intensity as the techniques that attract and excite readers *"as soon as they pick it off the shelf".* In other words those elements of the cartoon that parallel engagement for simulations.

Just as McCloud discusses a philosophical divide between those who advocate *"a thrilling ride"* and those who believe that the emphasis should be on the story (its characters and events), it seems that there are other opposing views for the design of business simulations. There are those who advocate graphic richness (as found in video games) and those who take a *leaner* view. Those who take the leaner view (myself included) justify it based on the premise that the cognitive challenge of running a successful (virtual) company is enough. To an extent, this justification is reinforced by research that suggests that the excessive and inappropriate use of graphics can detract from learning (Sloutsky et al, 2005). However, Eisner (1996) suggests a role for *"visual pyrotechnics"* in comics – *"a plot that centers on a single problem".* Thus, for simulations, the introduction of graphics and video gaming elements may be appropriate for simple simulations that focus on a narrow learning need.

Those who advocate the absolute necessity for graphic richness justify this because they feel that it is necessary for the *digital natives* or *generation Y.* My response to that this is that is a load of *Hogworts* (meaning hogwash but based on the Harry Potter series where generation Y seem to be enthralled with a medium (the book) that is obsolescent compared to radio, movies, television, video games etc.

In the context of cartoons, McCloud argues *"the principles of pure, clear story telling should be your starting point"* and, for simulations. I believe that **learning purpose** should be the starting point and the priority. Additionally, I believe that it is important not to include decisions, results and graphics that are not directly necessary for learning – no matter how *neat* or *cool* the model is. This is reinforced in comic design where O'Neil (2001) states *"Never write a scene, or a single panel, that does not contribute directly to your plot".*

Design Values

When designing a simulation I use three values – *learning effectiveness, learning efficiency* and *learning consistency.* I accept that at first glance these may be regarded as

just *good things* (like motherhood, apple pie, not beating the wife) but there is more to each.

Learning Effectiveness

This must be measured from the viewpoint of the learner and this presents particular problems to the simulation designer and business trainer because the adult, business learner has his or her own perceptions of learning needs and the learning must be relevant to the learner's current situation. This means that the design process starts from identifying learning objectives, the audiences and the way the simulation is to be used (Rock Pool Method – Chapter 8). These constrain the design and provide a focus.

Learning Efficiency

First I wish to differentiate between *learning efficiency* and *teaching cost.* It may be very cost efficient for a university professor to lecture to a hundred plus students or for an e-learning course to deliver instruction at a cost of four pence per prospective student. But, if the university students neither understand nor remember or only a tiny proportion of the e-learning students complete the course, teaching is efficient but learning is not. This means that the design must be *lean* and provide the desired learning and no more than the desired learning in the *shortest time* possible (Design for Value - Chapter 6).

Learning Consistency

Unlike academic education where (I feel) the purpose is to separate the poor students from the good ones – passing the good students and failing those who deserve it, in company training every learner on every course must gain (Hall, 1995a). This means that learning must be consistently good. But, with a diversity of knowledge, experience and capability this is a challenge and this means that the design must take into account the learning process and the way this can be *managed* (Design for Process - Chapter 4).

The Book

This book covers:

1. **Types of Business Simulation**
2. **Learning and Simulation**
3. **Art of Simulation Design**
4. **Design for Process**
5. **Drafting the Simulation**
6. **Design for Value**
7. **Design Craft**
8. **Design for Quality**

1. Types of Business Simulation

This chapter describes the basic simulation process, the different types of *model-based* simulations, their characteristics and manner of use and describes the simulations that I will explore in depth to provide examples.

2. Learning and Simulation

This chapter explores fundamental learning models and where business simulations enhance learning and where they do not. Also the chapter compares classroom based with Internet based E-learning and explores the reasons why companies use business simulations. As such the chapter provides a knowledge-base to help designers communicate with the business sponsors who are paying for the simulation.

3. Art of Simulation Design

This chapter explores how computerised business simulations are a sequential art form that parallels the strip cartoon or comic. It uses this parallel to detail the structural aspects of computerised simulation design. In doing the chapter covers the tacit and instinctive aspects of simulation design making these explicit using the comic strip design knowledge base.

