

40 simulating years - a personal journey.

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This paper explores the forty years that I have spent designing and running computerised business simulations for management development and business training in companies around the world. As such it parallels SAGSET's 40 years, exploring the colossal changes in computer hardware but, with simulations dating to the 1970s still in use suggests that there have been minimal changes in business learning needs. Finally, the paper explores the three aspects of design that I believe are crucial to the design of simulations that effectively, efficiently and consistently provide learning.

The Beginning - The Time-Sharing Years (1970 - 1980)

In 1969 I returned to the UK to launch the UK's first interactive corporate modelling package (PA300) and thought that a management game would be a good way to get business people to understand the *power* of business modelling and Computer Time-Sharing. I say *power* because, at that time, the computers I used had a massive 15 kilobytes of memory, were accessed over ordinary telephone lines using a typewriter style terminal at a speedy 110 bits-per-second and stored programs and data on paper tape. The EXEC Management Game System (Hall, 1994a) was completed in 1970 and ran with three teams in a hotel on June 18th, 1970. (I remember the date because it was the day of the British General Election when Ted Heath was a surprising winner). And, thus started my career designing and using computerised business simulations for management development and business training.

In the early 1970s, Computer Time-Sharing memory had increased to 36k bytes and the computer access over normal telephone lines was a whole 30 characters a second. Also, unlike the earlier (Mark I) system that consisted of multiple computer centres around the world, this larger Time-Sharing System (Mark III) had two *super centres* located in the USA and accessible using communications links from around the world. A problem with this was the lack of satellite and cable capacity across the Atlantic so that on several occasions the links were lost as television took precedence. But from the business viewpoint this was sensible as Computer Time-Sharing use was largely during the 9 to 5 working day and so as Europe's usage fell away, the American usage started and as this fell away the usage in Japan began - diurnal load levelling.

By 1976 I had developed four further simulations - two (TEAMSKILL and BUYPLAY) that were used as national contests in the UK, the third was a real-time project management simulation and the fourth a simple forecasting-inventory management simulation. In 1976, I escaped the corporate world to teach marketing at a college and set up my business on a part-time basis. By the end of the 1970s I had developed another five simulations with durations from two hours to several days and of the simulations I developed in the 1970s four are still in use!

Early Microcomputers (1980 - 1990)

During the late 1970s it became apparent that Computer Time-Sharing would be replaced by the microcomputer and I wrote an article forecasting a microcomputer on every desk in 1978 (Hall, 1979). (This was several years before IBM put the microcomputer industry back several years and at a time when the average businessperson in large companies *"would never have a computer on their desk*

because they had a Data Processing Department”). In 1980 bought my first microcomputer – a top of the line Tandy (Radio Shack) Model 1 (Trash 80) with a huge 48 kilobytes of RAM and *two* 80 kilobyte floppy discs. It cost me £2000 (\$3200) but, as by this time, Computer Time-Sharing was costing me £100 per *hour* of use, the microcomputer purchase was economically attractive. It enabled me to get a job at Ashridge Management College (the UK’s premium provider of business training) and I introduced both Ashridge and the College of Marketing (the UK’s premium provider of marketing training) to microcomputers. I used the Tandy word processor (Scripsit) to write my second book (Hall, 1983) and drag Cassell (the publisher) *screaming and kicking* into the electronic publishing age (they wanted to retype *everything* on a Linotype machine – in the end they accepted a paper tape from me – but UK print unions meant that it had to be printed in Singapore!)

In January 1983, at the age of forty, I left Ashridge to run my own business full time and have done so ever since. Also in 1983 I ran another national simulation-based contest (TEMEWORK) sponsored by the Engineer Magazine and the British Government. In the following year (in association with Ashridge), I became involved in the Benson & Hedges Management Challenge. This was a contest for business people in the Middle East (Hall, 1989) that ran for the next six years. During this time I developed four simulations for it, spent about a month each year in the Arabian Gulf. Yearly, the contest had about 5,000 contestants and delivered some 11,000 column-centimetres of editorial coverage in the media. Unfortunately Saddam Hussein invaded Kuwait and the contest ended. Three of these simulations were designed to provide basic business acumen and financial appreciation for different industries (manufacturing, retail and services) and all of these are still in use today (although their functionality has been enhanced significantly and they have been moved from MSDOS to Windows). This long use is because basic business knowledge and skills are the same today as they were decades ago and all these simulations had a short duration (one day) making them attractive for use on time limited company training courses.

