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{renamed Cass Business School, City of London from 1st August 2002 }

City University Business School doctoral programme

Department of Management Systems & Information

“Executive Learning in the Information Management Domain through IT-Mediated Methods”

Thesis submitted by Nigel Courtney

July 2002

Abstract

This thesis reports on a study of IT-mediated learning methods to improve executive understanding to harness the capabilities of new information and communications technologies for business benefits.

Part 1 describes how a distillation of existing knowledge on strategic information systems, management learning and information management led to four hypotheses centred on the enhancement of executive IT skills. This provided the foundation for a programme of action research starting in 1995 with a self-selected community of interest. The collaborative development and exploration of a range of learning materials and environments led to the emergence of a generalisable framework – the Executive Learning Ladder. The prototype was tested by measuring the outcomes of fifty executive learning events during 1997. This process identified both strengths and weaknesses in the framework which was refined and retested with new communities in 1998/9. The findings propose the conditions for successful application of the framework.

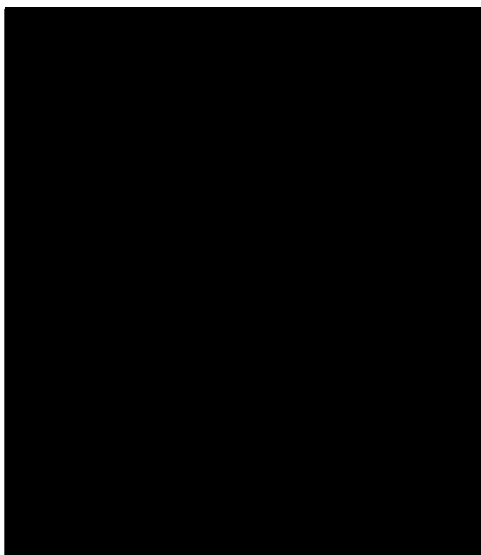
Part 2 reports on a further tranche of fieldwork to verify these findings. Validation of the hypotheses against the action learning projects in sequence reveals a dynamic shift of importance. From this a practical and generalisable approach is developed – the 'blended method'. The paper concludes with an account of applications of the blended method to satisfy a range of audiences with different objectives. The success of these instantiations shows that IT-mediated methods accelerate executive learning in the information management domain.

(227 words)

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Foreword

This thesis examines executive learning in a particular context. But it also presents the author's own voyage of discovery and learning. This foreword seeks to explain the evolution of both thesis and voyage. Although the format is structured, the reader will find research findings embedded throughout the text. Later, an afterword offers some thoughts to researchers reaching waypoints on a comparable voyage.

Following range-finding work the finalised research question was: "What generalisable framework will enable and accelerate executive learning in the information management domain through IT-mediated methods?"

Initial study highlighted the importance of three well-documented research areas, namely; management learning, information management and strategic information systems. This led to the idea that, if a solution to the research question was to be found, it must draw on all three domains. This intersection would be concerned with 'those skills that enable executives to identify business benefits that are potentially available from the deployment of effective information systems'. These skills were termed 'executive IT skills' and a set of hypotheses was formulated to evaluate the idea. The quest revealed a lack of published work that could inform the project – it seemed that this highly specific issue had hitherto generated more heat than light.

At that point, the author met by chance with representatives of a newly formed consortium of leading organisations. They had clubbed together after realising they were each trying, separately, to solve the same research question. In colloquial terms, they expressed this as: 'how can managers get their arms around this thing called information technology?'

This requirement and the author's appointment as the consortium's research director to help them solve the problem predicated the action research methodology.

The first phase, which took two years, resulted in the creation and publication of a substantial volume of original work. Meanwhile consortium membership had grown. The second phase, which took a further 12 months, entailed testing and improving the outputs by means of 50 workshop-style events involving a total of 561 executives.

As might be expected, members of the consortium variously found value in different parts of the work. But measurement of executive learning in a non-academic context is problematic. The method adopted was to measure individual's perceptions of the future value of what each had learned. This elicited qualitative statements and aggregated quantitative data the reliability of which only becomes apparent through the subsequent behaviour of the learner.

By this time the preliminary research findings had led to a proposed generalisable framework that satisfied the research question. However, the consortium members, feeling they had largely achieved their original objectives, dissolved the consortium. In order to definitively prove or disprove the research hypotheses it was necessary to conduct a third phase of fieldwork for 12 months to test the proposed framework with a series of new groups of executives.

In parallel, papers reporting work-in-progress were selected by referees for reading at five academic conferences and authorisation was granted to complete the draft thesis. The feedback from this process was invaluable and gave much food for thought. The study had, of necessity, expanded to such an extent that its documentation had to paint a very broad canvas - the corollary being that the conclusions must also cover a broad spectrum.

During presentations to specialist audiences it became noticeable that a subset of the main findings tended to attract the majority of interest. Two stand out; first, the effectiveness of the IT-mediated learning environments featured in the research and, second, the importance of metaphor and artefacts to help executives to internalise new concepts. The former, such as the Executive Studio, have proved to be very powerful resources but they require substantial financial investment and ongoing maintenance. The latter, typified by 'transitional objects', have been equally influential but in addition constitute a more practical and generalisable technique that could be applied widely.

In 1999, following advice from academic colleagues and reviewers, it was decided to encapsulate as 'Part 1' the then draft of the thesis including the lengthy work to establish a generalisable model. An unavoidable corollary of this is that some observations in part 1 (for example about the dotcoms) will now appear dated.

Part 2 was then developed to update the literature survey and to conduct a final batch of experiments with learning groups having no connection with the consortium. The findings from the aggregated total of 45 experiments, carried out in three discrete time periods, were used to evaluate the four research hypotheses and identify any dynamic shift in their significance. The conclusions also describe how the findings were synthesised to formulate and apply a 'blended' method for accelerating executive learning. This flexible method converts learning events into learning programmes, augmented with ICT in particular ways and with the appropriate use of metaphor and transitional objects.

In effect, the thesis itself becomes a transitional object – perhaps and hopefully like a Russian Doll in which each new layer offers a more true-to-life image of the subject.

PART 1:

This part of the thesis is arranged in two sections; A: Context and B: Fieldwork.

A: CONTEXT

1 The research area of interest

This thesis reports a research study to establish a generalisable framework for executive learning in the information management domain through IT-mediated methods. Circumstances required the study to be conducted on a part time basis.

Part 1 of this thesis describes how the research area of interest, the research problem, main literature survey, set of hypotheses, research methodology and work plan were crystallised. In the process it was ascertained, inter alia, that no such generalisable framework existed.

The action research methodology was employed for the fieldwork phase of the study and in order to validate the hypotheses. This process and the associated testing are reported in Part 2. This entailed the production of a substantial number of reports, case studies, tools and techniques and multimedia resources.

For ease of reading the thesis does not include detailed accounts of every artefact and output from the fieldwork. Instead, some illustrative examples are appended in

Chapter 12, including a paper on information management roles that characterises the action research process used.

1.1 Background events shaping this study

Prior to the commencement of this study, participation in several research projects had encouraged the author to apply formally for approval to pursue research at the City University Business School. The initial approach proposed a study of European styles and perspectives on business process reengineering. At that time BPR was still a new and IT-driven phenomenon and very much shaped by American cultural attitudes. These were characterised in its progenitors' seminal articles by phrases such as "Don't automate; obliterate!" (Hammer 1990) and "Shoot the stragglers!" (Hammer & Champy 1993).

Speeches and articles by European academics and business thinkers were already indicating a concern that this explicit aggressiveness went against the corporate grain in the UK and mainland Europe (Bartram (1992), (Grint 1993), (Talwar 1993). One of the earliest UK case examples acclaimed as a success was Baco Engineering, a Lancashire-based maker of domestic boilers. However, Baco had managed to lose no fewer than five chief executives during its one-year BPR implementation programme (Harvey 1994).

Having placed the study in context and highlighted the importance of IT-mediation and change management, the proposal stated three primary objectives:

- to ascertain the origins, identify definitions, describe the phenomenon, collate relevant examples, derive the lessons and add to existing knowledge of BPR

Chapter 1: The research area of interest

- to investigate, substantiate and promulgate the factors which characterise a variant of BPR more suitable for use by European organisations
- to collaborate with colleagues at CUBS to uphold a world-class reputation for outstanding research into key IT-driven organisational and business issues

The University Higher Degrees Committee approved the proposal and specified that the part-time study would be supervised by Professor Clive Holtham. Research commenced with an extensive review of the literature on BPR. It transpired that this literature had grown with extraordinary rapidity from only five articles in 1990 to well over one thousand by 1994 (as reported in Coulson-Thomas 1994).

By then the initial blind faith in the infallibility of BPR as a 'silver bullet' had been replaced by more measured contributions by the methodology's progenitors and even by hostile criticism from some authors. For example, Tom Davenport, among the first to publicise BPR (Davenport & Short 1990) and Michael Hammer had both conceded that 70% of BPR initiatives were failing to deliver the expected benefits (Davenport 1993), (Hammer & Champy 1993).

It was certainly evident that some organisations had applied the principles to achieve outstanding business transformations; examples in the UK studied by the author included National Vulcan Engineering Insurance and Western Provident Association. These first-hand studies indicated two vital ingredients for success and two critical deficiencies leading to failure. Success demanded a charismatic leader and a business facing imminent collapse. Failure was characterised by the inability of the management cadre to understand the technologies upon which BPR was so dependent and the reckless ejection, in practice, of those employees who were the repositories of corporate knowledge.

This early review was considered in combination with reflection on the lessons learned from range-finding research projects by the author (see section 1.4). As a result, it was deduced that the accepted research proposal would have to be extended to embrace two more fundamental problems, namely; the need to significantly raise executive awareness of the capabilities of information systems and the need to harness corporate knowledge.

The next section attempts to place these two fundamental problems in context.

1.2 A major barrier to competitiveness

Something peculiar is happening. The owners of start-up firms with tiny sales and ballooning losses are becoming multi-millionaires by floating their businesses on the stock exchange. If these firms were offering a better bicycle the owners would be talking to a Receiver. But the offerings of the gilded ones are far more intangible. In one way or another they all promise to unlock boundless wealth by exploiting the 'wired-up world' – a concept that until about 1997 was ridiculed by the cognoscenti, including Mr Bill Gates.

Take two examples. In late 1998 Dixons and Energis launched Freeserve, with a clever idea for offering 'free' access to the Internet (they get back a share of Freeserve subscribers' telephone charges). Although sales have not yet reached £3million, its July 99 floatation valued the company at £2bn and the share price doubled within days. Two years ago, in the US, a small group of financiers, who believed that Internet-related traffic would increase, had the idea of promising to lay fibre optic cables across the Atlantic. They swapped their idea for 50% of USWest, a

local telephone company with sales of \$12bn, to form Global Crossing. Former president George Bush spoke at its inauguration, accepting shares in lieu of a fee. Within two years the \$15m stake of one of the financiers, Gary Winnick, had grown in value to \$5bn. Mr Bush was able to sell his shares for \$14million.

During 1999 a further 130 Internet-related start-ups were floated, some with similar outcomes. For businesses like these the price-earnings ratio is meaningless. City analysts have had to invent a new measure of attractiveness, the 'burn rate' – the speed at which a company can accumulate losses in order to acquire subscribers for unproven services. [sources: 'Press 1999']

What is it that makes shares in these companies so strangely desirable? The obvious answer is easy money; but something must underpin the confidence that this will flow.

A common factor appears to be the faith of investors that the managers of these companies possess both a deep understanding of the capabilities of new information and communication technologies (ICT) and the skills to convert this understanding into business benefits. The urgency of investors to enrich these managers may be driven by the belief that they are among a tiny minority blessed with the ability to achieve this alchemy.

The Freeserve phenomenon is contemporary evidence of a problem that has persisted for at least twenty years, namely; the difficulty of obtaining benefits from the application of ICT. This thesis aims to contribute to the solution of this problem. In order to do so the research has identified and progressively focused on one particular barrier that is holding back progress and productivity.

This barrier is the lack of ability of many of those in leadership and decision-making roles to exploit the capabilities of ICT effectively.

1.3 Reasons for studying this barrier

This barrier has been selected for research for four reasons:

- the author's first hand and frustrating experience of the barrier
- an increasing realisation that it is encountered by many
- the concern of leaders that the barrier is restricting economic development
- a personal belief in the value of interactions between business and academia.

1.3.1 First hand experience

During the 1980s the author was responsible for a directly employed workforce of about 120 people generating aggregated revenues of some £100M. Investment in computerised accounting systems began in 1981 in response to pressure from auditors and shareholders. These were effective but, by the end of the decade, progressive investment in systems to distribute business information had failed to deliver the expected benefits. This was taken as an indication of personal shortcomings and was a prime factor in the decision in 1990 to enrol on the part-time MBA in Information Technology Management at City University Business School.

1.3.2 A shared problem

A leadership role can be lonely; the confession of shortcomings to subordinates can be very risky. It has been strongly argued that a chief executive who professes not to understand ICT is no better than a marketer who admits to being baffled by marketing strategy; both deserve to lose their jobs (De Feo 1997).

Henry Mintzberg found that executives in need of advice are four times more likely to consult outsiders than colleagues (Mintzberg 1964). The author's exchanges during the late 1980s, with a peer-group of owner/managers and with professional advisors, revealed few who could claim success in managing ICT. But shared ignorance does not disguise inadequacy; it was clear that those who had persevered with the problem and made progress were profiting.

This observation was reinforced by the opportunity to interact with the 1990/1 & 1991/2 cohorts on the CUBS MBA. It seemed that 'information capable' managers exhibited two key characteristics; they could use everyday ICT themselves and they had a grasp of how more sophisticated applications could be harnessed by an organisation. On the face of it, a deep comprehension of the workings of the technology was not an absolute requirement. What mattered was a clear and communicable understanding of the capability of the chosen ICT to support better ways of working.

1.3.3 Leaders' emphasis on ICT for progress

Throughout the 1990s successive UK governments and EU administrations have attempted to catalyse action to improve the use of ICT. These efforts, while

laudable, have had limited success. The Parliamentary IT Committee (PITCom) sponsored innovative experiments with shared databases when only a handful of MPs then used a computer. The Institute of Directors published an in-depth inquiry into barriers to executive use of IT (IoD 1992). The government's Information Society Initiative was launched by the DTI but was quickly to be dominated by industrial partners from the IT vendor community (<http://www.isi.gov.uk/isi/>). European Union initiatives, under Commissioner Bangemann, soon became preoccupied with the potential of the Internet and the World-Wide Web as infrastructure for use by EU citizens.

These initiatives largely failed to distract general managers from an enthrallment with Business Process Re-engineering (BPR). The MIT90s study had articulated the concept (Venkatraman 1991) and, by 1993, some pioneering examples written up by academics had seized the imagination of managers in advanced economies (Davenport & Short 1993). This new silver bullet was concerned with 'the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed' (Hammer & Champy 1993 p32). The concept focused on Structure, Management Processes and Technology – components of the path-breaking MIT90s Framework (Scott-Morton 1991 p20). However, BPR largely overlooked another key element of this framework, namely; Individuals & Roles.

In many attempted implementations the BPR 'solution' involved redesigning cross-functional business processes so that people could be replaced with computer systems. Huge numbers of people lost their jobs; mainly middle managers. The growing groundswell of public disquiet was not contradicted by the progenitors of BPR. In fact, they conceded that at least 70% of BPR initiatives failed to deliver the

expected benefits; in rapid succession they blamed themselves for forgetting about people and recanted (Davenport 1997).

The author's attempts to verify this failure rate were unsuccessful – it appeared to be an informed 'guesstimate'. Private companies took pains to conceal their failures to protect their share price. The few contemporary case studies of BPR or Strategic Information Systems failures were in the public sector and as the result of public inquiries. Examples of include the Stock Exchange's 'Taurus' project, written off at a cost of £400million and the London Ambulance Service fiasco which allegedly cost 20 lives. The common theme of these inquiries was that a large part of the blame for failed implementations lay in the inability of the responsible managers to understand the expensive technology they had commissioned (West London TEC 1993).

1.3.4 A dual approach to self-development

The author has a long-held belief in the value of combining academic and business thinking both for self-fulfilment and to improve business performance. The following milestones illustrate this commitment:

- Took first degree in the School of Engineering and Building at UMIST. Invitation to pursue post-graduate research had to be declined for family reasons
- Career in project management progressed to general management and to eleven directorships and the posts of managing director and executive chairman. Gained professional charter through part-time study and membership/fellowship of five relevant institutes and several societies for business people

Chapter 1: The research area of interest

- Gained the MBA at CUBS while running own business. Enrolled on the doctoral programme at CUBS on the same basis

This combination of business practise and academic study has covered thirty years. The dual approach has both strengths and weaknesses. New ideas and techniques can be tested immediately in the workplace. A business mindset also helps with the necessary translation of management literature for application in fieldwork with practical managers. On the other hand this same mindset can hinder the presentation of outcomes in an academic style. The need to overcome this difficulty while managing multiple responsibilities has prolonged the study.

Perceptions about this duality have also changed over time. Twenty-five years ago few UK managers held a degree; espousal of the pursuit of excellence was likely to provoke ridicule. Although the figure today is still barely 20% (ONS data) the need for continuous learning now underpins management practice. When this is conducted collectively it can lead to the 'learning organisation' (Senge 1990; Pedler et al 1997). These drivers impinge on the effective use of ICT from different perspectives concerned with learning methods and processes. Individuals need to improve personal competencies; organisations need to develop a shared understanding of best practice so that it can be adapted to particular circumstance and applied successfully.

1.4 The overall research plan

Having established and articulated the research area of interest, an outline plan for the study was formulated. The indicated durations reflect the fact that this was, perforce, to be a part time study.

1. Review of literature on the research problem	months 0-9
2. Range-finding research activity	months 0-18
3. Selection of research methodology	months 6-12
4. Crystallisation of research hypothesis	months 9-12
5. Fieldwork	months 12-48
6. Model building	months 18-30
7. Distillation of interim results	months 24-36
8. Re-testing preliminary findings	months 36-48
9. Synthesis and conclusions	months 48-60

As will be demonstrated in this thesis, steps 1-4 revealed the lack of a generalisable solution to the research problem. As a result the fieldwork stage entailed extensive development and testing of experimental *materiel*. Although substantially completed by month 48, the distillation of interim findings had to be delayed until then. The re-testing stage (months 48-60) then allowed step 9 to occur in months 60-66.

1.5 Range-finding

So the barrier to be researched – the research problem - has been crystallised as the lack of ability of many of those in leadership and decision-making roles to exploit the capabilities of ICT effectively. Reflection on the reasons for selecting this barrier for research has suggested that the potential solution will involve learning methods and processes that address both individual and collective approaches.

Prior to formally enrolling on the doctoral programme several opportunities were taken to practise academic research in addition to business activity. These had entailed questionnaire surveys, telephone surveys and face-to-face interviews. The common theme of the topics investigated was the role of ICT in business transformation and this led to a broadening awareness of the factors affecting the research problem. One of these studies, conducted in parallel with the literature survey, is described below because it enabled some lateral thinking to be tested, namely; the application of child psychology in managerial research.

1.5.1 Executive awareness of technology shifts

The Digital Equipment Company (now merged with Compaq) sponsored a CUBS Working Paper entitled “Future Frameworks for Open Client-Server Technologies”. This was co-authored with Professor Clive Holtham and published via a public seminar in January 1995. A version of this paper was read at IEE International Seminar on Client-server Computing, Brussels, Oct 95 and published in the proceedings.

Chapter 1: The research area of interest

The investigation started with the premise that during the 1970s and 1980s buyers of large-scale computer systems were subjected to 'proprietary lock-in'. An organisation buying, say, an IBM mainframe computer was forced to buy IBM operating systems, IBM applications software and peripherals and to employ IT staff specifically trained in IBM systems and methodologies. The same lock-in came with products from Digital, ICL etc.

In 1965, just seven years after the invention of the integrated circuit, George Moore, one of the founders of Intel, observed that the miniaturisation of electronic circuits would reduce resistance and, by bringing components into closer proximity, speed up the transfer of signals between them. Moore's knowledge of the pace of scientific advances caused him to predict that processing power would double every eighteen months. This prediction has become known as Moore's Law and, broadly speaking, it has been proved correct up to the present day (Czerniawska & Potter 1998). One manifestation of this law is that a mobile telephone now contains more processing power than did the first manned Apollo spacecraft.

By the early 1990s this phenomenon had enabled IT vendors to develop a new generation of compact machines. The potential of these was realised through new and more efficient programming languages that could allow different proprietary systems to inter-operate. At the same time the liberalisation of state-controlled telecommunications infrastructures had encouraged rapid technological advances that enabled data to be transferred reliably between remotely sited machines. Suddenly Engelbart's 1960s experiments in distributed computing on the Stanford campus (Engelbart 1962), and the later pioneering work to establish the Internet, had become a viable and economical proposition for institutional users of ICT.

Digital, at the forefront of these developments, believed that the sacrifice of proprietary lock-in had to open up new business opportunities. The problem was that few of the decision-makers in current or potential client organisations could comprehend the new offerings. The research to investigate this problem started in early 1994.

1.5.1.1 Shaping a management research process

The research process is worthy of note since it is relevant to this paper. The project sponsors were based in England, Scotland, USA, South of France and Copenhagen. From the outset it was agreed that a combination of face-to-face interaction and distributed computing techniques would be utilised, as appropriate. Various sub-groups co-ordinated progress by e-mail, telephone conferences and physical meetings, on one occasion in an airport lounge in Warsaw. Only once during the 13 months of the project did the entire team come together for a face-to-face meeting.

The first stage of the research entailed an exhaustive analysis of the prevailing situation and alternative scenarios. This led to the definition of the problem in the form of a sequence of theoretical models. The model of the desired future state was then converted from a diagram into a transitional object (see section 2.2.3.1). The purpose of this physical artefact was to minimise the need for verbal explanation by conveying the issues in a physical form that could be handled by the interviewee. The desk research also embraced an in-depth study of barriers to the evaluation of new technologies by non-technical managers and proposed a theoretical model for solving this problem.

The second stage led to the identification of four salient issues, namely; technology, organisation, buying behaviour and market structure. Eight hypotheses were advanced to explain these issues.