4. Design for Process
Simulations are not static entities. Rather learning, engagement and workload change *dynamically* as the simulation progresses and this chapter explores the issues and design implications of these dynamics together with design for learning management, the experiential learning process and the way the simulations are used.

5. Drafting the Simulation
This chapter covers the aspects of drafting the simulation model, deciding decisions and results. Thus in contrast to Chapter 3 (The Art of Business Simulation Design) that concentrates on structure, this chapter concentrates on design detail.

6. Design for Value
Having worked in manufacturing it is natural for me to transfer lean ideas from the factory to the classroom. This chapter explores the aspects of simulation design that affects leanness to ensure value in terms of efficient and effective learning and design covering the business modelled, design and use waste, lean simulation design, design novelty, complexity and customisation

7. Design Craft
This chapter explores simulation software - its architectural needs and functionality, an architecture (that won a major London, England innovation award), documentation, the model – its elements, structure and language.

8. Design for Quality
This chapter explores the aspects of simulation design that affect quality. It covers my simulation design methodology (The Rock Pool Method – winner of the ABSEL best simulation paper award in 2005), design *soundness* in terms of *structure* (composition), *software* (sources of software errors), *design* (final testing) and, finally *learning* (validating that the finished design delivers learning effectively, efficiently and consistently).

Bonus Chapters
These are updated chapters from my book *SIMULATION: Virtual Business Experience* and provide information for *users* of business simulations rather than for *designers* of business simulations.

9. Ways to Use Business Simulations
This chapter describes ways in which computerised business simulations can be used for executive development. For each the main reasons for use are listed and discussed. Example or examples of actual use are provided. Practical issues are listed and practicalities discussed together with how the simulation links to other learning.

10. Tutoring Business Simulations
This chapter provides practical advice on how to run simulations on management development courses. For *new users* it provides a comprehensive guide and how to *get up to speed* and circumvent problems. For *experienced users* it should provide an extensive aide-memoir.

11. Choosing Business Simulations
This chapter covers choosing a simulation for a specific development situation based on development objectives, duration, target audience and manner of use. It lists the questions that need to be asked about the simulation model, the software, documentation and design provenance. And explores custom design, tutoring options and commercial aspects. It is designed to help the neophyte and, also, to ensure the experienced user does not overlook anything.

12: Why use Business Simulations
This chapter explores ***Why companies use business simulations?*** as the answer helps define the simulation session's learning needs and objectives.

Appendices

Appendix A: Case Study Simulations

This appendix provides information about the six case study simulations.

Appendix B: Software Process Flows

This appendix provides information about software process flows for a range of different types of simulations. For each, the key process steps are shown.

Appendix C: References

This appendix provides a list of books and papers cited in the book and hence provides additional research information.

Appendix D: Simulations

Besides the case study simulations this appendix provides a list of other simulations cited in the book and where appropriate a link to further details.

Appendix E: Simulation Design Check Lists

This appendix consists of worksheets that help Define Needs, Specify the Simulation, Design Metrics and a Simulation Session Checklist.

Case Examples

Throughout the book I mainly use six simulations to illustrate points. However, where appropriate, I illustrate points from some of the other sixty-five simulations that I have developed.

Cartoons

Symbolising the Corporate Cartooning theme, I have interspersed cartoons (comic strips) to enliven, act as an aid memoir and provide a pause for reflection. (I apologise for my sense of humour (or humor for my American readers)). There are three major sets of cartoon (comic strip) characters – one involves a Dean of Games (DOG) an academic pedadog and Computer Aided Tutor (CAT) as introduced in Cartoon 0.01 earlier. The second involve a caveman, his cave wife and cave mother-in-law – artistically just as I see simulation design as a cartooning process, I see the alternative artistic viewpoint emphasising *reality* as a primitive *hunter-gatherer* paradigm and this lead me to using the caveman metaphor! The third involves a group of druids who manufacture hooch called *"Druids' Revenge"* and who I use to illustrate aspects of business.