During the 1980’s, I developed twenty-nine different simulations covering a wide range of training needs and by 1990 was using MSDOS based microcomputers with up to two megabytes of memory and 40 megabyte hard discs. (I bought my *first* hard disc in 1983 – it cost me £2000 and stored a whole five megabytes.) In 1989, I moved my office to a unit in a converted Victorian Dog Food Factory – a brilliant working environment with 27 inch solid brick walls, 11 foot ceilings, exposed steel beams and columns and a balcony where I can sit out working.

Consolidation & Reflection (1990 - 2000)

In the early 1990s I decided that it was time for me to evaluate my knowledge of business simulation design and began an ongoing programme to explore how simulations were used, the learning processes associated with running them, simulator architecture, design methodology and design structures. As part of this I discovered both SAGSET and ABSEL (thanks to a memorable workshop run by Dick Teach in the West of England). I was very surprised when my first ABSEL paper won the best paper award (Hall & Cox, 1994). I have been involved with SAGSET since then as a council member including a time as web master and now as treasurer. I attend the ABSEL conference regularly where my iconoclastic practitioner views are accepted in good humour (or should I say humor).

In 1995, I was very proud to obtain a Churchill Fellowship to study business simulation use in the USA. This and my own experience *running* simulations led to my book “SIMULATION: Virtual Business Experience” (Hall, 1996). At about the same time, I recognised the potential of the Internet and registered the domain www.simulations.co.uk (and have recently registered www.simulations.me.uk).

The Internet has allowed me to expand internationally so that now 90% of my business is outside the UK. But, despite the Internet's marketing and information benefits, I believe that the *best* management learning occurs in the classroom where small *teams* of business people can share knowledge and negotiate and argue their position - an activity that forces deep cognitive processing and allows experienced business people to learn from each other.

During the 1990s, I designing another fourteen simulations included one that replicated a Casino and another that had a two minute duration!

Reinvention (The Noughties)

At the start of the noughties, I translated my 1990s research into a simulation architecture (Hall, 2003) and a simulation platform. This allowed me to update my simulations and won me an Innovation Award in 2002. The next year (2003), I won a British National Training Award for the learning underpinning this work. In 2005, I won my second ABSEL Best Paper Award for my Rock Pool simulation design methodology (Hall, 2005) - a methodology that provides a structure in terms of design stages but maintains creative freedom within each stage.

In 2006 I was delighted to be given the World of Learning award for "*Outstanding Contribution to the Training Industry*". An award that not only recognised my work but, much more importantly, recognised the role simulations play in training.

In the noughties I have developed another thirteen simulations including a Not-for-Profit simulation and a major operations management simulation where I won the business because of the Teamskill simulation that I designed in 1971! Experience of Use

Besides developing simulations for the first twenty-five years (1970-1995) the state of the technology was such that it was necessary for me to run simulations for clients. When I did my Churchill Fellowship study as part of an assessment of the ways companies used simulations and the reasons for using them I reviewed the number of times that I had run simulations for clients and found that over the previous quarter century I had run simulations around 2000 times. Experience that I believe was crucial to me designing simulations that provide good learning.

In the early Time-Sharing days one had to take a Teletype around with you and a modem. Since the terminal weighed upwards of 100 lbs (50 kilos) it is not surprising that I go a hernia. Things improved with the Silent 700 "portable" terminal. This included an acoustic coupler eliminating the need for a separate modem. Despite the fact that even at the end of the 1970s the maximum communication speed was 30 characters per second (300 bits per second), my ability to run simulations from training centres or hotels was a significant advantage. On one occasion, I won a major contract because the competition (IBM and ICL) ran their games on mainframes where the decision-making cycle involved phoning in the decisions for punching on cards. After processing the results would then be couriered back by a man on a motor scooter - taking very considerable time.

With my first microcomputers the situation was not much better. A large suitcase held the computer keyboard, expansion unit and disc drives. The printer was in a separate case and then there was the box of paper. But at least I no longer needed to use a phone line with the attendant problems (such as the hotel phone operator pulling the plug because on listening in she heard a high pitch whistling).

Eventually, in the mid1980s I bought one of the first true portable computers - the Apricot Portable (with a 3.5 inch floppy drive, a 4.77 MHz processor and 256k RAM). It was a major step forward as at that time I was running the Benson & Hedges

Management Challenge across the Arabian Gulf and hence travelling tens of thousands of miles each year.