1.5.1.2 Extrapolating from informed opinion

The third stage entailed the examination of these hypotheses via face-to-face interviews with 40 appropriate people. This sample comprised of directors of 19 IT vendors and of 21 'institutional users' that were pioneering or evaluating the deployment of client-server technologies. Each interviewee was briefed by fax on the salient issues. The transitional object was tabled at the start of each interview. The vendors seemed to find it even more interesting than did the institutional users. Handlers from both communities spontaneously offered new and intriguing interpretations as to its meaning and implications. Generally, the use of metaphor materially accelerated the interviewees towards knowledge-sharing. Interviewees' responses to the eight hypotheses were collected using a 5-point Likert scale. Most interviewees preferred to take the proforma and mark these scales themselves.

By analysing and synthesising these data it was concluded and reported that client-server technologies were enabling organisations to use client information to transform supply chains into 'value networks' for mutual benefit and that this behaviour reduced the need for participants to acquire world class skills in every domain.

1.6 Learning from these experiences

These range-finding opportunities all impinged, to varying degrees, on the research problem. Two chief benefits emerged:

Firstly, the literature searches required for each report had raised awareness of a range of relevant issues. Consideration of these findings helped to identify three broad categories of literature: management learning, strategic information systems, information management. These literatures are discussed in chapter 2. Chapter 3 explores the common ground between the three literature domains to formulate the research hypotheses.

Secondly, the preliminary studies had allowed a range of information-gathering techniques to be tested with practising managers. This had also taught that the most telling insights from interactions with managers often arise after the interview, sometimes as they escort one to the lift. Selection between alternative research methods is discussed in chapter 4.

Section B describes the fieldwork undertaken and the emergence of a generalisable framework for executive learning in the information management domain through IT-mediated methods. This fieldwork stage was protracted and gave rise to a significant quantity of material – both text-based and in multimedia formats.

Section C provides abstracts of published papers arising from this study, a selection of which is appended for reference.

2 Literature review

The desk research for this thesis began in 1994. Prior involvement in relevant research initiatives had helped to focus the literature review on three broad categories or domains of literature, namely; information management, strategic information systems and management learning. Since 1994, each of these domains has been the subject of significant advances.

2.1 Rationale for the three chief areas of concern

2.1.1 The relevance of information management

Effective management has always entailed the ability to acquire reliable and actionable information at the right time. The need to manage information itself has existed since people realised that knowledge equals power. Until about 200 years ago it was feasible to grasp all knowledge of a subject. Dr Johnson single-handedly wrote the first English dictionary; Sir Christopher Wren was a revered surgeon before he turned to architecture (Halliday 1967). About a century ago scientists began to complain that they could no longer keep up with developments in their field. Today's managers have to cope routinely with a world in which 70% of all the information ever produced has been created within the last 30 years (Bawden 1999).

In addition to traditional sources such as libraries, innovations such as CD-Rom and the Internet offer access to vast amounts of electronically stored information (Hammond 1996). But information seekers have likened the use of such facilities to 'trying to drink from a firehose' (Greenhalgh 1998). For example, the Internet search

engine Altavista locates over 200,000 websites on the subject of "information management" and many of these websites contain hundreds of pages of text (author's test 25/8/99). The ability to sort wheat from chaff has become a key differentiator for personal and organisational success (Young 1998).

Faced with this proliferation of information, information scientists sought better ways to categorise it (Orna 1990). These efforts highlighted information as a whole as an asset that should be managed by organisations with the same care that they applied to the three traditional economic resources: human labour, financial capital and physical assets (Eaton & Bawden 1991). Political economists have gone further by proposing that the availability of information will lead to new societal hierarchies characterised by 'information haves' and 'information have-nots' (Carey 1997).

These factors highlight 'information management' as a chief area of concern. However, in 1994, many managers clearly still saw it as something that librarians did and few had heard of its extension - knowledge management (Preteceille 1994). Since then the burgeoning enthusiasm of managers for both information and knowledge management has focused on practical applications (Cooper 1997). The initial scope to be considered included business turbulence, productivity and process. This focus has evolved to embrace the study of business transformation, information management (as a discrete discipline) and 'applied knowledge management' (Noble 1996).

2.1.2 The relevance of strategic information systems

Over the last thirty years or so, technology shifts have been a major contributor to the pace of change in the business domain. Computing devices now pervade almost every walk of life. Large IT vendors like IBM and Sun advertise that, today, one third of the world's gross domestic product is being spent on computing and telecommunications products and services. The 'first era of computing' focused on the automation of tedious processes (Tapscott & Caston 1993). By the mid-1980s leading organisations were learning to exploit the strategic capabilities of ICT to transform performance (Keen 1988). In this new 'information age' (Hamel & Prahalad 1994) it was no longer sufficient for managers to rely on information systems experts. New roles were emerging such the 'hybrid manager' (Earl 1989) and the 'new information professional' (Holtham 1992). Successful implementation demanded both that managers used the new technologies themselves (Boone 1991) and understood the strategic implications of ICT for competitive advantage (Rockart & DeLong 1988). Hence the selection of the second chief area of concern 'strategic information systems'.

The literature review for this topic embraced studies of the emergence of new organisational forms made possible by the capabilities of ICT and of the effective deployment of ICT systems for business benefit.

2.1.3 The relevance of management learning

Many managers report that increasing turbulence in the business environment is forcing them to work longer hours under greater pressure, allowing ever less time to

contemplate and understand what is going on (Ward 1997). In the past, a novice manager typically would enter a line of business, enjoy a protracted 'apprenticeship' and aspire to a senior management role, in the same industry and often the same organisation, when reaching his or her 40s or 50s. Today, the future is decidedly uncertain for those who do not achieve board or partner level by their early thirties. Even in a flattened organisation this can require promotion every two years, so the manager must constantly learn new skills while exercising existing skills excellently (Taylor 1997). The ways in which individuals and groups overcome this dilemma are seminal to the research problem. The third chief area of concern is, therefore, 'management learning'.

Within the literature on the broad subject of management education the intention was to examine how managers learn and this led to consideration of mental models (Winnicott 1958) and learning strategies and styles (Honey & Mumford 1982).

2.2 Drawing the big picture

Plainly, each of the three domains is a major topic in its own right, with a discrete literature. However, this does not imply that the domains are mutually exclusive. Indeed, the very wording of the research problem suggests that any proposed solution must respect all three domains. If so, it is reasonable to assume that important components of the solution will lie where the domains converge.

These inter-relationships may be illustrated in the following fashion:

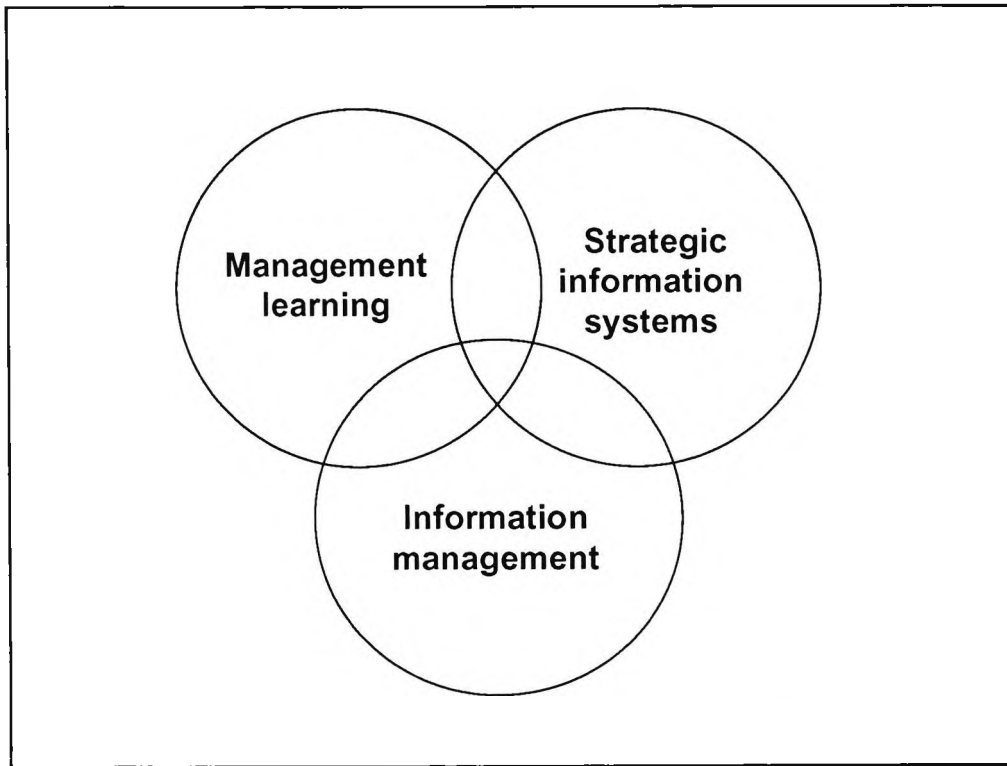


Figure 1: Three areas of theory converge

This Venn diagram suggests that, to the extent that the three domains do in fact overlap, the central area, colloquially known as 'the sweet spot', will be of particular relevance.

In March 1997 Peter Drucker gave a speech to members of the IT Skills Forum (Drucker 1997). His theme was the responsibility of managers to master information management and strategic information systems. He dismissed the contemporary notion of an information revolution; Caxton's printing press had caused that 500 years ago. The challenge for today's managers was to keep abreast of evolutionary change and they now had the technology to help them do so. He recalled his invention, forty years before, of the 'executive control panel' and that the limitations of

the technology then available had defeated his attempts to build a prototype. He foresaw “within the next five or ten years” that managers of even quite small businesses would make everyday use of such a control panel. Those who achieved it first would be the winners.

If Drucker's prediction is right then the three domains must, indeed, overlap. But he spoke of outcomes; he proposed that it was up to others, including organisations like the IT Skills Forum, to make it happen. In order to explore this we must first examine the separate domains.

2.2.1 Theories for information management

If a physical artefact is transferred, possession passes with it. When information is transferred possession remains with the giver. This distinction highlights the innate intangibility of information. From a theoretical viewpoint, information can exist in a range of forms across a spectrum comprised of data, information, knowledge and wisdom. In introducing the concept to managers, theoreticians have found it helpful to express the Information Spectrum in scalar terms (Wiig et al 1997).

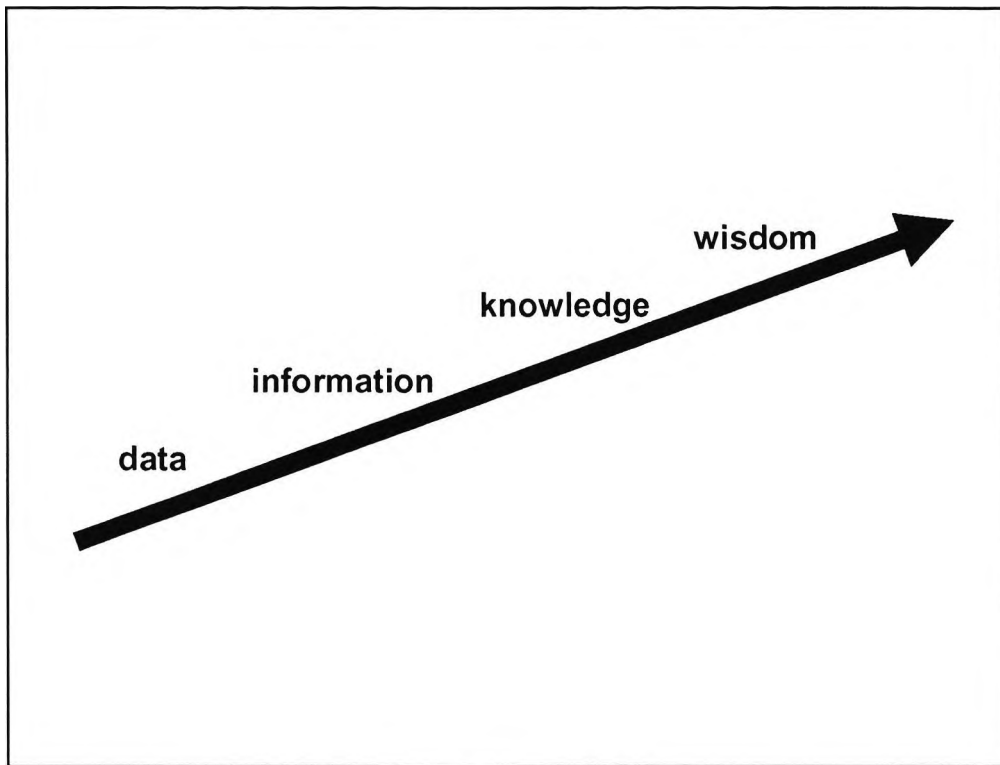


Figure 2: The Information Spectrum

These states have been defined as follows:

Data: 'A representation of facts, concepts or instructions in a formalised manner suitable for communication, interpretation for processing by humans or by automatic means'. [BS3527: Part 1 (1974)]

Information: 'The meaning that a human assigns to data by means of conventions used in their presentation'. [BS3527: Part 1 (1974)]

Knowledge: 'Understanding of information in context' [Ermine 1997]

Wisdom: 'Experience and knowledge applied with judgement' [Holtham 1997].

However, familiarity with this scalar representation has led to criticism. For example, information scientists at a conference panel discussion insisted that the spectrum requires an understanding of signals and semiotics as precursors of data (ECIS 1997). These arguments go beyond the scope of this thesis. On the other hand, Knowledge Management specialists argue that the spectrum is meaningless unless it extends beyond wisdom to 'action' (Young 1998).

Perhaps the idea of a scalar progression made more sense when people spent a lifetime developing their expertise in a particular line of work. Today, the pace of change means that information can quickly become obsolete. This and the end of 'jobs for life' mean that the acquisition of knowledge must be an iterative process. The emergence of flatter organisational structures and the move towards project-based teamwork have raised the importance of shared information and knowledge. Research by the CIA found that "between 70% and 90% of the intelligence a company typically needs resides with employees who collect it while dealing with their suppliers, customers and other industry contacts. The challenge for companies is to create ways to get at that information" (Caudron *in* Sandman & Borska 1995).

2.2.1.1 The knowledge dimension

The concept of shared information exposes a further discontinuity in the information spectrum. What is information to one person may be data to another. But data and information can exist independently of people. For example, it can be stored and identically copied as text on paper or in electronic form in a computing device. However, knowledge and wisdom can only exist in people's heads or, in the case of the craft expert, in the fingertips. Possession is exhibited by behaviour.

So, an expert wishing to transfer knowledge must express it as information. The recipient then internalises this information in the context of his or her own experience or 'worldview'. As a result the acquired knowledge can never be identical to the source knowledge.

The Hungarian philosopher Michael Polanyi helped to bridge this discontinuity with the concept that knowledge exists in two forms; explicit and tacit. The former is amenable to some sort of codification so that it can be 'articulated, structured and made public'. However, the latter defies codification; tacit knowledge is that which remains 'private and unique to individuals' (Polanyi 1956). This idea lay dormant for forty years until it was rediscovered by the Japanese academics Nonaka and Takeuchi. Their book caught the imagination of managers, became an international best seller and spawned a new management discipline – the knowledge-based theory of the firm (Nonaka & Takeuchi 1995).

The possession of knowledge and insight has equated for centuries to power and influence, both for individuals and for organisations (Grant & Baden-Fuller 1995). Grant observes that knowledge-based theory also permits us to look beyond conventional transaction cost analysis to better understand the optimal boundaries of the firm (Grant 1998).

2.2.1.2 The transformation of information

By the early 1980s rapid developments in IT convinced systems scientists interested in artificial intelligence and expert systems that computer memory capacity could be used as a knowledge repository. This would allow a body of knowledge of expert

ideas to be assembled into an 'institutional memory' (Curet & Killin 1991). But it became apparent that knowledge acquisition is "often a slow, costly and difficult process which justly earns the reputation of being the main bottleneck in the production of an expert system" (Neale & Morris 1988). This and the lack of ease of use of the ICT then available consigned expert systems to a scientific backwater.

Since World War II the industrialised nations had gradually changed into 'information societies' (Porter 1990). In the typical advanced economy of the 1990s, the once dominant manufacturing sector has declined below 20% of GDP and the service sector accounts for 70%. This shift brought with it a change in perceptions. Bankers, for example, began to see that their core competency was no longer simply 'dealing with money' but 'dealing with information about money'. Accordingly, the ability to use ICT to manage this information in real time was the new critical success factor (Rockart 1979). But this same ICT posed a threat by allowing new entrants to compete without the expense of physical assets such as branch networks. Those in the creative and consulting professions, with few fixed assets, went one stage further by re-classifying themselves as 'knowledge workers' and their organisations as knowledge businesses.

The theories surrounding Knowledge Management are topical and popular but their bases are long established. Plato taught that we can only have inexact conceptions of things we perceive with our senses but we can have true knowledge of things we understand with our reason (Gaarder 1995). 2,300 years later Wittgenstein argued that almost everything that is most important cannot be stated at all but only, at the very best, indicated by our use of language (Hacker 1997).

The information spectrum implies a scalar development - a best place to be. Argyris and Schon observed that, initially at least, the human error-correction process seeks a better result by trying a new strategem within the original set of 'rules'. They called this 'single loop learning'. But this is not enough – the instructed child will often start to ask “Why?” and seek to change those rules. In a corporate context people need to review experiences in order to make sense of events for future use. They described this as 'double-loop learning' (Argyris & Schon 1978).

Orna and Stevens have made this concept more accessible to managers by depicting a cycle for the transformation of information into knowledge as shown in figure 3 (by courtesy of Holtham; after Orna & Stevens 1995).

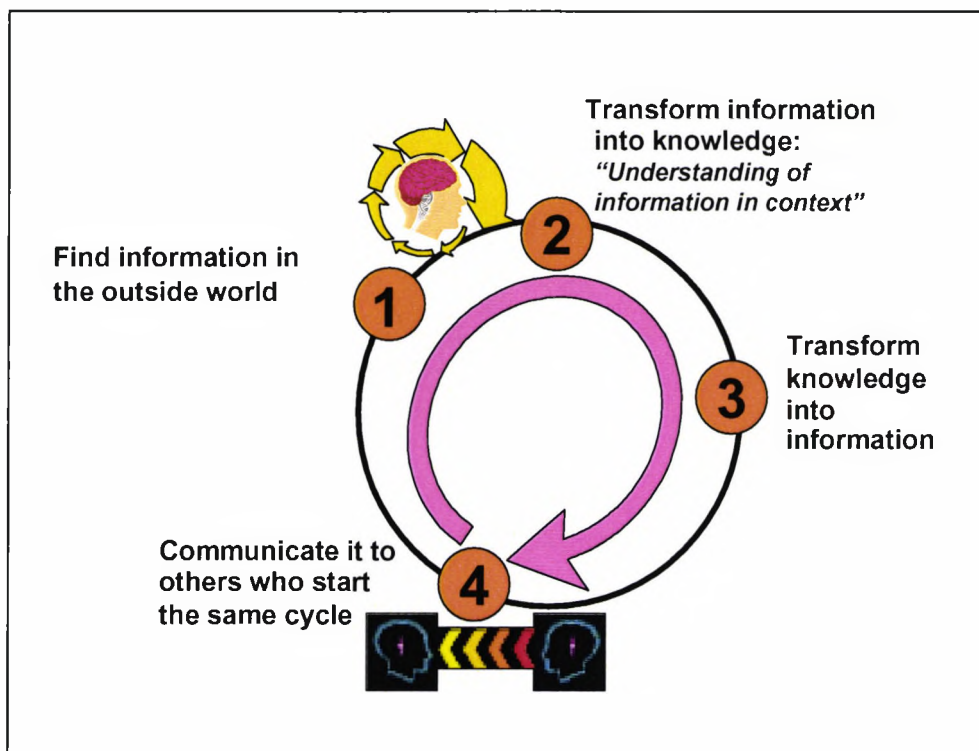


Figure 3: The cycle for transforming information into knowledge

This model clearly depicts a system by which humans engage in an interchange. Tacit knowledge can only, if ever, be transferred by personal interactions. In an organisational context the model is valid for specialist knowledge justifying the time required for the transfer. But if an organisation wishes many to share particular knowledge widely it is more practicable to codify the portion of the knowledge that can be made explicit and then use information systems to deploy it appropriately. Whether these information systems are paper-based or IT-mediated the information cycle needs to be elaborated to reflect the steps in a typical business process.

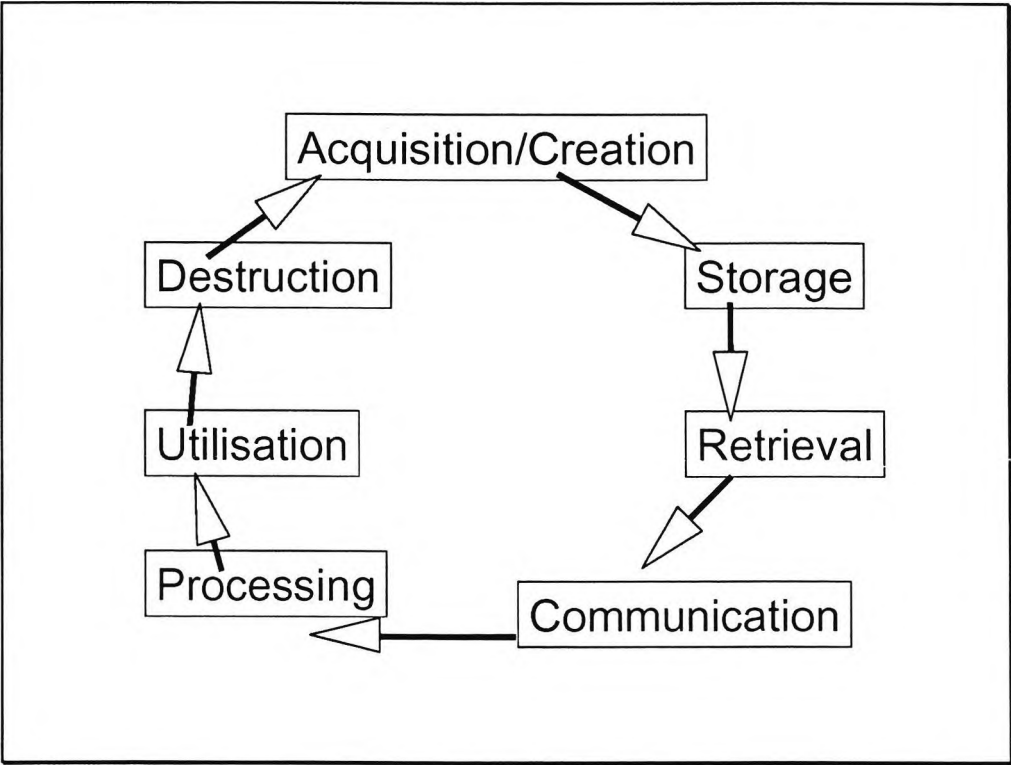


Figure 4: The process view of the information cycle

2.2.1.3 A shortage of memory

Scientists had struggled to use computer memory to drive expert systems. Just as their hopes faded business-people began to realise that the respite gained by mass redundancies in response to the early 1990s recession had been accompanied by a 'hollowing out' of corporate memory (Talwar 1993). For example, the Nationwide Building Society recognised that it had suffered particularly badly "because none of our branch managers had been in post during the previous recession. As the upturn approaches I worry that none has had experience of a boom" (Parry 1993).