At about the same time I bought my first Laser Printer (a Hewlett Packard) costing me about £2000 and printing in black at 300 dots per inch. (Today I can buy a monochrome full duplex printer printing at 1200 dots per inch for £60 and a colour laser printer for £77!)

Today as virtually every businessperson has their own laptop it means that today I spend less than 5% of my time actually running simulations and the rest designing and renting them for use by trainers. Although I am not now running simulations as much, I am certain that the experience of their use in the classroom is invaluable as it ensures that the simulation is designed for use.

Design Considerations - Corporate Cartooning

A major interest of mine is the design of simulations and from the very beginning I disagreed with the pervasive view that replicating reality exactly was desirable and that simulation models should be complex. Rather I always saw business simulations as simplified and stylised replicas and, as such, the mathematical equivalent of the cartoon or comic strip (Hall, 2008). Unfortunately, although there were dozens of books on *drawing* cartoons, there did not seem to be any books on *designing* cartoons or comic strips. That was until a keynote speaker at the 2006 E-Learning Guild conference mentioned Scott McCloud's book (1993) and this provided the information I needed. I found the parallel between strip cartoons and business simulations exact and profound. Just as strip cartoons are not just pictures but also words, you must view a business simulation as a combination of the model and interactions (the decisions made and their outcomes). Secondly, the ways cartoons transition panel-to-panel are paralleled by how business simulations progress period-to-period. Thirdly, the relationships between the cartoon's words and pictures are paralleled by the relationships between the business simulation's interactions and models. The parallel between strip cartoons and business simulations allowed me to articulate and structure a much of the tacit knowledge that I had gained developing more than sixty simulations. In 2008, I shared this at several conferences including ABSEL (Hall, 2008) and ISAGA (as a keynote speaker).

Design Considerations - Systems Dynamics

The second aspect of design is the dynamics of use in the classroom and how learning advances (or not) as the simulation runs. I see this as a system consisting of three interacting dynamics (Hall and Cox, 1993) where the dynamics are *cognition* (learning), *affection* (feelings or engagement) and *workload* (Hall, 2009). My experience in running simulations led me to identify characteristic patterns and problems associated with cognitive development, engagement and workload - dynamics that must be taken into account when designing a simulation. Also, these dynamics shape use in the classroom and require the trainer *managing* the learning process. To provide appropriate information and tools to allow the trainer to manage learning a *Tutor Support System* must be designed into to the simulation (Hall, 1994b).

Design Considerations - Leanness

The third design aspect is *leanness*. The ability to design a simulation with the short duration required by companies and provide the required learning effectively, efficiently and consistently. This has several implications. There is the need to clearly identify and understand client needs in terms of business training objectives, crucial business issues and structures and align the simulation to these. Further the design must take into account how the simulation will be used and its audiences (both learners and trainers). Then you must develop the simulation to match these criteria and no more. For example, to build the business awareness

and acumen of junior managers, management trainees and specialists I created a range of seven different industry specific simulations - manufacturing, retail, service, distribution, banking, not-for-profit and even casinos. (Considering the current world economic situation, it is worth stating explicitly that the banking simulation is *not* an amalgam of the not-for-profit and casino simulations!) But in terms of matching client needs, different scenarios were not enough, it was necessary to create different versions for each of these simulations. Consequentially besides a standard business acumen versions there are versions for financial appreciation training, middle management assessment centres and company conferences. Likewise, different trainers may need different levels of support and hence need different versions. Finally, there are language needs and so I have versions in both English and American! In terms of what is modelled, the decisions made and the results produced, I believe that it is imperative to build in *only* those that directly relate to the learning objectives. In other words, do not build in features just because you can do it, it is neat or cool or emotionally and aesthetically rewarding (to the designer).

40 Simulating Years

As you can see, I have spent most of my working life developing and running business simulations for company training. So far I have developed sixty-four simulations. Besides the seven business appreciation simulations, there are several to teach strategic management, several functional simulations (manufacturing, marketing & sales management), several process simulations (business flows, stage-gates and project management), several planning simulations (financial, marketing and entrepreneurship), several sales negotiation simulations (industrial products, consumer goods, systems purchase, construction projects), several simulations covering concepts (such as product life cycles, inventory management, time-series forecasting, etc.) and even one replicating the British Political System! Although (reflecting company training needs) most of my simulations last between half and a full day, I have a few lasting several days and one lasting two minutes (it was designed for use at an exhibition).