But, as Churchill said, the one thing we can learn from history is that people never learn from history (Churchill 1952). As the recession eased a new idea from America seized corporate attention - business process reengineering (BPR). In essence, this remedy promised improved performance by the ruthless replacement of people with machines. By 1995 the critics and victims of BPR complained that it actually stood for 'big people reductions'. When even its progenitors admitted its imperfections it was blamed for corporate anorexia (Talwar 1993).

Consultants had done well out of BPR because it frequently led to lucrative systems integration projects. Andersen Consulting, for example, was consistently posting annual growth in excess of 40% in its published accounts. As the craze for BPR subsided the leading consultancies urgently needed a replacement to keep their large teams of systems integrators busy.

Nonaka and Takeuchi's presentation of a business perspective on knowledge theory (Nonaka & Takeuchi 1995) came as manna from heaven to many jaded managers and consultants. They required little encouragement to believe in ideas that might enable their organisations to capture expertise and knowledge before it walked out of

the door. Although these ideas were expressed in quite theoretical terms, the business community found them intellectually stimulating. The book was a best seller and seminars and conferences attracted droves. However, regular attendance at these events showed that the number of successful case studies was small; the usual suspects appeared repeatedly. The subject of knowledge management was fascinating but many managers were unable to see how they could apply the principles in the workplace.

Consultants reasoned that if an organisation was able to harness knowledge it would need somewhere to store it and some means to redistribute it. Gemini Consulting was among the first with the new offering: Applied Knowledge Management. First, the organisation must make explicit the tacit knowledge underpinning its business processes. Then, this must be made available instantly to whomsoever could add value by using it to delight customers. The result: the 'real-time organisation' (Noble 1997). To make this happen, the computer database became the knowledge base, or 'k-base'. But the redistribution problem was more complex and has involved the domestication of the Internet. This is discussed further in section 3.1.

2.2.1.4 The extraction of business value from knowledge

The purpose of knowledge management is to enable organisations to extract business value from knowledge. During the 1980s Karl Wiig in North America and Karl-Eric Sveiby in Scandinavia resuscitated long-neglected work by Drucker and by Polanyi (Wiig 1997, 2001; Sveiby et al 1987). Peter Drucker wryly recalls that in the 1950s he had described the concept of a manager's 'information dashboard' but had to give up for want of technologies to make it happen (Drucker 1997). Michael

Polanyi had set out to distinguish between explicit knowledge (that which can be codified) and tacit knowledge (eg: that which exists in the fingertips of the master potter) (Polanyi 1956). However, business interest in KM did not take off until the mid 1990s, following the publication of Nonaka and Takeuchi's best-seller, by when information technologies existed that enabled the theory to be put into practice.

The focus of early practical applications tended to vary by geographical region. In the US it was 'knowledge value management'; in Scandinavia, 'intellectual capital management' and, in France, 'knowledge productivity'. These approaches are explained with illustrations below.

2.2.1.4.1 Knowledge value management

This is illustrated by the widely reported case of Dow Chemical (Petrash 1996; Stewart 1998). In the early 1990s Dow was developing a new compound that was expected to produce a large proportion of future revenues. But the scientists got stuck and the board was becoming impatient. The scientists could imagine what the breakthrough solution would look like but they couldn't create it. They surmised that someone may have done so – but would want a King's ransom to share it. Very delicate inquiries were sent to the US Patent Office. The response was that a solution did indeed exist and had been patented. Who owned it? The Patent Office replied; 'You do'.

Dow then realised that it owned some 29,000 patents most of which were known only to the scientists who had created them. A global patent costs about \$25,000 per annum to maintain. The company had to undertake the monumental task of finding

out what it knew. In the process it gauged which patents were valuable. As a result, huge numbers were donated to US research universities. The only proviso was that Dow would have first option to fund promising developments. Almost overnight Dow both greatly increased its research expertise and saved some \$40M per annum in patent fees.

In many ways this approach sets out to apply the financial audit process to intangible assets in order to manage their source and application. US technology vendors were not slow to see a bandwagon coming. Tools proliferated; initially document management systems (such as Lotus Notes and Documentum) and document imaging technologies, then more outward-looking Internet-based solutions and intranets (Brooking 1996).

Today, online searchable knowledge repositories are widely employed – particularly in consultancy and legal professions (Susskind 1999; Gottschalk 2000). And they are being taken up by public sector organisations such as Surrey Police, Metropolitan Police and HM Customs & Excise (Courtney 1999).

2.2.1.4.2 Knowledge capital management

This approach started in Scandinavia and stems from the belief that goodwill, monopoly position or sentiment do not adequately explain the difference between market capitalisation and net worth. This is particularly pronounced in knowledge businesses like Microsoft and was demonstrated recently by the float of Salomon Brothers.

Lief Edvinsson of Swedish insurance company Skandia deduced that the difference represents, at least in part, the intellectual capital of an organisation (Edvinsson et al 1997). Skandia had found it took two years to establish a profitable presence in a foreign country. This was hampering growth and depressing the share price. Edvinsson worked with Sveiby to develop Sveiby's Intangible Assets Monitor [see <http://www.sveiby.com.au>] to facilitate the flow of knowledge from human capital to knowledge capital. This Intellectual Capital Index (ICI) methodology measures the change in the value of knowledge rather than its absolute value. Skandia applied the method to its own business and took the unprecedented step of publishing the ICI pseudo balance sheet as an appendix to its annual report to shareholders. This convinced staff that it would be worthwhile to share and develop what they knew. As a result Skandia became able to open foreign branches that became profitable within six weeks. The share price shot up.

This approach has spread abroad and is now being examined by US government committees as a possible means by which accounting standards can more accurately reflect business realities (Stewart 1998; Skyrme 1999).

2.2.1.4.3 Knowledge productivity

The third category is demonstrated by the work of the mathematician Jean-Louis Ermine at the French Atomic Energy Commission (CEA). France has very little fossil fuel and depends on nuclear power for over 80% of its energy requirements. The international test ban treaty preventing further atomic explosions at Muraroa Atoll meant that the design of future reactors and weapons must be derived from knowledge in the heads of France's nuclear scientists, an increasing number of

Chapter 2: Literature review

whom are approaching retirement age. The issue was prioritised by the French cabinet as one of national importance. Ermine's solution enables groups of experts to create a 'knowledge book' that codifies the actions they would take in each circumstance (Ermine 1996). This process, Methodology for Knowledge Systems Management, has proved so powerful at CEA that the ten largest French companies have adopted the methodology successfully (Ermine 1997).

In principle each of these approaches can be implemented without the aid of ICT. In practice, ease and speed of access to very frequently updated knowledge makes the effective use of ICT a *sine qua non*. One of Ermine's knowledge books enables the legal profession in France to access online and navigate 550,000 jurisprudence cases (Ermine & Coquand 1997). The ICT is merely an enabler. The critical factor is the motivation of experts to share the know-how that equips them to earn a high salary.

Case studies researched for this thesis suggest that this unlikely behaviour can be stimulated without recourse to money. It is more likely to occur if clearly related to career progression or simply to the wider long-term interests of the organisation. At CEA, for example, prominent acknowledgement of collaborators has enabled the creation of priceless knowledge books (Ermine 1996). In the UK, knowledge-sharing lawyers, underwriters and managers have seen their incomes leap when their codified knowledge is made available to clients for 24 hours per day (Holford 1996).

2.2.2 Theories for strategic information systems

A strategic information system can be simply defined as a system that conveys information with strategic potential. The method of transfer can be verbal, written or via some form of technology, often in combination.

Evidence of such systems survives from antiquity. The cave paintings at Lascaux date from 10,000BC when life expectancy was barely 25 years. Arguably, their purpose was to enable tribal elders to depict effective hunting techniques for the benefit of future generations. The earliest known scripts are on baked clay tablets from Mesopotamia in 3500BC. The glyphs, impressed with a reed, have been deciphered by experts at the British Museum. They are not poems or religious texts; they record administrators' harvest tallies (Holtham 1998). This purpose characterised the Domesday Book.

In more recent times, military intelligence has tackled the problem of distance with semaphor, the Aldiss lamp, carrier pigeons, radio etc. However, the telegraph was invented to reduce accidents on railways, before the concept of time zones. News of the unexpected British victory at Waterloo was sent by pigeon. The birds returned to their suppliers, persecuted Huguenots including the DuBuisson and Rothschild families who had fled to the UK. Grasping this windfall of strategic information the Mrs DuBuisson and Rothschild raced to the London stock exchange and founded their families' fortunes (DuBuisson 1995).

Simple techniques during WWII led to more accurate delivery. Sir Fitzroy Maclean used the public telephone in Axis countries to report troop movements to London. In the Whitehall bunker Churchill was briefed by means of short notes stuck on the wall outside his bedroom. Operations rooms enabled staff officers in glazed mezzanines

to see flags denoting allied or enemy planes moved across a table map by WAAF in radio contact with pilots. The world's first electronic computer was developed at Bletchley by Alan Turing and his team to decipher the Gestapo's Enigma machines (BCS Bulletin 1999).

Despite the obvious effectiveness of such systems several decades passed before business thinkers began to see the potential for computers to be used strategically as well as to automate (Beer 1972; Rockart & DeLong 1988; Keen 1989). The first business computers were huge, both in terms of size and expense. Watson, the head of the then nascent International Business Machines (IBM), famously remarked that there would only ever be a market for five such machines.

These machines, typically occupying several rooms, were fragile. One of the first in the UK was used for the Army payroll. Its water-cooled valves, the size of marrows, were notoriously unstable and demanded the constant attention of engineers (Best 1980). It is probable that such early purchases were influenced more by engineers and scientists than by managers. Nevertheless, by the 1970s advances had attracted many large businesses to invest in machines to speed up accounting systems.

This trend was accelerated by the effect of Moore's Law combined with the liberalisation of telecommunications (see chapter 1). Dramatic increases in computing functionality, accompanied by plummeting costs, soon took economies of scale to unprecedented levels. When revenue growth dwarfs the cost of new product development a 'virtuous circle' can take hold: better and cheaper computing devices drive sales of these devices which fuel the development of better and cheaper devices ... and so on (Tapscott & Caston 1993). For example, the advent of the

digital watch was greeted with such customer enthusiasm that the cost of a processor or 'chip' was driven down from £3 to 3p within a year and the initially expensive innovation became a petrol forecourt freebie.

Although effective information systems can be paper-based, the domain of strategic information systems is characterised by a focus on computer-assisted facilities. By the mid-1980s organisations that had worked out how to integrate their information systems with telecommunications were seizing the competitive advantage (Keen 1988). Although some best practice organisations in the US were reported to be exploiting the capabilities of IT in new, strategic ways (Rockart & De Long 1988), Claudio Ciborra observes that the academic study of the alignment of business and IT was already faltering for want of agreed metrics (Ciborra 1997).

In the US the response was to concentrate on creating organisation structures and behaviours that relied on the extensive use of information systems. In rapid succession, many American executives became entranced with IT-enabled transformation (Scott-Morton 1991); business process re-engineering (Hammer & Champy 1993), distributed IS architectures (Donovan 1994) and organisational renewal (Gouillart & Kelly 1995).

The rapidity with which all these initiatives have waxed and waned not only evidences a relative lack of effectiveness but also reflects the emergence of 'fad-ism' among managers desperate to find a silver bullet that would cure organisational pathologies (Pascale 1992).

In the UK the quest for an effective solution tended to focus more on new managerial roles. Michael Earl proposed that, for an organisation to tap the strategic potential of IT, top management must decide the role of IS and IT (Earl 1989). The British

Computer Society responded immediately, in collaboration with Earl, to promote the 'hybrid manager' – defined as "a person with technical skills able to work in user areas doing a line or functional job, but adept at developing and supplementing IT application ideas" (Keen 1988). To offset the implied technical bias, Earl added two further roles: 'leaders' – business executives who can drive the exploitation of IT; and 'impresarios' – IS managers who can propel the organisation into strategic consideration of IT (Skyrme 1996).

Meanwhile, Holtham was developing the concept of the New Information Professional. This hybrid role was more rooted in the information management domain long frequented by librarians and other specialist information scientists (Holtham 1992).

While Earl and Holtham both proposed that the relationships between these types of behavioural roles would determine organisational effectiveness, Mary Boone observed a more singular phenomenon in practice. She interviewed sixteen top-flight American executives who attributed their success in large measure to personal computing abilities which they employed 'to communicate, coach, convince and compete' (Boone 1991).

Boone conceded that her sample of exemplars was atypical. Her point was that the benefits these individuals had achieved, both personally and for their organisations, ought to motivate Luddite managers to try harder to improve their IT skills. In the UK, enthusiasts for the hybrid manager concept soon learned that it required long-term commitment. But the deep recession between 1989-92 demanded short-term strategies for survival. Business process reengineering promised the necessary

'quick fix' but also required senior non-technical managers to grasp the capabilities of IT.

Faced with this dilemma managers were happy to take the advice of consultants and place some or all of their IT in the hands of specialist contractors - a practice known as outsourcing (Brewer 1993). Those responsible for information systems in large businesses such as ICI and British Gas justified this step to their boards with diagrams resembling figure 5 (Limond 1996). By adopting this policy ICI reduced its world-wide workforce of IT specialists from 1500 to 30 overnight (Sykes 1997).

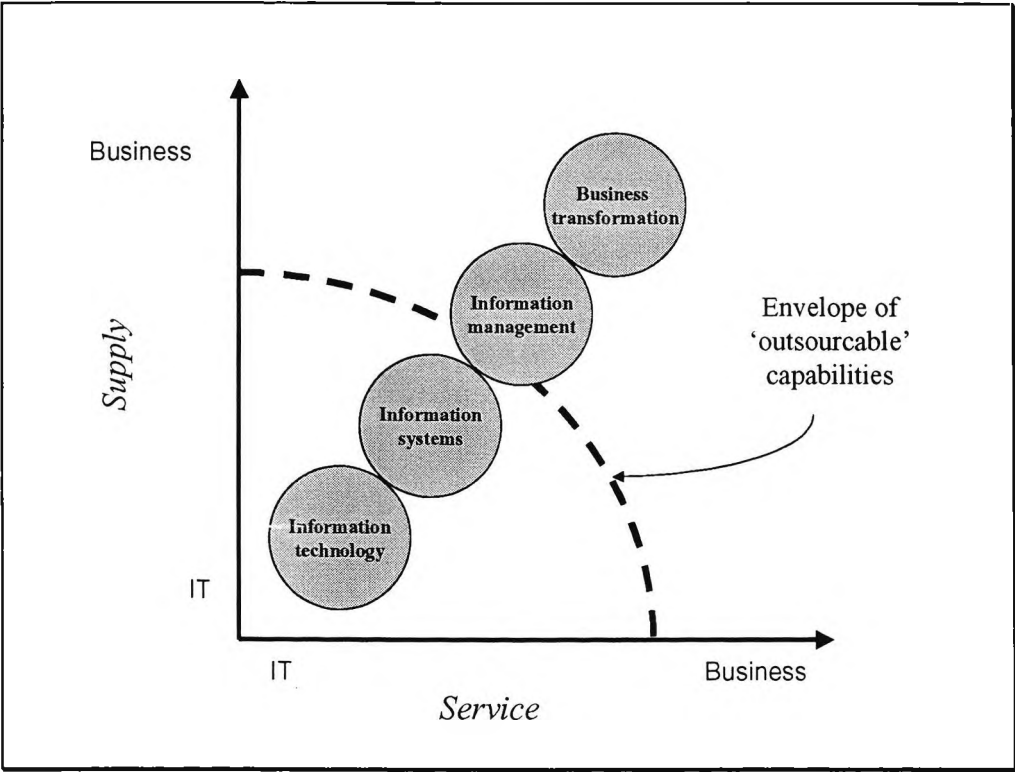


Figure 5: The envelope of out-sourcable capabilities

The outsourcing offer entailed buying the client's IT systems and taking on its IT staff. Clients were able simultaneously to get rid of a poorly understood problem and reduce headcount without upsetting the trades unions. Outsourcers offset the high risks by insisting on long term contracts, typically of ten years (Stone 1995). The profitability of pioneers such as EDS soon attracted IT vendors like IBM and ICL to enter the market. By 1997, the UK financial services sector and central government had both outsourced more than a fifth of all IT, mainly to a handful of major players (Nicolle 1998).

This practice flies in the face of 1980s thinking that saw the exploitation of IT as the key to competitive advantage (Rockart & DeLong 1988). Clients justify their expediency by the rapidly increasing complexity of ICT and re-classifying it as a 'non-core' business activity. However, some executives worry about their decision. At interviews with top managers at global investment banks, three quite independently averred that if the IT systems went down for one whole day their bank would never recover and have to close (Holtham & Courtney 1995). Organisations disenchanted with their outsourcer have found it difficult, if not impossible, to reverse the process and resume control of their IT (Noble 1998).

This deliberate ejection of IT expertise was exposing the paucity of executive understanding of strategic information systems and the major consultancies were having a field day at their expense. A major survey report by the West London Training & Enterprise Council provided the stark evidence. Directors of a sample of over 700 UK businesses admitted that their own lack of IT skills, and that of their managers and staff, constituted a major barrier to profitability and growth (WLTEC 1993). This government-funded report was widely distributed. In 1994 executives representing some of the largest UK businesses got together and compared notes.

They recognised a shared problem; in each case their top management cadre was more or less incapable of participating meaningfully in information systems strategy.

Several of these organisations were trying urgently to initiate management education programmes. For examples: at GrandMetropolitan, for the top 100 managers; in the Post Office, the top 300; at British Airways, about 1000. These initiatives aimed to emulate Boone's exemplars; managers who not only had a good grasp of the strategic capabilities of ICT but were also used ICT competently in their daily work. Except at BA, with its Catalyst 2000 project and the Quest centres for individual IT training, the results had not been electrifying (Bradley 1996). The lack of IT awareness at board level was leading to blocked or ill-judged IT investment decisions (Holford 1995). But foreign competitors rejoiced that these directors saw no disgrace in boasting that they would retire without ever having touched a computer (De Feo 1995).

As a result of this first informal meeting the participants decided that, rather than each pay consultants to tackle the same problem, they would pool resources for the common good. A not-for-profit company was set up – the IT Skills Forum – and the founding 20 member organisations put up non-executive directors and subscribed funds for engaging subject experts in the joint development of practical solutions. The key factor was that member representatives would participate directly in all research activity. This would ensure, firstly, that solutions would be practical and to-the-point. Secondly, that members could take advantage of work in progress rather than wait for an eventual report.

The primary objective of the forum was expressed simply by the board as: 'to enable managers to get their arms around IT for business benefit' (Sykes 1997). In

February 1995 the Forum engaged the author under a consultancy agreement to fulfil the role of research director. The remit was to bring about effective executive education programmes in the strategic use of ICT. The outcomes are described in chapter 5.

2.2.3 Theories of management learning

There is a long-standing tradition in management education of using case studies abstracted from real situations. This is at the heart of the Harvard approach (McNair 1954), itself developed from the traditions used in the Harvard Law School at the end of the nineteenth century. It is also worth noting that medicine has an educational tradition that is based on both live and second-hand case studies.

During the 1960s a movement began in favour of a 'less classroom, less hierarchical' form of management education (Revans, 1978), rooted much more in managers analysing their own situation and in sharing their experiences with peers. The proposed process would require a physical environment, not dissimilar to the *atelier* of an artist, to be created for accelerating practical learning of both novices and more experienced practitioners (Argyris & Schon 1978). This approach – a form of action learning drawing on Piaget's fundamental work and described by Vygotsky as "the process whereby human development occurs" - led to Kolb's observation that "experiential learning is a process that links education, work and personal development" (Kolb 1984) and to the concept of the reflective practitioner (Schon 1983).

Many educationists have proposed spectra of learning processes. These highlight distinctions between education, practical and work experience (Ashton & Easterby-Smith 1979) or broad awareness, attitudes and skills (Taylor & Lippitt 1975). The consistent theme here is that the methods used will involve short steps, participation, feedback and interaction.

A premise of educational psychology is that we are all born with a preferred cognitive style, be it holistic, versatile or serialist. Extensive survey work has enabled learning style to be expressed in terms of two fundamental dimensions: verbal/imagery and wholistic (sic)/analytic (Riding & Cheema 1991). Riding arranges these orthogonally to map individual characteristics to the most suitable form of technology-assisted training (Riding 1996). Honey and Mumford's 'Manual of Learning Styles' (Honey & Mumford 1982) made these psychological concepts more accessible to managers by providing diagnostic tools based on Kolb's learning cycle model (see section 4.1).

Personal circumstances will also determine when off-the-job or on-the-job learning options are appropriate (Easteal & Thomas 1984). Observers of training for managers in practice came to the conclusion that it should be less concerned with formal courses than with a mix of reading, interaction and first-hand experience (Markwell & Roberts 1969).

2.2.3.1 The importance of metaphors and transitional objects

Work in the field of child psychology (for example, at the Tavistock Institute during the 1950s and 60s) has examined the significance of 'transitional objects' which provide emotional support to children as they unlearn earlier theories and make the

transition to more accurate theories (Winnicott 1965). Seymour Papert has applied the findings in his work on the education and development of IT skills in school children. A physical artefact helps them to translate information into knowledge for evaluation (Papert 1980).

2.2.3.1.1 *The theory behind 'transitional objects'*

Behind these ideas lies the concept of mental models. The way in which a person responds to events is shaped by his/her accumulated experience, or 'worldview'. In infancy we develop largely through direct, tactile experience and through eye contact. As we mature we learn to absorb lessons indirectly. At the age of about three months the human baby starts to follow the gaze of its mother. The mother's facial expression tells the baby if the thing being viewed is 'good' or 'bad'. This is the first sign of the intelligence that distinguishes humans from other primates (Miller 1999).