Although in the last forty years, computers have changed radically (from 15 kilobytes RAM with storage on paper tape to those with 4 gigabytes of RAM and 750 gigabyte hard discs (Computer Shopper August 2010), core business knowledge needs have not. As a consequence, I have simulations from the 1970s and 1980s where, although functionality and usability is remarkably different, the core simulation model is the same - simulations that are still used by major, sophisticated companies on their training programmes. In fact 50% of my firm's revenue is from simulations designed before 1990!

Although just past retirement age, I have had and am still having too much fun designing business simulations to consider retiring. Besides continuing to design new simulations I am currently working on a book on business simulation design. Reflecting the parallel with cartoons and comic strips, I the book will be called "*Corporate Cartooning: The Art, Science and Craft of Business Simulation Design*".

Overall, my life's work has been to take business learners *from knowledge, through simulated experience to wisdom*.

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My Simulations

A list of the simulations that I have developed over the years.

	Simulation Name	Date	Original Client	Simulation Type
1	EXEC	1970	Honeywell Information Systems	Total Enterprise [1]
2	TEAMSKILL	1971	Metalworking Production Magazine	National Production Contest [2]
3	Politico	1972	Honeywell Information Systems	Political Game
4	A Planning Experience	1973	Honeywell Information Systems	Project Management [3]
5	Buyplay	1976	Industrial Purchasing News	Purchasing Management [4]
6	Insomniacs	1976	Lucas	Supply Chain Contest
7	A Management Experience	1976	British American Tobacco	Total Enterprise
8	Product Launch	1977	Chartered Institute of Marketing	Marketing Concepts [5]
9	Market Strategy	1978	Chartered Institute of Marketing	Marketing Planning
10	TAME	1978	Sony	Tactical Management Appreciation
11	RENTRA	1980	Pye/Philips	Small TV & Radio Retailer Contest [6]
12	Corpse	1980		Strategic Corporate Planning
13	Global Operations	1981	Sony	Market Strategy [7]
14	Operations	1981		Production Concepts
15	Customer Management	1983		Selling Concepts
16	Sales Calls	1983		Selling Concepts
17	Sales Mix	1983		Marketing/Team Building
18	Sales Negotiation	1983	Chartered Institute of Marketing	Sales Negotiation
19	Retail Mix	1983		Retail/Team Building
20	Temework	1983	Engineer Magazine	National Engineering Contest [8]
21	TIME	1983	Chartered Institute of Marketing	Medium Term Forecasting
22	EXPO	1983	Chartered Institute of Marketing	Short Term Forecasting

23	MULREG	1983	Chartered Institute of Marketing	Long Term Forecasting
24	Break Even	1983	Chartered Institute of Marketing	Profit & Cost Concepts
25	Profitability	1983	Chartered Institute of Marketing	Profitability Concepts
26	SMITE (Industrial Products)	1984	Cranfield	Sales Management
27	INTEX	1984	BAT & Ashridge Management College	International Management Contest [9]
28	OPPLAN	1984		Operations Planning
29	Financial Analysis	1985	Philips	Financial Planning
30	INVEST	1985	Chartered Institute of Marketing	Investment Appraisal
31	Sales Analysis	1985		Statistical Analysis
32	Inventory Analysis	1985		Inventory Analysis
33	Management Challenge	1986	BAT	International Management Contest [9]
34	Forecast & Control	1987	ICL & Henley	Sales Forecasting
35	Retail Challenge	1987	BAT	International Management Contest [9]
36	SMART	1987	Ashridge Management College	Service Company Strategy
37	CISCO	1988	GEC	System Company Strategy
38	RESERVE	1988	Ashridge Management College	Commercial Impact of R & D
39	Service Challenge	1989	BAT	International Management Contest [9]
40	Commercial Negotiation	1990	Chartered Institute of Marketing	Sales Negotiation
41	UMIX	1990	RTZ	Functional Interactions
42	Technique	1990	Philips BV	High Tech. Strategy
43	Casino Challenge	1992	GEC	Casino Management
44	Systems Negotiation	1992		Sales Negotiation
45	Distribution Challenge	1993	Midlands Carpet Distributors	Distribution Company
46	Executive Ladders	1993	Executive Group	A two-minute exhibition game! [10]
47	PROTEST	1993	GEC	Project Management [3]
48	SYCOPS	1994	GPT	Systems Company Appreciation
49	QUAD	1994		Quality Advantage
50	Executive Challenge	1996	Ciba Geigy	Pharmaceutical Company [11]
51	PROFESS	1998	Barclays	Professional Services Appreciation
52	FINESSE	1999	Barclays	Financial Services Contest [12]
53	Desman	1999		Design Management Concepts
54	Business Focus	2000	Barclays	Sales time management
55	SEED	2002	Partnered with Imperial College	Entrepreneurial Planning
56	Constructive Negotiation	2002	Carillion	Sales Negotiation
57	Foundation Challenge	2002	Wellcome Trust & Henley Man. Col.	Not for profit
58	Logistique	2004	Tennaga	Service Strategy
59	EXTRA	2004	Rockwell Automation	Introduction to Strategy
60	Distrain	2004	Schneider Electric	Distributors
61	Prospector	2005	W.S.Atkins	Commercial aspects of Projects
62	Banking Challenge	2005	National Bank of Serbia	Banking Appreciation
63	SMITE (FMCG)	2006	Kraft Foods	Sales Management
64	BOSMAN	2008	HSBC	Banking Operation [13]
65	Service Launch	2008		Marketing Concepts
66	Industrial Challenge	2009	AzkoNobel	Chemical Company

Highlights:

[1] EXEC - Management Game System, developed while I as working for Honeywell Information Systems, was run widely from 1970 to 1976. Could be run over a wide area network, with the computer controlling access and simulating on a real-time basis. Participants, using their decision entry terminals had access to a Decision Support System.

[2] Teamskill was the National Production Management Game. MetalWorking Production, Honeywell Information Systems and Dunchurch Management College sponsored it. Following a very successful run it was repeated in 1978.

[3] A Project Experience was a general-purpose project management game. Using Time-Sharing Computer terminals it could run in real-time and so replicate the time pressures of real project management. However, the technology was so expensive that it was not economically viable. The concepts were reused and extended in PROTEST a project management simulation for GEC.

[4] Buyplay was the National Purchasing Management Game. Following the success of Teamskill another Morgan Grampian publication initiated and sponsored the contest.

[5] Project Launch was originally developed for Computer Time-Sharing. Since then, this two-hour simulation has been used widely and continuously. In 1980 it was transferred to first generation microcomputers (Tandy I, Apple 2 and Commodore Pet & later to Tandy III and Apple 3), in 1984 it was transferred to the first PCs. The basic model has now been transferred to Windows and the simulation is still being used.

[6] RENTRA was sponsored by Pye (a Philips subsidiary) and used at the 1980 conference of RETRA (the Radio, Electrical and Television Retailers Association) and was my first microcomputer based simulation.

[7] Although originally developed for a conference of senior Sony staff, Global Operations was used for many years as the course finale of Ashridge Management College's principal business strategy programme. It has been widely used for in-company training (clients have included GEC, Philips, Tenneco) and a special version was used by Smiths Industries on their Assessment Centres.

[8] Following the success of Teamskill and Buyplay, the Engineer Magazine together with the Engineering Council and the DTI sponsored Temework. This contest covered all stages of the product development process from design, through producibility studies, production, launch and success in the marketplace. Innovatively, Decision Support software was provided for the contestants to run on *first generation* home computers (BBC, Commodore, Sinclair, Tandy etc.).

[9] In 1984 Ashridge Management College were asked by BAT (UK & Export) to oversee an international management contest in the Arabian Gulf. Recognising my expertise in designing simulations and running contests, they came to me to design the games to be used to challenge and identify the winners.

[10] Initially, when I was asked to develop a two-minute business game to be used on an exhibition stand of the Executive Group of Companies, I said it was impossible. However, on reflection, I developed a business game involving participants bidding for new contracts while emphasising the need to build quality and maintaining profits - all in two minutes!

[11] From the mid 1980s to date I have been researching simulation design. Research that has led (I believe to a better design) and one that speeds and facilitates the development of new simulations. Executive Challenge was the first new simulation based on the new design architecture. Besides being used on the Ciba Geigy conference, a simplified version was used yearly at a sixth-form conference run by Wycombe Abbey and the Royal Grammar Schools.

[12] Following the successful development and use of a Professional Services simulation by Barclays, I was asked to develop another, more complex simulation to be used as an in-house business contest. Both the time-scale and budget was extremely tight, yet I delivered on time - largely due to my simulator design architecture and methodology.

[13] BOSMAN was developed because of my expertise developing TEAMSKILL (1971)!