In due course those entering the business environment begin to develop their worldview by accommodating business experiences. Initially, the novice manager has no yardsticks by which to gauge a new event. This vacuum is filled by internalising experiences as profusely and rapidly as possible.

At this stage the accent is on acquisition. In terms of the Information Spectrum, the material being collected may be likened to data. As the volume increases the manager needs to mentally sort and categorise the collection to provide it with context. In this way the collected data is converted into actionable information. This sense-making process allows the manager to derive additional meaning by making connections between experiences. Selectivity is also improved because the

manager is better placed to discern what he/she needs to know in current circumstances.

As managerial expertise increases, less detail is required in order to absorb new information into the mental model. The connections made convert information into knowledge. In the very experienced manager an allusion or metaphor can be sufficient to trigger an appropriate connection. In terms of the Information Spectrum this accumulated knowledge may be likened to wisdom.

2.2.3.1.2 *The application of transitional objects in business*

Wastell observed that, in the field of information systems design, transitional objects can help overcome learning dysfunctions (Wastell 1999). The author's first hand experience of interviewing senior non-technical executives has shown that giving them to handle a physical artefact in the form of a transitional object can very quickly open up meaningful discussion of a complex IT-related concept.

One such (see section 1.5.1) was created and used during interview-based research into management perceptions of client-server technologies (Holtham & Courtney 1995). The work started with extensive discussions with subject matter experts, including those who understood the technology and those accustomed to marketing and selling novel technological solution. This led to the formulation of a theoretical model that place the technology in a business context: a technology infrastructure helped an organisation to hold out its offerings to the marketplace. A client-server architecture increased flexibility and market responsiveness by enabling an organisation to select and combine IT products and services from a range of vendors

and thereby support more effectively the way its people and processes actually worked.

This theoretical model is depicted in figure 6:

***Open Client-Server Enabled
Service Delivery Processes***

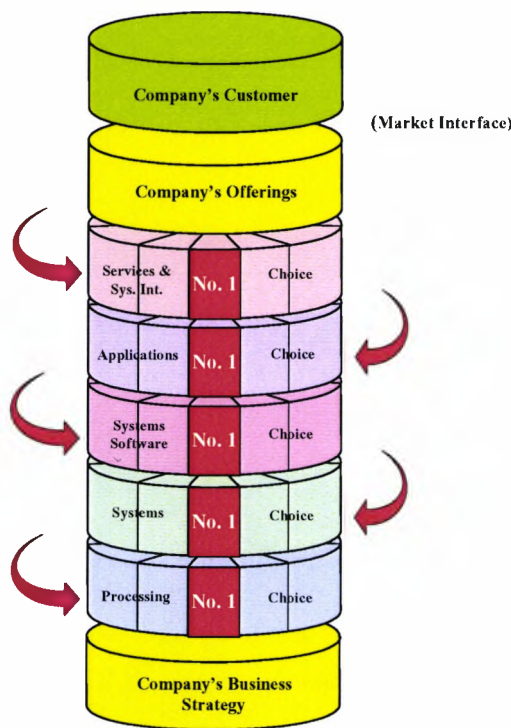


Figure 6: The theoretical model explaining client-server architecture

The research project required the model to be tested with senior executives in organisations that were early adopters or potential users of the proposed solution. Client-server architecture was then a relatively new concept and in the research report, the model had required 7 pages of explanation. The interviewee sample was

predominantly to comprise of directors of global investment banks. Given the limited time such people can allow for an interview, a lengthy explanation would be counter-productive. Clearly a device was required that would convey the issue almost instantly and allow the time to be spent exploring its meaning and potential. The author decided to make a physical artefact that represented in three dimensions the components of the theoretical model and their dynamic interaction.

This artefact was a 'transitional object', the theoretical origins of which are described in section 8.2.2.2. As will become apparent in further sections, this concept was to be an important component of this thesis.



Figure 7: A transitional object to convey the client-server concept

In this case, it was immediately clear that it helped interviewees to grasp within seconds what was then a novel and complex proposition. As they internalised meanings from the object some interviewees likened it to the wheel mechanism of a 'fruit machine'.

Another example is Andersen Consulting's 'strategy pegboard', conceived of to explain the complex issue of change in an IT-mediated business environment. This transitional object is in the form of a cribbage board, representing the business strategy, with pegs sculpted to represent process, people and technology. A fine elastic thread joins the three pegs. A change programme must involve all three, in harmony, if it is to be effective. If any peg is advanced along the board too far ahead of the other two they all tumble.

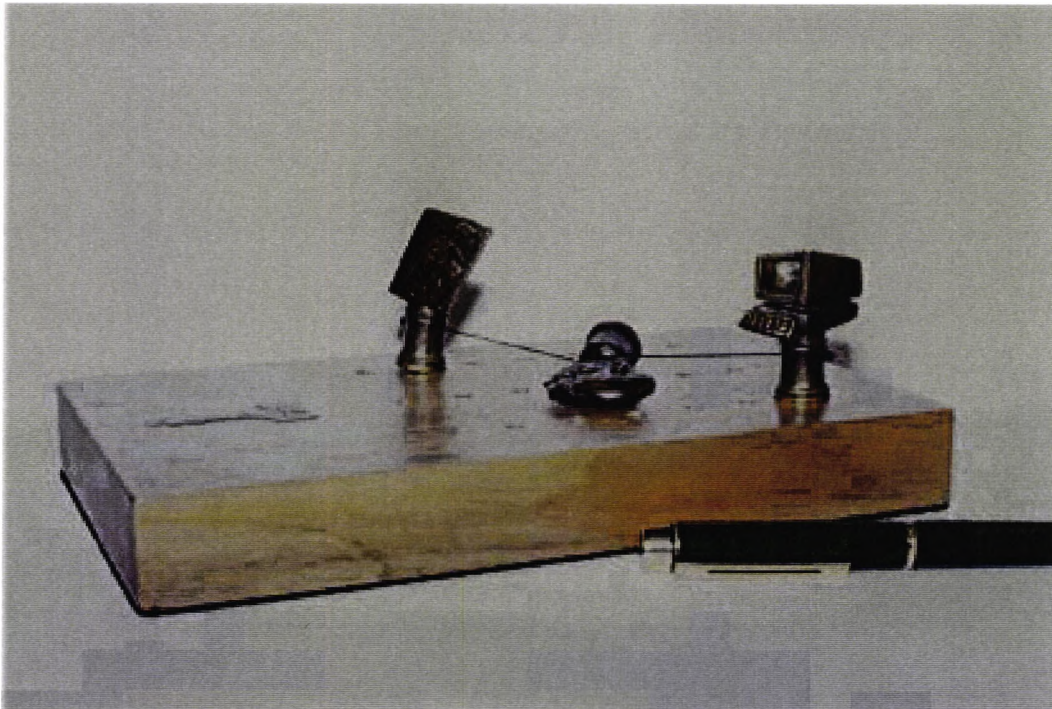


Figure 8: The 'Strategy Pegboard' transitional object

The transitional object conveys in seconds, and persuasively, a concept that might otherwise require lengthy explanation and debate. Typically the executive's immediate response is 'OK; so how should we design a holistic change programme?'

As Alan Kay, the Apple Fellow, has said: "A picture is worth a thousand words; a metaphor is worth a thousand pictures". Chapter 5 reports the results of creating and deploying a series of such objects - both original and created by third parties.

During the preliminary research the reaction of non-technical executives and IT directors to the same transitional object was compared. The latter group tended to indicate that it reinforced their mental model of business-IT alignment. Among the former group, it was more likely to catalyse lateral thinking and exploratory thought processes.

2.3 A summary of key messages

In terms of the development of managerial competencies in the strategic application of ICT, the theories addressed in this section can be grouped into three categories. One of the most discussed categories relates to re-thinking the traditional 'user' and 'IT professional' dichotomy, with particular reference to developing the intermediate or hybrid category, as ascribed to Earl. Secondly, there are theories that delineate specific skills that managers need to develop (Dulewicz & Herbert 1996). These theories go on to propose equally specific methods – usually education and training – through which these skills can be enhanced. Thirdly, there are holistic theories, which propose that skills be enhanced in close conjunction with, for example, organisational development approaches.

Chapter 2: Literature review

Tannehill stressed the importance of motivation to the role of the manager as educator, coach and counsellor (Tannehill 1970). More recently the trend has been to promote personal responsibility for on-going learning (Senge 1990). From this has emerged the belief that personal development must embody a willingness to share information and knowledge so that the entire organisation can become a 'learning company' (Pedler et al 1997).

But as the writer Eric Hoffer warns us: "In times of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists" (Brown 1997).

This literature survey, combined with the prior and concurrent preliminary fieldwork, had led to a point at which clues about common factors between the three areas of concern were beginning to emerge.

Certain contributions to each literature domain, as relevant to the intersections of the three domains, had begun to particularly influence the author's thinking:

2.3.1 On information management

Salient contributions:

Knowledge-based theory of the firm	Grant
Measurement of 'institutional memory'	Edvinsson
The 'learning company'	Pedler / Senge

In summary these say:

effective information management is a key success factor for individuals and organisations alike in an increasingly fast-moving world. The sharing of information and explicit knowledge between individuals is affected by context, experience and presentation. In an organisational setting the large volumes of information demand systems that allow the extraction of business value from intelligence. In both cases the appropriate application of ICT greatly increases effectiveness.

2.3.2 On strategic information systems

Salient contributions:

Alignment of business and IT

Scott-Morton / Ciborra

New roles and competencies (eg: 'hybrid') Earl / Holtham

In summary these say:

in strategic information systems theory there is a dichotomy between personal and enterprise-wide approaches. Individual managers often need personal coaching to equip them to use the IT they expect their staff to employ. At the enterprise level the focus should be on roles rather than posts. Relationships between business and technical roles must be fostered if the organisation is to exploit the strategic capabilities of ICT for business benefit.

2.3.3 On management learning

Salient contributions:

Learning strategies and styles

Riding / Easteal+ / Markwell+

Action Research

Kolb / Argyris & Schon

In summary these say:

in management learning there is now an awareness that executive education must be 'mass customised'. Managers tend to dislike formal courses, partly because their work tends to involve urgent and multiple agendas. They learn more quickly in interactions with peers and when new information is presented appropriately. A practical skill will be mastered if and when it clearly aids the manager's work.

In theory, the solution to the research problem will be rooted in these common factors. If they can be crystallised a hypothesis can be formulated as the basis for the testing and evaluation of possible solutions. This is discussed in chapter 3.

3 Hypothesis

By early in 1995 this examination of the three literature domains had highlighted some theories of particular relevance to the research problem.

3.1 Common factors in the literature

At the start of chapter 2, the three literature domains were represented as overlapping circles (figure 1 on page 36). The initial desk research found evidence of overlaps or common ground between pairs of domains. However, it elicited scant evidence, in 1995, of a literature that described the area where all three theory-domains overlap. On the face of it, this suggested that the three domain-pairs did not in fact overlap:

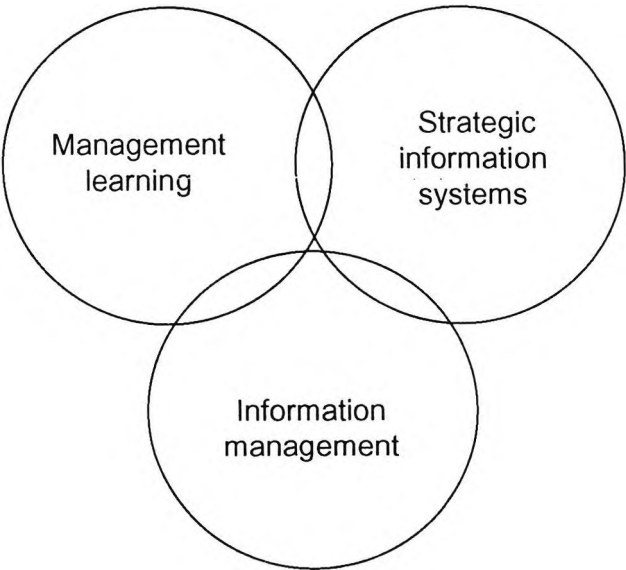


Figure 9: When all three literature domains do not overlap

The existence of this possibility threatened the entire project. And yet contemporary, first hand case study research by the author indicated that some leading executives had been able to persuade their boardroom colleagues to invest simultaneously in all three domains and, in the process, had made their businesses into 'real time' organisations and propelled them to the top of the 'Most Admired Companies' survey compiled annually by Management Today.

Examples include Jim Noble, then IT director of Trafalgar House and now Chief Information Officer of General Motors in Detroit; Joseph De Feo, then Group Head of IT at Barclays Bank; and Dr Richard Susskind, then Special Advisor on IT at Masons Solicitors and now chief advisor to Lord Woolfe on the IT-mediated transformation of legal process.

In 1995 Barclays invested £1Bn to develop its prowess in the three domains (Mills 1996). At HP Bulmer, the Hereford cider maker, the investment of a mere £300,000 had enabled the company to dominate its sector to the extent that its two nearest rivals had been forced into a defensive merger (Dr Martin Wynne in Courtney 96b).

These examples, drawn from a portfolio of 38 first-hand, contemporary case studies by the author, gave comfort to the idea that there was, indeed, an overlap between the three literature domain-pairs and that the ability to describe this overlap was of particular relevance to the research problem. On the other hand, these instances, being localised, could be atypical. In order to establish whether or not this is the case, it is useful to look at a set of historical events that appears to characterise more broadly a bridging between the three domains. One such example that could qualify is the domestication of the Internet, referred to in section 2.2.1.3.

Chapter 3: Hypothesis

By 1995, many businesses had connected their IT systems via local area networks but, in the real-time organisation described by Noble, access must be extended to suppliers, customers and the increasingly peripatetic workforce. At that time, an alternative global data communications infrastructure, the Internet, had been widely used for a decade. These users were mainly scientists and academics to whom it offered open access; no-one owned it and it was unregulated. To IT departments tasked with the security of corporate data, the Internet was potentially dangerous. Besides, technical issues such as Internet Protocol were seen as the stuff of telecommunications specialists. As a result it was not a widely used business tool. Indeed some multinationals, like ICI, had made it a punishable offence to use the Internet during working hours (Sykes 1996).

The Internet exploits all components of the global telecommunications infrastructure by using any copper, fibre optic, satellite and ultrasonic transmission media that is available at the instant required. It does this by a technique called packet switching. When a message is addressed to a recipient the system divides it into small, labelled packets of data and sends each by the quickest route, using standardised computer code and procedures collectively known as Internet Protocol. At the destination address the packets are re-united and presented. Take the analogy of a goods train. It could be delayed by a track failure. But if each wagon was uncoupled, labelled with its destination and place in the train and then sent off by different routes, the signalbox system would see that it arrived to rejoin its partners.

The Internet originated as a strategic defence initiative in the late 1960s, when the Cold War was at its height. US Defense agencies realised that the government's ability to communicate would be lost if a major telecommunications switching centre was destroyed by an enemy missile. The solution was to inter-connect these

switching centres to provide alternative routes through the network. Scientists used computers to monitor this connectivity and then worked out how to send data between these connected computers.

By 1989 this ability to send electronic messages, or 'email', was hardly used outside the scientific and academic communities who had the time and expertise to master Internet Protocols. At that time Tim Berners-Lee, an English physicist working the atomic particle research laboratories at Cern, discerned an alternative perspective on the Internet (Riley 1998). It was a global communications network; but it could also be viewed as a huge web of inter-linked computing devices. If a chunk of information residing on a computer in this 'World Wide Web' was given a unique address then one could retrieve a copy of that information.

A method already existed for attaching a label to a piece of digitised data – standard generalised mark-up language (sgml). Berners-Lee developed a simplified version called hypertext mark-up language (html). By associating this with the Internet domain-naming convention an item of information could be given a unique address. Berners-Lee then designed and made freely available an application called Mosaic that enabled a user to search, or 'browse', the World Wide Web for a specified piece of information and then view it.

His young assistant, Marc Andreessen, decided to leave Cern to develop a commercial version of Mosaic. He named his firm Netscape and the product Navigator. It was seized upon by computing enthusiasts but ignored by the business community. Few firms had embraced the Internet and even the major IT vendors, including Microsoft, treated the Internet as an aberration and a distraction.

Chapter 3: Hypothesis

Clearly, Navigator would only become useful if and when large numbers of people felt it worthwhile to endow their information with a unique and published address (Czerniawska & Potter 1998). Andreessen responded in 1993 by taking the unprecedented step of giving away his commercial product to individuals and reserving the right to charge a modest licence fee to corporate adopters. The strategem worked and a growing number of organisations was happy to buy a licence to enable staff to access this growing treasure chest of information.

Netscape Navigator rapidly became a 'killer application'. This slang term is widely used in the IT industry to characterise a software solution that transforms the way work is done and so creates a competitive advantage in areas that are critical to an industry. Navigator is an information sharing tool. Each time the programme is copied and employed the number of many-to-many links increases exponentially and so the application spreads like a virus, quickly wiping out the less effective applications that had prevailed previously.

Until then, the distribution of business information had mainly been restricted to expensive and private 'local area networks'. Netscape's browser allowed businesses cheaply and easily to exploit the Internet as a global communications medium.

Corporate users were very attracted by this but remained deeply concerned that this openness made their private information accessible to unauthorised people intent on mischief – ie: hackers. One way to reduce this risk was to impose password controls, or electronic gateways to the Internet, to limit access to their databases. In effect, they annexed part of the ownerless Internet infrastructure to create a private network. When this is restricted to employees it is called an intranet; if it is accessible to

Chapter 3: Hypothesis

authorised outsiders it is an extranet. A third alternative was to post a corporate website for the world to see.

By 1995 these very rapid changes forced major IT vendors like Microsoft and IBM to admit they had been wrong-footed. Their belated attempts to regain the initiative affirmed the Internet and the World Wide Web as the principal communications infrastructure for business computing. Despite some questionable marketing tactics designed to destroy the upstart Netscape, America On Line paid \$4.2bn for the company in 1998 (Ayres 1999). In July 2000 the Financial Times reported that, in the UK, 38% of companies had established an intranet, 42% used an extranet and 58% maintained a corporate website (Connectis, 2000).

This fundamental shift made the recently popularised theory of knowledge management (Nonaka & Takeuchi, 1993) a practical possibility. The corollary is that it also contributed to the globalisation of business. Today, the corporate view is that it is immaterial where information is processed or stored as long as it is instantly accessible to those authorised to have it. EDS, for example, processes all Amex's global transactions on a Cray supercomputer that happens to be located at Stockley Park, near London. At the press of a button, the work can be transferred to a sister installation in Rio de Janeiro (Stone 1995). The bank accounts of First Direct's customers are processed on large computers in Leeds. When the staff goes home their work is continued by subcontractors living in India. The work follows the sun but the data never leaves Leeds (Wilson 1998).

So, in the space of a few years, the Internet has moved from being a technical curiosity viewed with suspicion to become an everyday part of the business environment. What led to this transformation? Was the Internet promoted by

corporate IT specialists or pulled in by eager managers? Neither. In general, both communities resisted it. The more credible reason is that 'hybrid managers' (Earl 1989) and 'information capable' executives (Wright 1997) saw that it could help them to deal with the business drivers they faced.

The concept of the hybrid manager had evolved since 1989. The original 'pure' concept had been derailed by the global recession and the discovery that cultivation of the required blend of technical and business skills is a long job. Architects know that it takes seven years to produce a comparable blend for their own profession.

New variants of hybrid have evolved. One type is comprised of middle managers who have been cast out by Business Process Re-engineering and obliged to start their own small firms. To survive, they needed connectivity and mobility. The ability to exploit the Internet not only offered this but also enabled them to compete against larger organisations weighed down with rules, regulations and fixed assets. A second type was being nurtured by consulting firms in response to client demand for systems integration skills. To be effective these peripatetic workers needed to access and subscribe to their employer's secure knowledge bases, and each other, at any time.

To perform effectively, both types of hybrid have had to learn quickly, often from each other, how to develop and use IT-mediated information systems. The fact that sufficient of them have succeeded has been a significant factor in the subsequent widespread adoption by business of Internet-related facilities.

This instance may be but a microcosm of the broader research problem but it substantiates the precept that the three theory domains do indeed overlap. This common ground is concerned with the development of managerial competencies to

apply ICT strategically in order to extract business value from information and knowledge - in short, with 'executive IT skills'. In pursuing this central theme it is acknowledged that when theories in the three domains have been centred either on the individual or the enterprise they have been only partially successful. It appears that an holistic approach is required for success.

3.1.1 Definition of 'Executive IT Skills'

It should be emphasised here that the executive IT skills referred to in this thesis only embrace hands-on skills of any type (eg: application package, e-mail, office software or co-ordination technologies) to the extent that these directly assist the executive in his or her everyday work. Much more important are those skills that enable executives to identify business benefits that are potentially available from the deployment of effective information systems. This was the goal highlighted in the 'IT skills in the 90s' report (West London TEC 1993).

3.1.2 Theories of IT skills development for executives

The executive IT skills of interest here can be grouped into three categories. One of the most discussed categories relates to re-thinking the traditional 'user' and 'IT professional' dichotomy, with particular reference to developing the intermediate or hybrid category, as ascribed to Earl. Secondly, there are theories that delineate specific skills that managers need to develop (Dulewicz & Herbert 1996) and then propose equally specific methods - usually education and training - through which these can be enhanced. Thirdly, there are holistic theories, which propose that skills

be enhanced in close conjunction with, for example, organisational development approaches and technology-enabled business performance improvement initiatives (Donovan 1994).

Tannehill had stressed the importance of motivation to the role of the manager as educator, coach and counsellor (Tannehill 1970). More recently the trend has been to promote personal responsibility for on-going learning (Senge 1990). From this has emerged the belief that personal development must embody a willingness to share information and knowledge so that the entire organisation can become a 'learning company' (Pedler et al 1997).

3.2 Key components of the research hypothesis

The barrier to be researched (see page 21) can be rephrased as: "Business progress and productivity is being held back by the lack of ability of many of those in leadership and decision-making roles to exploit the capabilities of ICT effectively".

The title of this thesis asserts that the solution lies in "executive learning in the information management domain through IT-mediated methods".

In order to crystallise the hypotheses that will enable this assertion to be proved or disproved, let us consider this proposed solution in sections.

The successful application of executive learning theories will depend on the personal circumstances of the executive learner. From an individual standpoint learning can be for its own sake as much as about doing one's job better. Steve Ballmer is reputed to have learned a great deal about Ferrari sports cars but it would be

tenuous to suggest that this knowledge makes him more effective as chief executive of Microsoft.

When learning is viewed in an organisational context, a learned manager becomes an asset. The contributions of the reviewed authors appear to converge on the belief that there is no single right way to achieve successful management learning. So, if the organisation is to foster its learned manager asset then it is necessary to offer managers a variety of practical approaches for learning. Such a menu must accommodate a range of variables affecting individual managers to different degrees:

- the learning style of the manager
- the current and anticipated time pressures on the manager
- the extent to which the manager works peripatetically
- the availability of those who can transfer the desired competence

The second part of statement concerns information management. This implies that the learning materials should have knowledge content to help learners extend their mental model of their environment. Learning theorists recommend the use of metaphors to help learners to internalise new ideas so they can quickly recall and employ relevant knowledge to a new situation.

The third segment of the statement speaks of IT-mediated methods. This suggests that the process should have a strong flavouring of systems thinking (Beer 1972) to open up minds to the strategic capabilities of information systems. For many non-technical managers this is an alien subject. The wisdom of the learning theorists

suggests that the situation lends itself to a dynamic, iterative learning process and that this is more effective when:

- it is shared within a self-selected peer group
- it draws on experiences from other organisations which learners perceive to be relevant to their own specific circumstances.

These deductions signal that the development of executive IT skills must take full account of managerial learning styles, awareness-raising techniques and knowledge-sharing behaviours. In short that:

1. there is no single right way to achieve successful management learning.
Organisations profit by combining a variety of practical approaches
2. learning is not linear; it must be a dynamic, iterative process
3. metaphors enable the experienced executive more rapidly to translate information into knowledge for evaluation and action
4. managers will develop strategic IT skills more quickly when they can draw on experiences from other organisations which they perceive to be relevant.

In order to progress it is necessary to hypothesise the result of extending the key messages from each domain pair to accommodate the 'missing' domain.

3.2.1 Hypothesis 1

Examination of the Strategic information systems & Information management domain pair can be summarised as follows:

In order to understand ICT managers need information presented to them about it to be endowed with everyday meaning and business context. The business value of this explicit knowledge is extracted by its use, not its acquisition. This is Applied Knowledge Management and it often involves some degree of IT mediation

The 'missing' domain is Management learning. If this is introduced, the statement can be re-expressed to describe the first hypothesis:

The business value of an unfamiliar business-IT solution can be unleashed if the learner can test it in a business context. This testing can be by means of a software application that clearly addresses a real and current problem or by a model or metaphor that allows the manager to evaluate the novel idea by comparing it to his/her mental model of the business environment.

3.2.2 hypothesis 2

In the same way, the key message from Information management & Management learning domain pair is that:

Managers are more disposed to share hard-won knowledge with peers and in teams. In turn, they learn when information is presented in a readily accessible form that accords with their experience or, if the information is novel, is introduced by a credible source

Chapter 3: Hypothesis

Introduction of the 'missing' domain – Strategic information systems – provides us with a second hypothesis:

Today, the immediacy of business information and the ability to exploit it is matched in both cases by rapid obsolescence. Managers have nothing to lose by sharing what they know in order to discover novel solutions by combining validated and new knowledge.

3.2.3 hypothesis 3

The Management learning & Strategic information systems domain pair can be summarised as:

The performance of managers is now judged both by results and by competencies practised. Improved understanding of the capabilities of a new ICT offering is best acquired when its application is experienced personally as a means to solving a pressing business problem

Introduction of the 'missing' domain – Information management – provides us with a third hypothesis:

Technology-driven change is shaking established marketplaces and opening up entirely new marketplaces. The ability to manage effectively in this information age requires management learning to be replenished in a dynamic, iterative way. This process is accelerated by familiarisation with ICT solutions that enable new ways of working.

If these three hypotheses are proved to be correct then we will need a practical approach that will enable business benefits to be harvested. This gives us a fourth hypothesis:

3.2.4 Hypothesis 4

the area where the three domains converge is concerned with the development of the 'executive IT skills' as defined. (see 3.1.1 on page 75)

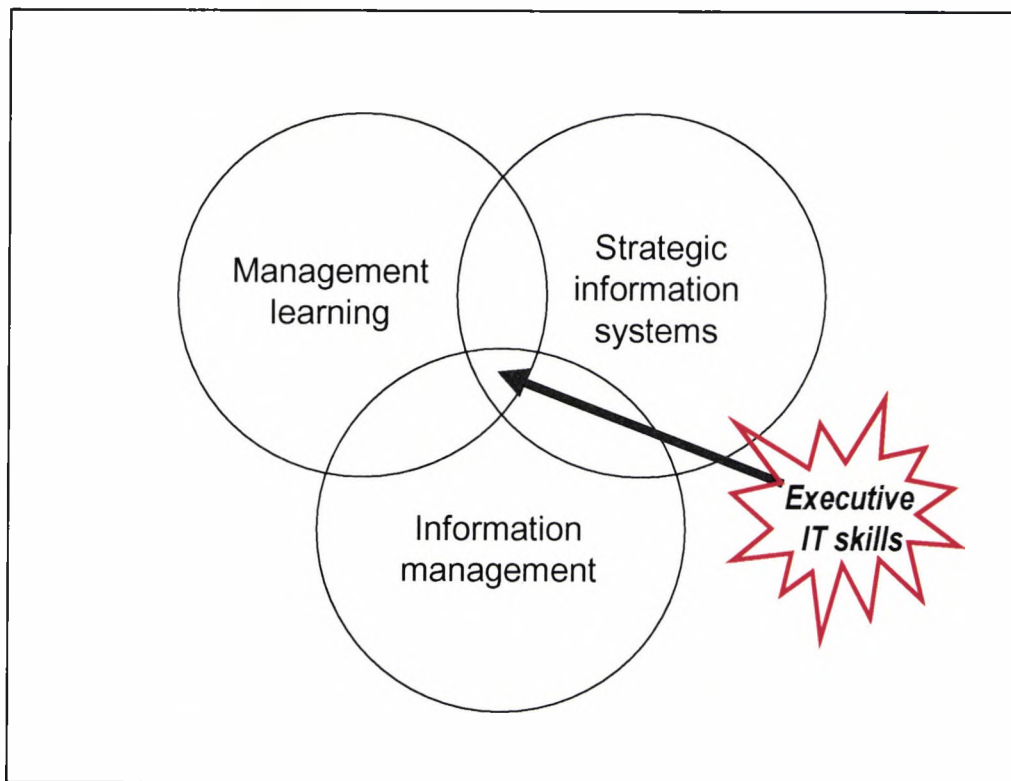


Figure 10: The configuration of hypothesis 4

Chapter 4 now describes the selection of a research methodology by which to test the four hypotheses.

4 Research methodology

The literature review for this research was not treated as an isolated step in the process. Work to identify the most appropriate research method was carried out in parallel and opportunities were taken to test promising techniques by undertaking preliminary fieldwork exercises.

The tightening of the research hypotheses made it possible to finalise the selection of research methodology and decide the essence of the initial research plan (see page 26). As will be seen, this research plan was developed and refined during the fieldwork stage (see table 1 on page 107).

The sections in this chapter describe the research methods considered and the reasons for the selection made.

4.1 General review of research methods

Human endeavour routinely involves the creation, application and evaluation of theory; we are, by nature, 'theory-dependent'. But prior theories and values affect the way we can 'see' the world; we become 'theory-laden' and our observations of reality are subjective (Gill & Johnson 1991).

Plato and Aristotle distinguished *episteme* (theoretical knowledge acquired for its own sake) from *doxa* (values and beliefs for practical application) (Gaarder 1885). This compartmentalisation of science continued until the 17th century when thinkers like Bacon and Newton proposed that theory need not be divorced from practice; the

definition of physical regularities would allow intervention into nature. Scientific proof would then entail rigorous searches for invalidity.

The rapid growth in knowledgeable populations was leading to increasingly complex forms of society. In this more imprecise world it made little sense to separate science from common sense (Kidder & Judd 1986). Flyvbjerg reminds us that Aristotle taught the importance of balancing three intellectual virtues: *episteme* (science), *techne* (art and craft) and *phronesis* (practical common sense or 'prudence'). Flyvbjerg's investigations of Danish local government highlighted that any study of human behaviour must take account of the dynamic of power. From this he has developed an action research methodology based on Aristotle's three fundamental questions [Where are we going? Is this desirable? What should be done?] together with a fourth derived from the work of Foucault and Nietzsche: Who gains and who loses; by which mechanisms of power? (Flyvbjerg 2001)

What we now call 'social science' has emerged as a means to study how people coped. In this context, the word 'theory' is better seen as a network of hypotheses advanced to explain a particular natural or social phenomenon. The building blocks of these hypotheses being: 'abstract ideas which are used to classify together things sharing one or more common properties' (Krausz & Miller 1974).

The organisational psychologist Kolb observed that people tend to reflect on their experiences, to identify guiding principles and from these to develop generalisable concepts that can be applied to new situations. The corollary is that an intentional act is an attempt to produce a desired state of affairs (Kolb et al 1979). This process or 'learning cycle' leads to the formulation of new rules (see figure 11 overleaf).

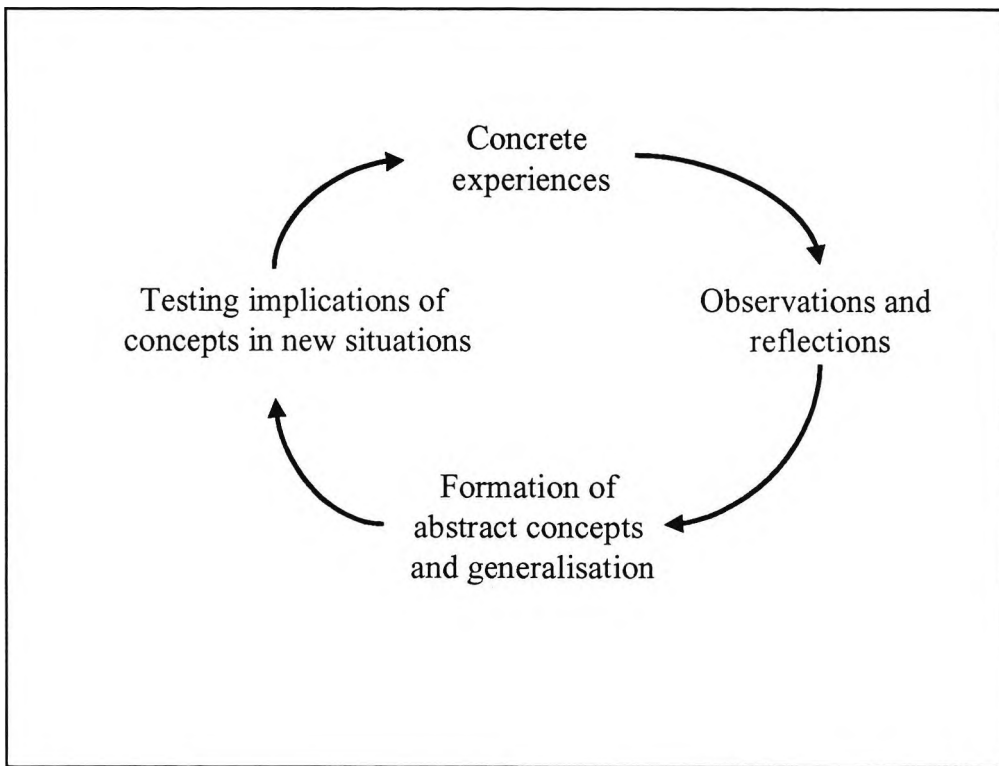


Figure 11: Kolb's experiential learning cycle

4.2 Research methods in the management domain

In essence, management is concerned with the organisation of human endeavour to achieve a particular purpose. As such it is a system for changing an existing state of things to a desired future state of things. This transformation requires a stratagem, a process and a method for gauging outcomes.

Until about a century ago this practice was reserved to political, military and clerical leaders and their stewards and viziers. Machiavelli focused on behaviours that could prolong the grip on power. He drew on Judaic, Greek and Roman histories to formulate advice on statecraft for 15th century rulers. The fact that he is regularly

quoted by present day consultants suggests that the rubrics have changed little in 500 years. For example: "And it ought to be remembered that there is nothing more difficult to take in hand, more perilous to conduct or more uncertain in its success, than to take the lead in the introduction of a new order of things" (trans: Marriott 1908 p48). This enduring popularity is also testament to the rarity of the talent to make tacit knowledge explicit.

Machiavelli described an art by which leaders persuaded or coerced. The traditional military chain of command enabled few to marshal many. Social and industrial revolution in the late 18th century began to redistribute the levers of power. French bureaucrats, for example, needed better information flows from the democratised regions. They defined lines of authority within a hierarchy so that information gathered by many could be channelled to the ruling Committee. Entrepreneurs such as Taylor and Ford set out to increase the efficiency of machine-assisted craft industries by assigning measurable performance requirements to each level of responsibility. This mechanistic approach to organisation, called scientific management, led to a wide-scale the industrialisation of work that prevailed until about 40 years ago (Mintzberg & Quinn 1991).

Since then the increasing turbulence of the business environment, fuelled in part by ICT, has led many practitioners to view management as both an art and a science.

To the extent that it is an art it is concerned with people and behaviour. To the extent that it is a science it is concerned with unpredictable events and metrics that tend to be inexact. Accordingly, most research in the management domain is essentially concerned with social science (Flyvbjerg 2001). In this context, research methods broadly fall into two categories: deductive and inductive (Gill & Johnson 1991).

4.2.1 Deductive research method

A deductive research method entails the creation of a theoretical structure prior to its testing through empirical observation. This involves the identification of dependent and independent variables and the elimination of extraneous factors. Rigorous attempts are then made to use existing knowledge to contradict the theory. This is the so-called 'true experiment' method often used in the natural sciences, such as physics. Essentially this process mirrors the left side of Kolb's experiential learning cycle.

Michael Porter's 'Five forces model' offers a practical example of deductive research in the social science domain. In attempting to understand how markets operate, Porter speculated on what a perfect market might 'look like' in terms of the key roles and relationships (Porter 1980). A virtue of this method is that it can produce a very simple and generalisable *a priori* model that is unencumbered by special cases.

Deductive research avoids the question of subjectivity by asserting that the creativity of the modeller is essentially unanalysable (Popper 1967). What matters is that the model is not contradicted when confronted by the empirical world. If the theory is 'operationalisable' then it may be deemed to be sufficiently objective. In the Porter example, it has been argued that the Five Forces model is flawed by its lack of the dimension of time (Mathur 1992). But this is not an intrinsic contradiction. The 'rightness' of the model makes it a valid management tool that the user can tailor to suit a particular set of circumstances.

4.2.2 Inductive research method:

Inductive research reverses the logical order of the deductive process. It reflects the right-hand side of Kolb's experiential learning cycle: a theory emerges from the researcher's explanations of what has been observed in the empirical world. Inductive theory is therefore 'grounded' in observation and experience.

Both social science and natural science research are positivist in that they seek theories that are not contradicted by existing knowledge. However, while natural laws can support the modelling of cause and effect, matters are less cut and dried in the social science domain (Flyvbjerg 2001). As Laing puts it, 'persons experience the world whereas things behave in the world'. The internal logic of human behaviour must be understood in order to make action intelligible (Laing 1967). Accordingly exponents of grounded research argue that this approach ensures that the outcomes are more likely to fit the data and therefore be useful, plausible and accessible (Glaser & Strauss 1967).

The problem with applying the 'true experiment' approach in the social science domain is that the independent variables tend to be a function of unpredictable human behaviour rather than immutable natural laws. The Hawthorne experiments in 1924 established that people are likely to change their behaviour when they know they are being observed (Roethlisberger & Dickson 1939). One solution is the quasi-experiment or 'after the fact' research. This entails the analysis of data collected before the intervention of the researcher. An example would be the retrospective analysis of accident statistics collected before and after the introduction of safety legislation. This approach is often hampered by the difficulty of identifying and eliminating extraneous factors.

4.2.3 Action research

In the 1940s the social psychologist Kurt Lewin was investigating people's resistance to new diets necessitated by wartime restrictions. In seeking to identify actions that would lead to a change in behaviour Lewin deduced that change was more likely to occur if barriers were removed rather than restrictions imposed (Lewin 1946). His efforts to prove this exposed the artificiality of isolating behavioural elements from what was an integrated and complex system because of the subjectivity of the sample of 'actors' being studied.

Some twenty years later psychologists at the Tavistock Institute in London encountered the same difficulty when investigating post-war social problems in the UK. Their innovative step was to accept that the subjectivity of the actors (in their terms 'clients') was an inescapable and relevant component of the problem being studied. They decided to confront clients with their psychoanalyst's perceptions of what was actually happening to them. This approach led to the emergence of a third alternative management research method, attributed to Lewin's original work and known as action research. Essentially, action research is distinguished from other research approaches by its dual objectives of solving practical problems and contributing to new knowledge through change and reflection (Lau 1999).

Management researchers in a number of problematic industrial settings, such as coal mining, quickly applied the new technique. In Rapoport's definition: 'Action Research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework' (Rapoport 1970).

Chapter 4: Research methodology

This mutuality is upheld by adopting a contractual approach closely resembling a consultancy arrangement. The key stages are termed contracting, diagnosis, action and evaluation (Gill 1986). Joint agreement between the researcher (the 'contractor') and the client's representatives must be sustained if the client organisation is to take ownership of and implement the outcomes. The researcher is given access to the problem area, jointly diagnoses it with the client and introduces the client to relevant conceptual models. The parties then jointly restructure the preferred model to take account of the client's particular circumstances. The embryonic 'solution' is then developed with focus groups of informed participants and/or pilot tests until a generalisable solution emerges that the client is willing to implement.

Action research lies between client-dominated consultancy and researcher-dominated theoretical study (Heller 1986). Argyris et al found the latter, or 'action science', to be unhelpful in the management domain. Clients will reject what they perceive to be an academic approach on the grounds that it will prove to be impracticable (Argyris, Putman & Smith 1985).

Schein distinguishes action research from ethnography (the comparative scientific study of human peoples) by describing the action researcher as a 'clinician' whose role is to facilitate an outcome. The client chooses and, usually, pays the clinician whereas the ethnographer selects the subject group on the basis of a specific research interest (Schein 1987).

Both roles are rooted in the inductive research tradition on the grounds that people are not 'it-things' and, therefore, social reality can only exist as a figment of the imagination of the individual. This is classified as 'ontological nominalism' (Schutz

1964) and it calls for an interpretative methodology which allows that human subjectivity cannot be denied as irrelevant to social science (Burrell & Morgan 1979).

Both roles, clinician and ethnographer, also draw on a similar set of philosophies (Gill & Johnson 1991), namely:

- praxis (action for the sake of change)
- hermeneutics (different interpretations catalyse new solutions)
- existentialism (humans always have the right to choose)
- pragmatism (practicality outweighs truth)
- process (change is continuous)
- phenomenology (subjective experience is the basis for knowledge).

It is the way these are applied that differs. The action researcher aims to produce new knowledge that will enable a particular organisation to solve future problems. The ethnographer aims to acquire knowledge with which to provoke action in the world at large.

4.2.3.1 The case research strategy

In action research, the preferred modes of engagement with actors often include surveys, questionnaires, interviews and focus groups. Interviews can be structured or semi-structured, from which data can be extracted and collated by quantitative analysis and content analysis respectively. Patterns, trends and extrapolations from

statistical analysis can enable the researcher to posit explanations for consideration by focus groups of informed opinion.

However, the sheer volume of data, combined with the possibility of conflicting signals from it, can overwhelm the researcher. For example, Henry Mintzberg initiated his investigations of strategy formulation simply by asking managers what they did. After several years work he was forced to conclude that 'managers are poor estimators of their own activities' and seemed unable to 'translate complex reality into meaningful abstractions' (Mintzberg 1973). He identified seven techniques variously employed by methodological pluralists: interview and questionnaire, secondary sources, critical incident, diary, activity sampling and structured and unstructured observation. All these would be familiar to the ethnographer investigating a formally and rationally planned management activity.

But Mintzberg observed that, in reality, strategy formulation is a discontinuous process. He concluded that the benefits of large samples for statistical significance were outweighed by those from a small number of detailed case studies of best practice. He described this new action research technique as 'pure description'. The researcher first adopts the role of detective, looking for order and patterns, and then makes a creative leap to generalise beyond the data (Mintzberg 1979). Positivists frown upon such boldness, even when employed by a very experienced researcher. One solution is to impose triangulation (Pettigrew 1988) or the devil's advocate approach (Sutton & Callaghan 1987). This can be achieved by ensuring that a panel of experts or steering group validates research work in progress.

4.2.3.2 The application of case research data

Yin suggested that, when the research problem is a contemporary phenomenon and the researcher has no control over behavioural events, a case study approach is preferable because how and why questions are more explanatory (Yin 1984). The approach also harmonises well with theory testing (Pinfield 1986), theory building (Gersick 1988) and grounded theory (Glaser & Strauss 1967).

Palvia argues that case study technique is particularly suited to research in the field of management information systems where the need is to articulate and explain fast-occurring changes (Palvia 1999).

Research on both information management and management learning, in an organisational context, tends to use 'before and after' case studies to gauge improved effectiveness. In the former category quantification techniques range from the information audit (Orna 1990) to changes in collective intellectual capital (Edvinsson 1997). In the latter category, assessment usually follows the Kirkpatrick model; reaction, learning appraisal, individual performance, organisational impact (Kirkpatrick 1959).

4.3 Selection of the research methodology to be used

It should be borne in mind that, although the literature review continued throughout this study, the principal issues had crystallised by the Spring of 1995. One aspect, IT-mediated learning, was being addressed by the contemporary development of computer-based training (CBT) which used the CD-Rom as a medium for transferring knowledge and skills. Inspection of products from the UK firm Learning Tree

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International and the US firm Burgess Video Group indicated that conventional CBT was mainly aimed at transferring skills to enable operatives to use proprietary IT applications in the workplace. This feeling was verified in March 1996 by a comparative survey of the popularity of ten alternative methods between 1990 and 1995 (author's research for the IT Skills Forum's 'LearnIT' programme 1996).

This investigation revealed little evidence that CBT was being used to accelerate the learning of general managers of the capabilities of ICT to transform business performance and improve competitiveness. A notable exception was British Airways' Catalyst 2000 programme, then being sponsored vigorously by the chief executive Sir Colin Marshall. This effective but extremely expensive initiative enabled BA executives to interact with business-IT gurus and then use CBT to consolidate the learning process in local facilitated environments called Quest Centres (Bradley 1996).

As had been made explicit, this research paper is rooted in other people's work and theories in three well-researched literature domains, each of which contributes key components to the research hypotheses.

These hypotheses address a problem area that is both very real and, at the same time, poorly understood. Previous research in the area has impinged on the specific research problem tangentially or within a broader executive development context. As a result, progress towards a solution has tended to be localised – often within a particular organisation. Several such organisations, in addition to BA, were happy to collaborate during the range-finding stage. For examples:

Chapter 4: Research methodology

- NatWest Group had, over two years, developed an IT skills enhancement system. This had been partially successful within the IT Services division but all attempts to apply it within other main divisions (retail banking, mortgages etc) had failed.
- EDS had also devoted two years to a similar initiative. This had become bogged down in a morass of job definitions. It was abandoned when the codified IT skills specifications outnumbered the total workforce.
- Esso UK had implemented a highly effective solution based on hybrid managers. Its success had been the foundation for sustained competitive advantage, for example through the Price Watch campaign. However, the project had taken over ten years to bear fruit.

This preliminary investigation indicated that, although some progress was being made parochially, no generalisable solution to the research problem was available. In the autumn of 1994 the IT Skills Forum (the Forum) had been set up, in short, 'to enable managers to get their arms around IT' (see section 2.2.2). Its first action was to commission a team of researchers led by Professor Amin Rajan to identify and bring back the solutions required. None was found (Rajan 1995).

As a result, Forum members were to invest £1.6million over the next three years in the shared development of a set of solutions that each member organisation could tailor to local needs.

So, by the start of 1995, a far-reaching research problem had been delineated, a hypothetical solution had been crystallised for validation and a highly motivated community of interest had appeared on the scene.

This Forum took soundings at City University Business School about business-oriented academic research. It transpired that the members had already identified over 50 issues to be tackled and had prioritised the first two. In short, these were a method for applying metrics to business IT skills and an effective method for raising executive IT awareness. The author was invited to attend a Forum board meeting and propose research programmes to tackle the two priorities.

Previously, each of the member organisations had separately commissioned research from such institutions as Templeton and McKinsey who, it was said, had responded in due course by presenting packaged or proprietary solutions as a *fait accompli*. The difficulty of implementing these had been a major driver for founding the Forum with the motto 'Joining Forces to Speed Progress'. The terms of reference now made it a condition that the R&D approach must involve member representatives in a continuous process. The two chief reasons being; firstly, to ensure shared ownership of relevant, actionable and practical outcomes and, secondly, so that members could adopt, adapt and implement work-in-progress rather than wait for a final report.

Against the background of the review of research methodologies, these impositions made 'action research' the appropriate, and indeed, irresistible choice. From a positive angle, this approach could certainly be viewed as a fruitful combination of theory and practice but it can also be viewed as putting the independence of the research at risk (Clark 1972). It needs to be noted that those involved in skills development are often attracted to particular approaches to personal and organisational development. In a fascinating case study, Edmondson demonstrates how different development models can greatly influence the outcomes (Edmondson

1996). This may mean that exposing a wide spectrum of options attracts criticism from those who have strong preferences only for one approach.

Bearing these factors in mind, each project proposal set out to present a symbolic representation of the desired objective together with a research plan comprised of an integrated suite of roles and activities. The roles would include a project steering group, a panel of subject experts and a self-selected group of member organisation 'champions'. The activities would feature data gathering via questionnaires, consultations with experts and interviews with informed practitioners – both members and non-members of the consortium. The analysed data from these would fuel the concurrent development, by appropriate specialists, of prototype tools to be evaluated by focus groups and at 'practical applications' workshops with those who would oversee the implementation of the outcomes within their own organisation.

In essence, the proposed research procedures are rooted in the nominalist tradition. This is because nominalism "sees the social world as an emergent social process which is created by the individuals concerned. Social reality, in so far as it is recognised to have any existence outside the consciousness of any single individual, is regarded as being little more than a network of assumptions and inter-subjectively shared meanings. The ontological status of the social world is viewed as extremely questionable and problematic (Burrell & Morgan 1979). In practical terms the proposed procedures embody an evolution of Lewin's ideas of action learning as characterised particularly in later developments by Winnicott and Papert (researcher as painter of metaphors), Schein (researcher as clinician), Mintzberg (researcher as pragmatist) and Yin (researcher as mapmaker in uncharted territory) (see section 4.2.3).

These theoretical aspects were not articulated in the proposals to the consortium. Nevertheless, these were accepted on face value by the board on 13th February 1995 – auspiciously, perhaps, the anniversary of Abraham Lincoln's birth. The two projects – a method for applying metrics to business IT skills and an effective method for raising executive IT awareness – came to be code-named TrackIT and DirectIT respectively. The board added a third, later named LearnIT, to disseminate the outcomes from the two priority projects and develop a cadre of internal and external consultants capable of tailoring the tools to suit particular organisational contexts.

This point in the research is, therefore, marked by an objective reality. No generalisable solution to the research problem appeared to exist in the literature or in the minds of leading business practitioners in the UK. Accordingly, the fieldwork stage of this research would require the evolution of a substantial amount of new material. But a set of solutions developed for a self-selected consortium is not necessarily generalisable. Section C, Fieldwork, will describe how this problem was addressed by retesting the preliminary findings with senior managers in other communities including, for examples, the public sector (with the Post Office) and the professions (with Deloitte & Touche).

B: FIELDWORK

5 Practical steps towards an understanding

As described in chapter 4, by February 1995, the conditions had been met and an opportunity found to commence fieldwork to test the hypotheses.

At this stage an underlying observation was colouring the author's thinking about managerial research. To make a general point rather baldly, busy managers are good at identifying a problem but are less adept at envisaging its solution. In a sense the situation is somewhat similar to the response often heard when people are asked their views about art: "I don't know much about art but I know what I like when I see it".

The prevalence of this attitude had been a driver for one of the precursor research investigations – on understanding executive information requirements (see section 1.5.1). The IS community responsible for configuring Executive Information Systems complained that most of the intended executive users were unable to say what information they wanted the system to present to them. Conversely, the users protested that the question was absurd because their needs changed constantly and unpredictably.

That research project concluded that business information systems should be designed so that the users themselves could configure and conduct ad hoc inquiries. But seven years later the problem was still evident. As Professor Richard Susskind reported, Lord Woolf's IT-mediated 'Access to Justice' reforms were being held up because judges could not say what information they required (Susskind 1999).

Computerised information systems are far more advanced today but apparently the users still lack the necessary 'executive IT skills' defined in section 3.1.1.

This could be taken as an isolated pocket of executive technophobia that is rapidly approaching extinction. However, empirical observation, for example, as an external member of the Faculty of Senior Management Education at Europe's largest employer – the Post Office – indicates a strong, continuing need for proof that the research hypotheses are correct and implementable.

5.1 Factors influencing the fieldwork plan

In essence, the research hypotheses (see section 3.2) propose that it is possible significantly to enhance individual learning of general managers about information management by the appropriate employment of a toolbox of primarily IT-mediated learning methods.

The design of a practical fieldwork research plan to test this needed to address three chief components: individual learning of general managers; (learning about) information management; IT-mediated learning methods.

5.1.1 Individual learning of general managers

Even among a group of highly motivated managers such as those representing the Forum consortium two fundamental conditions are clear. Firstly, these individuals participate to find solutions they can take back for their own organisation's benefit. But, in reality, they can only learn for themselves and then hope to be able to transfer

this learning to colleagues. Secondly, each individual will have a unique worldview and a discrete set of objectives. Progress in a joint endeavour will depend on the consensual agreement of shared goals and the adoption of a 'common language'.

5.1.2 (learning about) Information management

Mintzberg positioned informational roles as fundamental attributes required by the general manager, along with leadership and decisional roles (Mintzberg 1975). Managers achieving high office are therefore justified in believing themselves to be proficient managers of a quarter of a century ago. The intervening years have ushered in an information age and a knowledge society in which management is by communication (Hammond 1996) and enterprises succeed by integrating human networking and computer systems (Savage 1990). The technologies that both fuel and support this emerging environment have hugely increased the amount of available information and the rapidity of its communication. In turn, these changes have accelerated a trend to globalisation of business by reducing time and distance barriers.

In this new world managers and enterprises unable to exchange information or money electronically are at risk of dropping out of contention. The recent upsurge of popular interest in Internet-related services characterises the pace of change. For example, in 1995, when this fieldwork commenced, all information exchanges between participants had to be by phone, fax and post because only a minority was equipped to receive electronic mail at work. Even fewer had access to the World Wide Web as a business information resource. Within three years all interactions

were mediated via a website that enabled participants to book places at workshops and download research documentation in full colour for local printing.

So the fieldwork for this portion of the hypothesis had to extend beyond 'traditional' information management and attract collaboration to learn about a distinct new variant that was to be named 'business information management'.

5.1.3 IT-mediated learning methods

From infancy we tend to learn best by doing. The Guilds that sprang up across Europe from the 14th Century recognised this by initiating apprenticeship schemes. The City of London's 100th guild, the Worshipful Company of Information Technologists, upholds this belief in updated form by fostering 'modern apprentices' (Melling 1988). We can learn about a skill by reading or watching but to exercise the skill effectively we need to practise it. The apprentice receives first-hand guidance from a master craftsman in the making of 'apprentice-pieces'. On completion of indentures he or she becomes an 'improver' and benefits from further supervised practice. Managers and professionals are known as 'practitioners' simply because they deliver their services by exercising an acquired set of skills and conventions.

So it is with computerised business information systems. Managers need hands-on practical experience of the tools not only to be able to use them themselves but, as importantly, so they can envisage how these tools could be employed in their organisation to improve existing working practices or to support new offerings.

The preliminary research studies surfaced two issues connected with this learning process. Firstly, executives fear their authority will be diminished if their ineptitude

with a new technology is exposed to in-house teachers - or even to strangers at a computer show. They feel more comfortable to learn from a trusted independent, singly or in small peer-groups of similarly inept executives. Secondly, other pressing management responsibilities mean that they will rarely apply themselves to this learning unless it is perceived to be directly and immediately relevant to a current problem or opportunity.

When fieldwork commenced a number of IT-mediated learning techniques had established a niche in the education market. Two broad categories had emerged during the LearnIT programme research:

- computer-based training (CBT) - typically used by individuals, often unsupervised and in their own time, to gain a particular skill
- IT-mediated distance learning methods increasingly employed by graduate schools of business to link teacher and remotely-sited pupil – but usually with low levels of class interactivity.

It was anticipated that neither category was suited to the multi-company groups targeted for this fieldwork. As has been mentioned, most of the intended audience were not equipped to access a remotely-sited computer (in some cases - eg: Barclays Bank - corporate IT security systems barred the practice). In addition they had specified a desire for high levels of interactivity and human networking. Accordingly it was felt that the focus on this portion of the hypothesis would need to be on creating physical environments in which appropriate technology support could be deployed to enhance the learning process. At that time Professor Clive Holtham was investigating prototype installations in the USA and completing a 3-year DTI-

funded project with UK industrial partners to develop effective techniques for Computer-Supported Collaborative Work (CSCW).

5.2 The design of the adopted action research plan

It was appreciated at the outset that the fieldwork phase would need to embrace a number of projects to test effectively what is a multi-dimensional hypothesis. The three programmes (TrackIT, DirectIT and LearnIT) were expected to run for more than 12 months but, since Forum members were keen to deploy interim findings, these programmes were broken down into projects with a planned duration of approximately five months.

For consistency and ease of communication a generic research approach had to be designed that allowed for a degree of tailoring to suit constituent programmes and sub-projects. The Forum members required research that produced practical tools and techniques that could be applied in their businesses. They believed that the successful implementation would depend on the transfer of a sense of ownership for the outcomes and that this would be achieved by active involvement in the R&D process.

This transfer process meant that different individuals would need to participate at different stages. The most senior representatives envisaged taking a steering role while delegating attendance at development workshops to subordinates in their respective organisations – to middle managers who would supervise implementations and, in turn, to junior managers who would actually 'pull through' the changes.

Although this process lent itself to the selected action research methodology it was sensed that the language of the theoreticians would not be well received by this audience. The presentational format for the required generic plan offered a further opportunity to see whether metaphors in the form of 'transitional objects' were as effective in the field of executive learning as they had proved in the field of child psychology (see section 2.2.3.1). The idea is that the human mind is more attuned to associating concepts with images than with words. The correspondent is able quickly to compare an image with his/her mental model of the world whereas spoken language requires an intermediate translation stage during which meaning may be lost or misinterpreted.

In terms of the information spectrum (see figure 2 on page 38) the mental model encapsulates tacit knowledge, the image characterises explicit knowledge but the spoken word is simply information, albeit with a degree of context (see section 2.2.1.2).

The technique had already been applied successfully with investment bankers during the preliminary research project on client-server technologies (see section 1.5.1). In that instance, a physical artefact had been used to represent a complex set of issues with which the correspondents claimed some familiarity. Its purpose was to short-cut the preamble stage of the interview and enable the conversation to get straight to the point.

The question now was: could such an artefact help senior managers understand a complex set of issues with which they were not familiar? And, if so: how important is the level of managerial experience of the correspondent?

5.2.1 The generic action research plan

A model was prepared that overlaid the familiar Gantt chart with graphical depictions of outcomes. Importantly, the Gantt chart convention was not calibrated by time. It would simply indicate four phases of work. Beneath each phase an image would characterise the form of activity (meeting/demonstration/workshop etc) and an array of symbols would indicate the type of output (report/portfolio/computer application/ audio-tape etc).

These ideas were parcelled together to create a transitional object that could be displayed via an overhead projector (see figure 12).

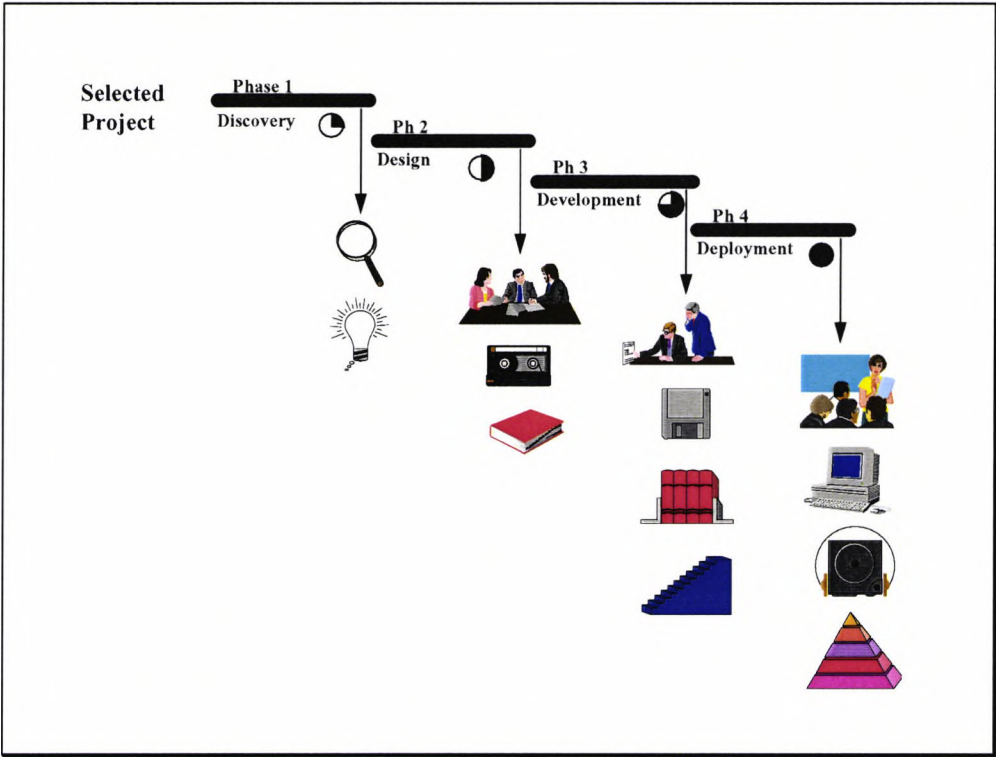


Figure 12: The generic research model

An accompanying slide defined the four phases as follows:

1. **Discovery** - we examine and report on existing published and unpublished research, worldwide
2. **Design** - we propose potential solutions based on collaborative studies of theory and best practice
3. **Development** - we share and debate the provisional findings with member representatives and other interested parties to produce a practical solution
4. **Deployment** - we work with industry experts, academics and the user community to deliver the solution

The model was immediately accepted by the Forum board and nick-named “the 4 D’s model”. Over the next three years it was to be used by Project Steering Group members as a thematic icon to initiate a series of projects. It was noticeable that the most senior executives could trigger a debate simply by saying ‘4-Ds’. Less experienced managers tended to need to review the actual icon and then ask to see actual examples of the outputs depicted.

5.2.2 The action research project plan

Once the conceptual model for the action research had been accepted a practical implementation plan was developed.

The four main ingredients were project steering group (PSG) meetings; off-site research and analysis; focus group meetings (also known as ‘issues and applications

workshops') and dissemination workshops (offered as 'masterclasses'), all as shown in table 1, below.

Day #	Activity	Purpose & process	Required output
Phase 1: Discovery			
1 (am)	Initial PSG meeting	❖ verify problem definition ❖ brainstorming what the solution might 'look like'	▪ shared agreement to the problem definition ▪ shared vision of the desired solution
1 (pm)	Focus gp workshop	❖ share existing knowledge ❖ find 'common language' ❖ brainstorming questions to be investigated	▪ initial reactions to a 'straw man' solution ▪ identities of admired/ good practice examples
2-30	Desk research	❖ literature search ❖ design model/questionnaire/ interview proforma	▪ work-in-progress report
31	Focus gp workshop	❖ review desk research	▪ agreed research focus ▪ agreed model/proforma
32-60	Off-site research	❖ gather/collate data from informed sample	▪ prepare initial analysis
Phase 2: Design			
61	Focus gp workshop	❖ interactive debate / reality check on preliminary findings	▪ agree basis of the prototype 'solution' ▪ define 'How Tos' to be elaborated
62-90	Off-site research	❖ tie case studies to model ❖ design software	▪ draft publication
91	PSG meeting	❖ present / debate draft materials	▪ revise / approve work-in-progress
Phase 3: Development			
92-120	Off-site research	❖ develop software and materials for beta testing	▪ distribute proposed 'solution'
121	Issues & application workshop	❖ interactive beta testing of the proposed solution	▪ agreed shape of publishable 'solution'
122-148	Off-site research	❖ produce documentation for sign-off ❖ draft courseware	▪ Structured documentation & associated assets
Phase 4: Deployment			
149	PSG meeting	❖ obtain sign-off of publications, courseware & software ❖ select expert facilitator to deliver courseware	▪ publish outputs ▪ agree schedule of courses
150-on	Masterclasses	❖ deploy courseware	▪ dissemination

Table 1: The action research project plan

5.3 Fieldwork proceedings

By the end of 1995 the original scope of the TrackIT, DirectIT and LearnIT programmes had been progressed through the '4-Ds' process and courseware had been produced which then deployed via masterclasses during 1996. This progress had encouraged the consortium partners to commission a series of sub-projects to develop each programme.

Three observations stood out.

- The first was that 'the management of information' emerged as the most troublesome of these priority issues that could neither be moderated or sidelined. Most participants wanted it addressed in two ways: as a personal skill (as in 'the ability to manage information') and as a corporate competency (ie: information management as a managerial activity).
- The second was that delivery of research reports for TrackIT and DirectIT had revealed a major problem. The key findings and accompanying software were welcomed but the intended audience found two 200 page reports too dense to be effectively usable.
- The third was that managers will apply themselves vigorously and effectively to learning about a new issue when it is causing them immediate pain. If the issue can be fixed temporarily another issue will take precedence; if the problem appears intractable it may fall off the 'to do' list entirely.

5.3.1 Information management as a central theme of the fieldwork

The first issue caused the board of the Forum, in the autumn of 1995, to resolve that the focus of the DirectIT research programme should shift from business transformation to effective management of business information. The 'Managing

Information' project was based on a 6-Role model initiated by Professor Clive Holtham's longitudinal studies of the subject. This led to the creation of the 'Executive Development Road Map' (which employed the metaphor of a Motorway signboard). The research involved producing a database of some 100 case studies from face-to-face interviews and a further 350 edited from published sources. Accompanying courseware was produced for series of masterclasses.

The TrackIT project was also flexed to focus on tools and techniques for measuring information management capabilities in various functional areas of business. Outputs featured Marketing, Financial management and IS management. These projects took advantage of the case studies and a further series of masterclasses was produced.

5.3.2 Structured documentation to aid sense-making

The second issue led to six months work to design and gain approval for a standard documentation structure that overlaid the 4-Ds model for all the planned research projects.

The resulting schema was disseminated by setting up a physical installation at the Forum's offices. The 4-Ds icon was stuck to the wall. A coloured thread led from each 'phase-bar' to a poster listing typical outputs from the relevant phase. From each listed output a coloured thread led to a physical example of the actual research outputs arranged on tables below the posters.

The new document and outputs structure presented project reports as portfolios comprised of a one-page 'challenge' to executive sponsors, 'insights for directors'

and 'handbooks for managers'. In other words, each family of resources was re-presented for implementers at various organisational levels. These portfolios were offered with supporting materials including presentations of build-ups of actionable frameworks, case study portfolios, electronic databases, software applications and CDs.

In the installation, the coloured threads led to the relevant documents and to laptop computers or CD players displaying the electronic outputs. Feedback from visitors indicated that they found it helped them to understand the hierarchy of outputs and whom in their organisation should utilise which components.

5.3.3 Sustaining managerial motivation to learn

The third issue had raised the vital importance of human networking to solve shared imperatives. It also exposed the need for particular environments in which multi-company peer-groups could interact with technology that might help them to overcome the prioritised business problems. This issue was tackled by two initiatives.

5.3.3.1 A new learning environment for enhancing executive IT skills

In the summer of 1995 Professor Holtham had made a study tour to investigate innovative environments for raising executive IT skills – in particular, work in the New York Education Authority and at Wake Forest University in North Carolina. Wake Forest had created a radical learning environment called the 'Executive Sandpit'. In discussion on his return a design was scoped to reflect a more European style. The

result was the 'Executive Studio'. West London Training & Enterprise Council offered to host it and DTI Minister Ian Taylor authorised funding of £1.75M to build it. From June 1997 the fieldwork was centred in this learning environment. The results are described in chapter 6.



Figure 13: The Executive Studio in West London (Sept 1997)

[for a virtual tour of the installation's various zones visit www.executive-studio.com]

5.3.3.2 A menu for executive learning options

The several hundred managers of consortium organisations participating in the fieldwork constituted a sample that reflected their community at large. An issue that was never far from the surface was the time-pressure experienced by these executives. It required a significant commitment by each one of them to ensure attendance at selected meetings and events. The corollary of this was that each had

a different set of expectations. In response to these conflicting demands a framework was distilled from management learning theory to help participants choose an approach most appropriate to their personal situation.

This framework expressed a menu of delivery options for executive learning. This set of managerial prescriptions drew on the work of the authors referred to in section 2.2.3 – in particular, Kolb, Ashton & Easterby-Smith, Easteal & Thomas and Markwell & Roberts.

A version of this framework, which became known as the 'menu of options', is shown in figure 14.

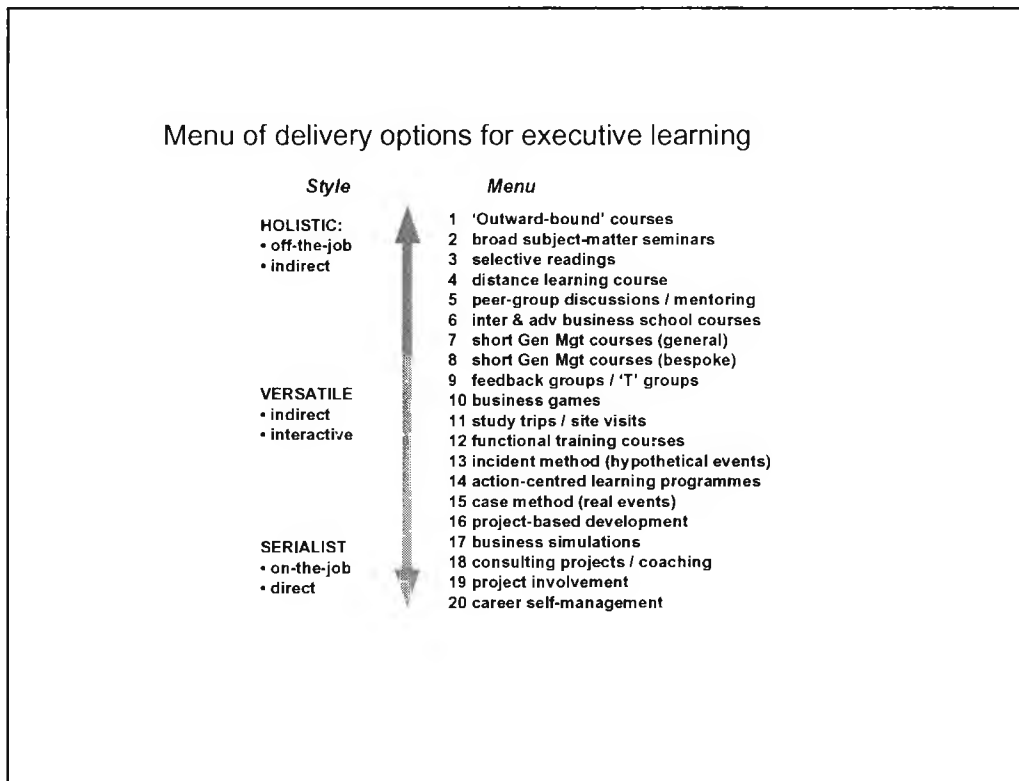


Figure 14: The executive learning 'menu of options'

Subsequent versions, published for example in the Executive Development Road Map, added guidance based on two further influences, namely; proximity and intensity. In this context the term 'proximity' was used to reflect the degree to which a manager worked peripatetically. The word 'intensity' conveyed the pace implicit in a particular learning option.

5.4 Towards a theoretical model explaining the hypothesis

In 1996 Professor Clive Holtham proposed a model to describe the relationship between learning and research in the business management domain. This model was derived from his empirical observation of the ways in which business managers absorbed objective interpretations of business realities. Essentially, the extent of a manager's personal experience or 'worldview' determines what is acceptable to him/her in terms of the presentation of new information.

Thomas Kuhn observed that if new information appears to conflict with the existing worldview then it will be resisted. This status quo will persist even when what has been regarded as 'normal science' no longer appears to fit or explain a growing number of observed situations and circumstances (Coulson-Thomas 1992). Eventually a revolution in thought, or paradigm shift, then occurs (Kuhn 1970).

For example, Ptolemy's mathematical proof that the world was at the centre of the universe survived for nearly 2,000 years until Copernicus found the formula worked better when the sun replaced the earth at the centre (Peters & Waterman 1982). A more recent example is the discovery in 1904 by Swedish mathematician Helge von Koch that an infinitely long line, which never crosses itself, can be drawn within a

circle. Mathematicians chose to ignore this disagreeable fact until Benoit Mandelbrot saw that it helped to explain his path-breaking work on fractal images and chaos theory (Gleick 1987).

The word paradigm is used increasingly. Burrell and Morgan define it as: 'views of the social world based upon different meta-theoretical assumptions with regard to the nature of science and of society' (Burrell & Morgan 1979). In everyday business parlance it seems to be used to mean 'scenario' or 'set of circumstances'.

The diagram of Holtham's conjecture (see figure 15, overleaf), which is located in the information management domain, is that a new reality observed by researchers can be conveyed to managers when it is presented in different forms according to the level of managerial experience of the recipient. A junior manager may require large numbers of case examples to grasp the new reality and this transfer is best effected by means of computer-supported collaborative working techniques (CSCW). On the other hand the expert manager may only require a metaphor to trigger acceptance of the new idea – provided the news is imparted by a trusted and credible peer.

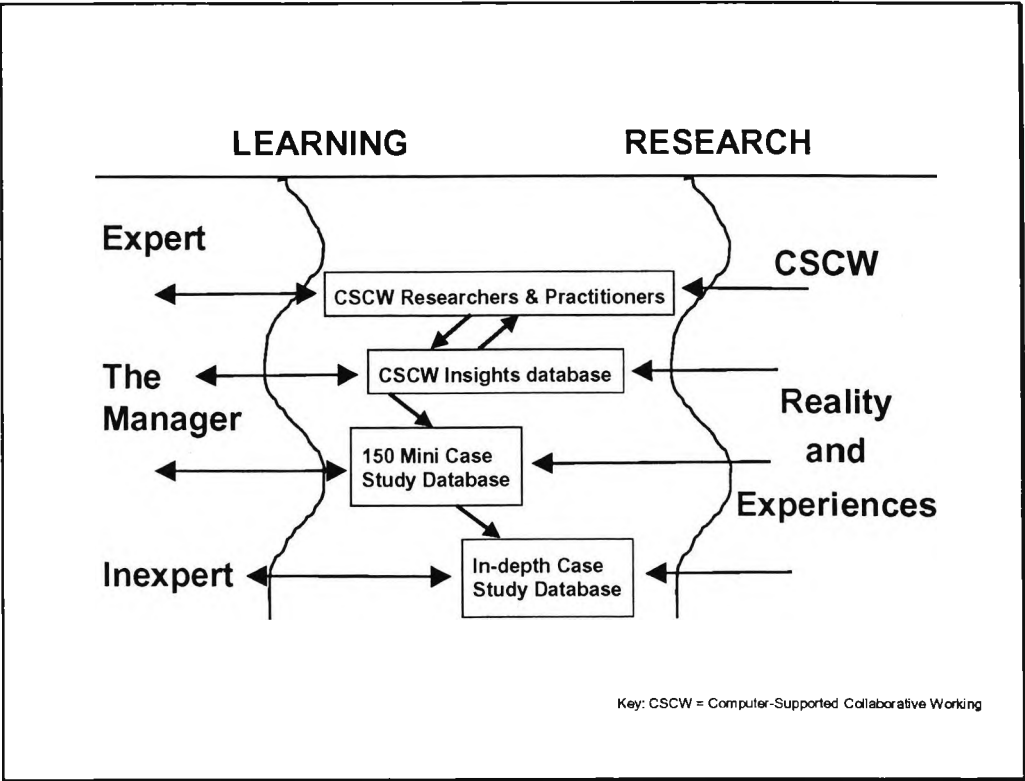


Figure 15: Transferring learning from researchers to managers

(with acknowledgement to Holtham 1996)

This conjecture was to offer a breakthrough in the development of a theoretical framework that reflected the research hypotheses. The community of interest certainly included senior, middle and junior managers. The materials being produced to support the fieldwork also broadly fitted with the range of presentational forms proposed.

However, when collections of case studies were deployed it was observable that middle managers responded better to a small number of in-depth, or 'maxi', case studies whereas the junior management participants preferred to refer to the large databases of 'mini' cases that had been prepared. This had not been predicted.

In one sense there was a connection here with the development of an effective document structure. This had shown that the outcomes reported in each case study portfolio should be restricted to four main categories, each with no more than two conditions – eight instances in all. This shape drew on Miller's discovery of 'the magical number seven, plus or minus two'. Miller, a psychologist, had studied the ways in which tone, pitch, taste, colours, words and digits are communicated between people. Again and again the number of acceptable variants seemed to lie between 5 and 9. (Miller 1956).

These findings led to the formulation of a revised theoretical model – dubbed the Executive Learning Ladder:

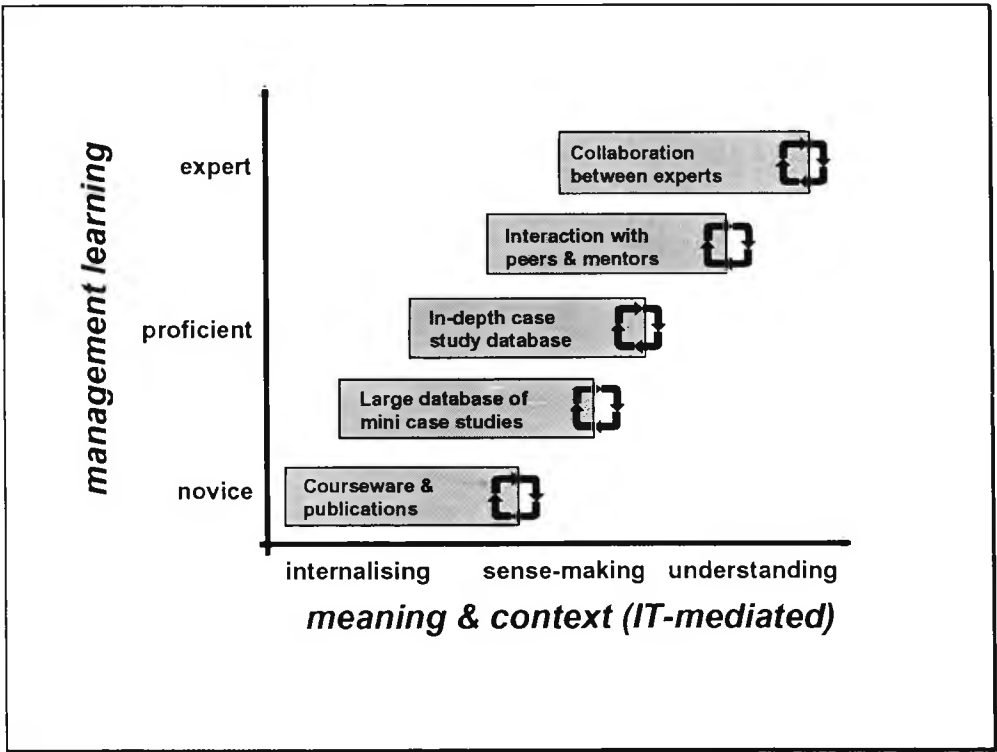


Figure 16: The Executive Learning Ladder

Chapter 5: Practical steps towards an understanding

This new framework, the Executive Learning Ladder, emerged in the summer of 1997, about four months after the 12-month validation programme commenced. It was presented for academic scrutiny at the 1st Knowledge and Innovation Conference at CUBS in December 1997.

Improvements based on further testing were read at the 6th European Conference on Information Systems at Aix-en-Provence in June 1998. A further version, this time with the benefit of the data from the completed validation exercise, was read at the Annual Americas Conference on Information Systems at Baltimore in August 1998.

With the benefit of feedback from these trials, the paper was revised to include information about the Executive Studio learning environment and a new version at the Centre for Virtual Work, Commerce and Learning at City University. It was read at the 4th Annual Society for Information Management Academic Workshop in Helsinki in December 1998.

Work now progressed to refine the testing process – see chapter 7.

6 Findings from the action research

By the end of 1996, after two years of fieldwork, a theoretical model had been shaped – the Executive Learning Ladder (see figure 16 on page 116).

A concerted effort was then required to test the validity of this model. But Lewin's warning had to be respected. The action researcher as 'clinician' must beware of allowing the necessary relationships with the 'actors' to influence the outcomes (see section 4.2.3). Unless this is handled sensitively there is a risk that a research study will become a self-fulfilling prophecy.

Accordingly, neither the Holtham conjecture nor the revised model was ever disclosed to the consortium participants. Instead, it was decided to carefully monitor all events and workshops over the next 12 months.

6.1 Measures of effectiveness of the action research:

The purpose of management education is to foster 'higher level learning' that will lead to a subsequent improvement in management performance. Critics say that management education lacks practical relevance and point out that admired managers such as Gerry Robinson and Richard Branson chose not to pursue formal education beyond O & A-level.

Rogers concludes that on-the-job, experiential learning is the only true management learning method (Rogers 1983). Other researchers see higher level learning as crucial to the development of creativity and the ability to understand new business drivers (de Kare-Silver 1997; Banerjee 1998). But attempts at measurement have

highlighted the large number of dependent variables (Smith 1998) and multi-causal factors leading to improvement (Ambler & Kokkinaki 1998).

Because the time-distance between cause and effect renders quantitative evaluation unreliable at best, Sarrafan proposes that *perceptions* of improvement are justified as a measure of the effectiveness of management learning (Sarrafan 1999).

This approach was particularly appropriate in this case because a typical 'actor' may not actually apply a lesson learned until much later. Also because individual participants were free to attend events as they wished; some attended regularly; others appeared once, never to be seen again.

The techniques they were exposed to included face-to-face workshops leading directly to the creation of a 'toolbox' of possible solutions, in-house trials of prototype solutions, electronically-supported meetings and permanently available online resources to aid dissemination. A range of methods was required to gauge perceptions of the effectiveness of these techniques, including:

- Delegate feedback forms to measure their perceived value of each learning event
- Take up of success stories resulting from implementation of solutions
- The willingness of delegates to participate actively in the research
- The desire of delegates to decide future research and learning events
- Renewal of annual subscription fees
- Achievement of stated Customer Satisfaction Index targets
- Demand for an increasing number of events
- Attendance levels at events

Chapter 6: Findings from the action research

- Usage rates of online resources and feedback about preferred features
- Continued sponsorship for single-company programmes
- Repeat orders for public seminars
- The interest of the academic community via refereed journals and conferences

6.2 Practical steps to measure perceptions of learning

This plan was helped by the fact that the board of the consortium had consistently attached the highest importance to rigorous measurement of the effectiveness of all its activities and outcomes. This was achieved by a combination of procedures:

- All meetings and events scheduled and publicised at least three months in advance
- Clear agenda and properly-kept and approved minutes of every business meeting
- Agenda and copies of research-based documentation and materials circulated at least two weeks before every Project Steering Group meeting
- Detailed feedback forms completed by every delegate at every event or workshop. These forms sought qualitative comment and each delegate's rating of the quality of the content, facilitation and venue using 5-point non-absolute Likert scales
- Detailed audit trails of all online resources and publications distribution
- Analysis of all feedback and audit trails tabled for review and approval at quarterly board meetings

To ensure the objectiveness of these measures further steps were taken:

- an officer appointed by the consortium personally contacted the senior representative of each consortium member organisation at least once per quarter to ascertain satisfaction and requirements
- the feedback forms were analysed by the company secretary to express the responses as an aggregated percentage rating and to highlight key qualitative inputs
- a consortium officer categorised all delegates by senior, middle or junior management level
- the Internet service provider summarised and reported the online traffic

6.3 Launching a testing programme

In January 1997 the board of the consortium ratified an ambitious programme for the next 12 months. This had two chief components.

- an international conference to publicise the Forum's objectives. This was entitled 'Convergence 97' and featured Peter Drucker, Arthur C Clarke and a cast of business leaders and academics, mainly from the UK and the US.
- a programme of at least 50 events over the next 12 months designed to enable the participants to understand, internalise and deploy the research outputs within their businesses.

The conference provided an opportunity to conduct a survey of top management opinion. Of the 250 delegates 105 completed a questionnaire that was analysed and published later the same day. These respondents, 76% of whom were chief executives or directors, were responsible for a combined turnover of £170bn (equivalent to 28.4% of UK GDP) and 7.47% of UK employment. Inter alia, this sample invested an average of 7% of turnover in IT and reckoned that 90% of their

staff needed to interact with IT to do their jobs properly. Over 54% believed that their organisation would be wiped out if its IT systems went down for 24 hours. (Convergence 1997).

Although these findings reinforced the relevance of the research, the longitudinal feedback from the programme of events provides a more direct validation of the study. This programme included meetings, workshops and masterclasses. Some were designed as one-off events, others to be repeated several times. By this stage, the learning materials comprised of:

- sixteen full colour portfolios of research outputs
- related publications sponsored by central government
- over 450 case studies arranged in ten portfolios
- diagnostic tools
- bespoke software applications available on floppy disk
- original video programmes
- an interactive CD
- extensive courseware

To support this, a dedicated website publicised the aims and objectives of the consortium and offered members a password-protected area. This offered a directory of members, the events diary with online booking facilities, downloadable copies of the research publications, the case databases and discussion areas.

Table 2 summarises the 50 events that were attended by a cumulative total of 561 managers and indicates their level of seniority.

Chapter 6: Findings from the action research

IT Skills Forum events between 1/2/97 - 31/1/98							
Event	Date	Senior	Middle	Junior	Total	Venue	
Directors Briefing	03-Feb-97	12	0	0	12	Thomas Miller	
R&D interactive workshop	17-Feb-97	9	5	0	14	The Post Office	re TrackIT
R&D interactive workshop	26-Feb-97	0	17	7	24	DTI	re TrackIT
Change mgmt	11-Mar-97	9	0	0	9	West London Centre	Buy In W/s
Directors Briefing	18-Mar-97	10	0	0	10	Thomas Miller	
Change mgmt	24-Apr-97	10	2	0	12	Thomas Miller	Buy In W/s
Change mgmt	30-Apr-97	5	2	0	7	West London Centre	Buy In W/s
Best practice site visit	13-May-97	4	3	0	7	Triangle Computer	
Consortium steering mtg	20-May-97	19	1	7	27	The Mayfair Hotel	AGM
Consortium steering mtg	20-May-97	12	1	8	21	The Mayfair Hotel	Council Mtg
Networking function	20-May-97	26	1	6	33	The Mayfair Hotel	Gala Dinner
Induction Meeting	20-May-97	0	0	7	7	The Mayfair Hotel	
Directors Briefing	28-May-97	1	1	3	5	Executive Studio	
Change mgmt	04-Jun-97	6	2	0	8	Executive Studio	Buy In W/s
Directors Briefing	09-Jun-97	3	1	2	6	Thomas Miller	
Change mgmt	08-Jul-97	1	4	2	7	Executive Studio	Buy In W/s
R&D interactive workshop	14-Jul-97	1	7	0	8	The Post Office	re TrackIT
IM masterclass	18-Jul-97	1	3	0	4	Executive Studio	
Change mgmt	03-Sep-97	2	4	0	6	Executive Studio	Buy In W/s
Directors Briefing	08-Sep-97	0	0	0	0	Thomas Miller	cancelled
Consortium steering mtg	09-Sep-97	19	0	5	24	West London Centre	Council Mtg
Networking function	09-Sep-97	26	24	0	50	West London Centre	ES Launch
Induction Meeting	09-Sep-97	2	2	0	4	West London Centre	
Special Interest Groups	09-Sep-97	9	3	0	12	West London Centre	
Masterclass	11-Sep-97	2	4	0	6	Executive Studio	IM
Best practice site visit	18-Sep-97	6	4	0	10	Western Provident	
Change mgmt	01-Oct-97	2	0	4	6	Executive Studio	Buy In W/s
R&D interactive workshop	08-Oct-97	3	3	0	6	Executive Studio	re LearnIT
Directors Briefing	09-Oct-97	0	0	0	0	Executive Studio	cancelled
Masterclass	15-Oct-97	4	0	4	8	Executive Studio	Mktg-IT
Change mgmt	04-Nov-97	2	1	2	5	West London Centre	Buy In W/s
Directors Briefing	06-Nov-97	0	0	0	0	Executive Studio	cancelled
Masterclass	07-Nov-97	0	5	0	5	Executive Studio	IM
Masterclass	24-Nov-97	2	4	0	6	Executive Studio	IM
Business Planning	26-Nov-97	1	4	0	5	Executive Studio	Bus Plann'g
Directors Briefing	02-Dec-97	1	4	0	5	Thomas Miller	
Business Planning	03-Dec-97	2	2	0	4	Executive Studio	Bus Plann'g
Change mgmt	03-Dec-97	1	2	0	3	West London Centre	Buy In W/s
Masterclass	05-Dec-97	0	0	0	0	Executive Studio	cancelled
Consortium steering mtg	15-Dec-97	18	2	0	20	The Dorchester	Council Mtg
Networking function	15-Dec-97	39	21	26	86	The Dorchester	Gala dinner
Directors Briefing	29-Jan-98	1	2	1	4	Executive Studio	
Practical business-IT	29-Jan-98	0	3	0	3	Executive Studio	Forum on Line
Practical business-IT	29-Jan-98	0	1	3	4	Executive Studio	Gp Dec Supp
Masterclass	29-Jan-98	5	2	6	13	Executive Studio	IM
Practical business-IT	29-Jan-98	1	0	1	2	Executive Studio	TrackIT tools
Practical business-IT	29-Jan-98	1	1	2	4	Executive Studio	Bus Plann'g
Directors Briefing	29-Jan-98	1	2	1	4	Executive Studio	
Practical business-IT	29-Jan-98	0	3	0	3	Executive Studio	Forum on Line
Practical business-IT	29-Jan-98	0	1	3	4	Executive Studio	Gp Dec Supp
Masterclass	29-Jan-98	5	2	6	13	Executive Studio	IM
Change mgmt	29-Jan-98	0	2	7	9	Executive Studio	Rel'ns'p mgmt
Practical business-IT	29-Jan-98	1	0	1	2	Executive Studio	TrackIT tools
Practical business-IT	29-Jan-98	1	1	2	4	Executive Studio	Bus Plann'g
		286	159	116	561	people attended 50 events 1/2/97-31/1/98	

Table 2: Fifty relevant learning events measured 1/2/97 – 31/1/98

6.4 Measurement of results

The level of managerial experience of the attendees at the 50 events was established by one of the consortium administrators and is shown in figure 17:

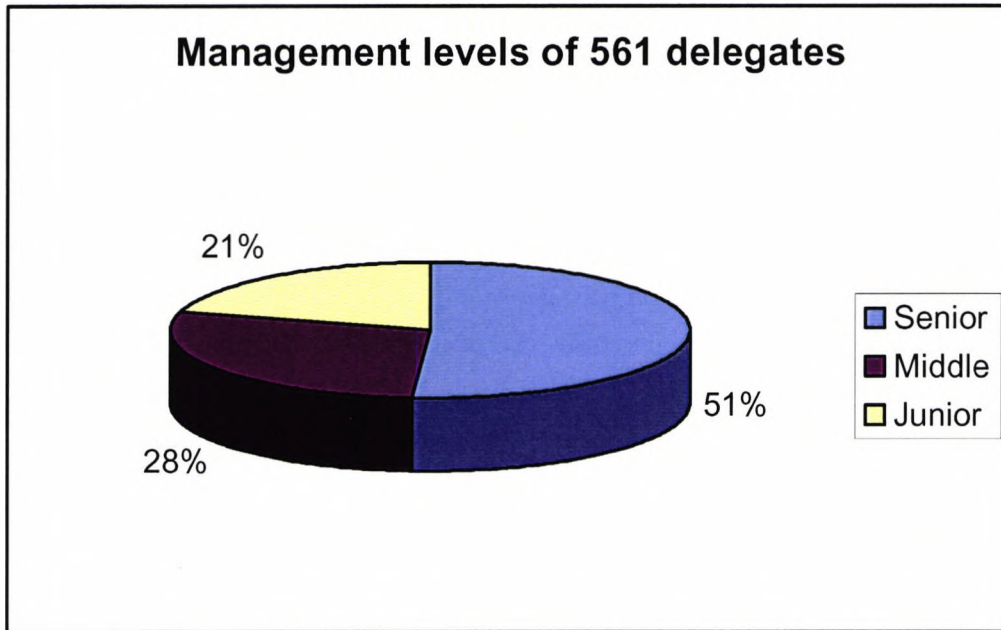


Figure 17: The management level of 561 attendees at 50 events

It transpired that the type of venue also had a material effect on proceedings. The Executive Studio, situated in Hounslow, had become available in the summer of 1997 for master-classes and sessions using group decision support software. Middle and junior managers reported that they found it an exciting and inspirational environment. However, the most senior executive participants soon tired of the journey. It was far more convenient for these managers to host peer-group meetings at their respective corporate headquarters buildings in central London or at a luxury hotel. These trends are reflected in figure 18, overleaf.

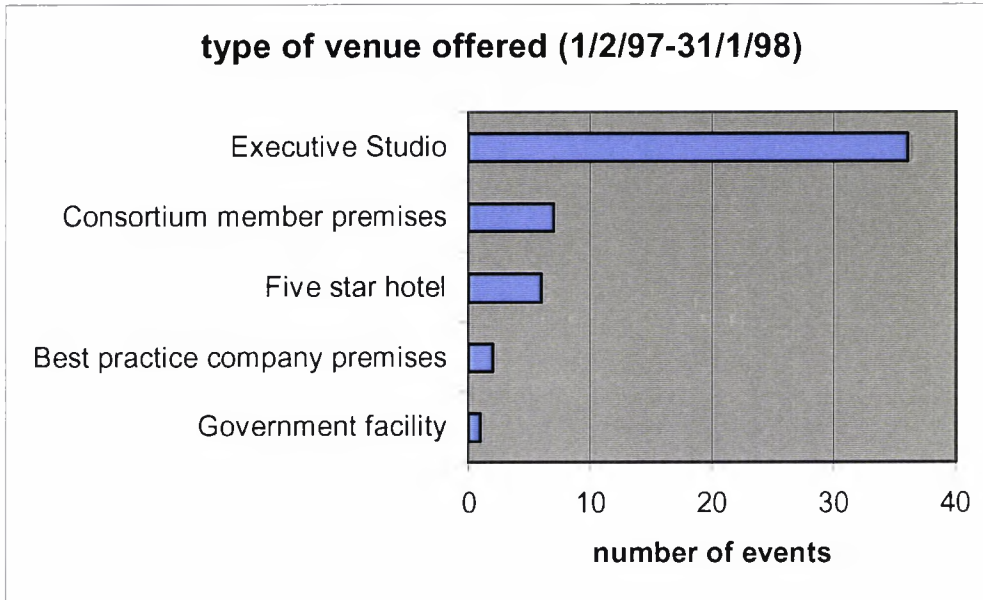


Figure 18: Preferred venue for events

The way in which member representatives elected to book themselves into and attend calendared events is extracted from table 2 and presented in figure 19, overleaf. This figure provides evidence of what might be expected – the senior executives favoured events of a directorial character. These events were staged early in the morning or late in the day to minimise intrusion on executive time. They were shaped as opportunities for short and intensive exchanges with peers, facilitated by an acknowledged subject expert.

Appropriate facilitators were identified and briefed by the author but finally selected by the relevant Project Steering Group on the basis of credibility, understanding of business issues, capacity to introduce new ideas and ability to place these ideas in the context of the research work of the consortium. Such people included Ron

Young, founder and managing director of Knowledge Associates; and Dr John Nicholson, founder and senior partner of industrial psychologists, Nicholson McBride.

Middle managers tended to choose to attend interactive workshops. These were generally designed for a full day and were shaped as opportunities for practitioners to review the research work-in-progress, bring their experience and objectives to bear and influence the direction of further development.

Junior managers tended to prefer hands-on occasions afforded by ‘applications workshops’ to gain first-hand experience of using the tools resulting from the research. Some of these occasions were split into two parts so that the tools could be applied with colleagues in the workplace and then reviewed with fellow delegates.

While these trends confirmed expectations presaged by the theoretical model, attendance at masterclasses displayed an almost equal distribution.

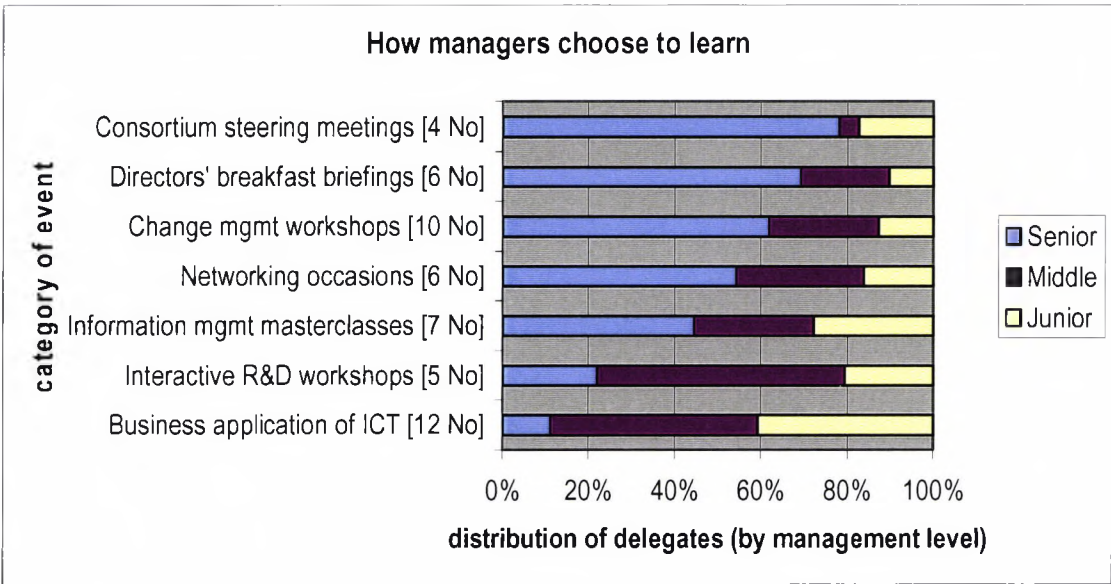


Figure 19: How managers self-select learning opportunities

Further examination of the attendance at masterclasses showed that the apparent equality of management levels is the result of a 'cascading' process. Figure 20 presents in chronological order the attendance at ten masterclasses on change management – in this context, the fostering of information- and knowledge-sharing behaviours. As can be seen, the first masterclass was attended exclusively by top managers. The next three repeats were attended by a proportion of middle managers. Later repeats were progressively dominated by more junior managers. Later repeats were progressively dominated by more junior managers.

This evidence indicates that top managers, finding the wares to be good, advised their reports to attend. In turn these middle managers recommended subordinates to attend.

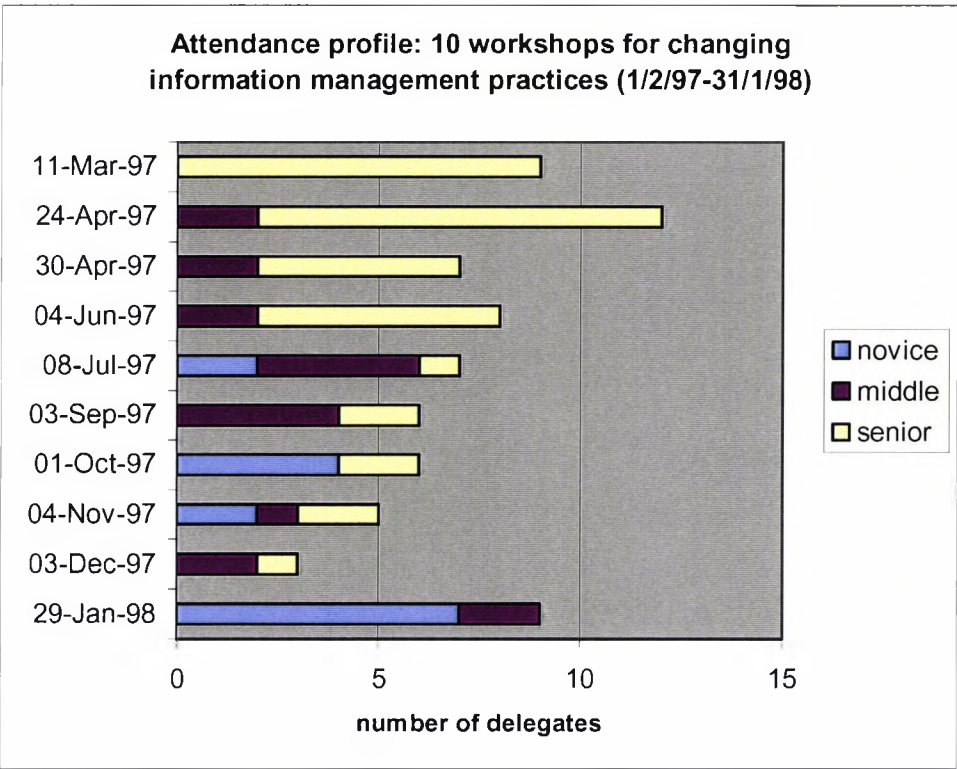


Figure 20: Cascading executive learning on information management

The 1-day ‘interactive R&D workshops’ were attended by between 15 and 30 people representing a good mix of senior, middle and junior managers. They were hosted by consortium members in ordinary meeting rooms and an innovative feature was that the morning period was devoted to an ‘electronic meeting’ (see section 8.2.1.5.1). This enabled mixed teams to debate provisional research findings and use decision support software to classify and prioritise the lessons learned. The results, documented by the system, became the basis for a draft publication for review by the project steering group.

The directors’ briefings were also hosted by consortium members – typically in the boardroom or their in-house Learning Centre. Analysis of the records shows that these meetings once again reveal the cascading process (see. figure 21).

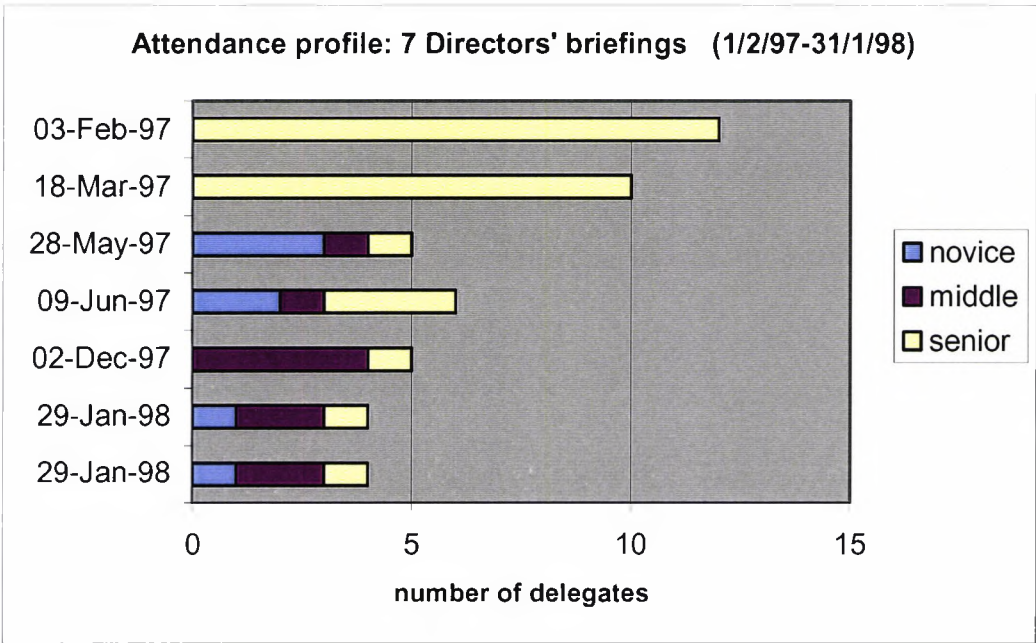


Figure 21: Cascading executive learning re business potential of IT

During the programme two additional measures of effectiveness emerged that, arguably, may qualify as the most compelling. Both were revealed by the actions participants took rather than what they said. The first relates to the fact that attendance at any event was entirely optional. The research effort was funded by corporate donations by consortium organisations. In return, any employee could elect to attend any event. Since the theoretical model was not known to this community, the actual pattern of self-selected attendance and the willingness of attendees to cascade learning opportunities to subordinate staff provides *prima face* evidence of validation.

The second indication of satisfaction was initially misinterpreted as a sign of failure – the most senior participants displayed a personal disinterest in the published outcome of projects they had commissioned. Take the DirectIT project for example (to raise executive awareness of the business potential of IT). The Steering Group included the Chief Information Officers (or equivalent) of The Post Office, British Gas, GrandMetropolitan and ICI. These people happily took turns to host half-day meetings about every six weeks over a period of nine months – an enormous commitment of very expensive resources. At these meetings they insisted on line-by-line examinations of the research work in progress. This painstaking work continued until they were content with the high quality, full colour final report. But after giving hearty commendations at the well-attended press launch their interest appeared to cease completely.

The author decided to raise his concerns at the next formal board meeting of the consortium. Improvements to the research methodology could then be applied to other consortium projects in hand.

The DirectIT steering group members were also among the 12 consortium board directors. They expressed astonishment – had they not publicly said the report was outstanding? They had no need to refer to their carefully stored copies; after each meeting they had immediately discussed the interim findings with colleagues and key staff, made adaptations to suit their own organisation's context and implemented these progressively.

They were now delighted to place the report in the public domain – not least because it would worry their main competitors to find themselves already nine months behind. In short, they had understood, tailored and cascaded the learning and were now eager to press on quickly with the next project to consolidate their firm's competitive advantage.

Other indicators of the effectiveness of the learning experiments with the consortium are recorded in proceedings and minutes over a 3.5 year period. The author kept notes of qualitative comments made at board meetings, 6-weekly Project Steering Group meetings and member events. The reader is respectfully asked to accept that the following examples are representative of this vast bulk of direct and proxy indicators.

Qualitative outcomes include:

- ◆ The TrackIT programme: Hospitality Training Foundation (the then national training organisation for the UK hotels & catering industry) used the TrackIT methodology and software tool with its 50 internal consultants. HTF reported that its effectiveness saved it 'a 6-figure sum' and six months' work

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- ◆ The DirectIT programme: a post-graduate student was recruited to use the DirectIT diagnostic toolset with 31 organisations (most of which were not consortium members). The exercise became his MBA dissertation – which won the City University prize in 1996. The author's 3-page summary caused the DTI to commission the consortium to produce a 20-page self-assessment ('Maximise the Potential') which was made freely available to any UK organisation
- ◆ The LearnIT programme: another MBA student used the consortium's LearnIT methodology to underpin a survey of 31 executive's strategic IT awareness. The author's leaflet summarising this work was debated by the 400 IT directors attending that years' IT conference on the cruise ship Oriana
- ◆ When the author demonstrated to a group of 20 consortium members an online searchable database of 150 business/IT case studies (using Lotus Notes in 1995) an IBM director present endorsed it with: "this is a rare example of the good use of information management"
- ◆ An IT journalist dubbed this resource "the UK's 1st extranet" (probably incorrectly). In reality, few members in 1995 had the skills or equipment to access it. But by 1997 they were so adept that the much larger membership voted unanimously to discontinue the printing of consortium deliverables

Feedback forms were habitually used but because of the large number of events and attendees the Company Secretary calculated summary metrics which were reported

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to the directors at 6-monthly board meetings and minuted. Table 3 (below) provides a summary.

Growth of consortium over 3 years:	1995: 20 member organisations 1996: 36 1997: 92
Annual subscription renewal rate: (at £14,000 pa for large organisations and £5,000 for HE/Not-for-profit orgs)	1995: 80% 1996: 88% 1997: 81%
Member attendance at consortium events:	1995: 248 participants 1996: 552 1997: 561
Customer Satisfaction Index: (*)	1 st 18 months: target 70%; actual 80% 2 nd 18 months: target 85%; actual 88.5%

*Note *: the consortium's account manager conducted quarterly interviews with the executive sponsor of each member organisation and their answers to a standard set of questions were used by the Company Secretary to calculate the 'customer satisfaction index'*

Table 3: Metrics reported by the consortium's company secretary:

The final proxy measure of effectiveness occurred as the consortium entered its fourth year of existence. The rapid growth in membership necessitated a strategic review of future direction. The board of directors decided that its original objectives had largely been achieved. Following this, the collection of research outputs and the membership list were sold to Wentworth Research/GartnerGroup and the consortium was formally disbanded.

7 Applying a narrower focus

The fieldwork process comprised of three key stages: observation, description and validation.

Chapters 5 reported the first two stages. In this study, observation entailed gathering information of perceived relevance to the hypothesis and endeavouring to make sense of it. In the event so much information was collected that without efforts to preserve its meaning and context it could have reverted to mere data. This problem was resolved in the description stage by endeavouring to convert information into explicit knowledge in the form of a theoretical model amenable to communication and evaluation – the Executive Learning Ladder (figure 16 on page 116).

The validation process adopted was reported in chapter 6. Data collected over a twelve month period from Feb 1997 to Jan 1998 was analysed and synthesised to ascertain whether the evidence supported or contradicted the theoretical model as a proof of the hypotheses. This examination revealed strengths in the overall model but also highlighted weaknesses in some areas at the detailed level.

This chapter describes the steps taken to focus on the weaknesses highlighted by the validation process in order to refine and remedy the theoretical model.

7.1 Strengthening the theoretical model

In preparing to apply this focus it proved useful to stand back and review the study in the round. Two issues emerged; one concerned with roles, the other with domains.

7.1.1 Roles in action research

The application of action research into managerial agenda requires the researcher to be closely involved with the actors without him/herself becoming an actor. The researcher's role requires a blend of management, technological and academic experience and the ability to vary the visibility of each component in a Chameleon-like fashion.

In this particular study the author's general and project management experience was probably the most important component because it helped to establish trust with the actors and credibility with case study subjects. The actors clearly signalled that possession of technological skills was taken as a 'given' – and all the better if self-taught – but any pretension to academic skills was best suppressed entirely.

However, the objectivity of the research outputs can be compromised by too close a relationship with the actors. When the actors hold demanding posts in industry the continuation of the project is likely to depend on the researcher assuming responsibility for project managing the proceedings. But the turbulent business environment makes defections inevitable and it may fall to the researcher to recruit replacements. Such actions can raise several risks. For example, high profile sponsorship is a critical success factor for the project but delegation can be followed by disconnection. Secondly, it is vital that the actors take ownership of the outputs and do not come to view the researcher as the process owner.

In this case the author did take on project management and recruitment responsibilities but the consortium managed to suppress the risks by fostering every opportunity to promote human networking between the actors.

7.1.2 Research coverage of the three domains of interest

This study is rooted in the area of overlap between three domains of interest (see Figure 1). The corollary of this is that the principle locus of each overlap will lie in one of the three parent domains. By the same token, individual research projects to test the hypothesis will tend to respect one of the parents more than the others. Table 4 locates, by parent domain, the research activity and principle fieldwork (1995-97) that led to the formulation of the theoretical model. It then shows the distribution of subsequent projects to refine the model. The learning from these subsequent activities is reviewed in this chapter.

Parent domain	Research activity contributing to the theoretical model (pre 1997)	Research activity for refining the theoretical model (post 1997)
Strategic Information Systems	▪ Client-server frameworks ▪ BPR ▪ Business transformation ▪ Process modelling ▪ Electronic meeting room (with VisionQuest)	➤ Electronic meeting room (with GroupSystems) ➤ Online document distribution using Acrobat4
	▪ TrackIT programme ▪ LearnIT programme ▪ Hoechst Office of Innovation ▪ Executive Studio ▪ Day MBA: BPR Elective	➤ Post Office Innovation Lab ➤ Executive Journey ➤ PPM programme CD
Information Management	▪ DirectIT programme ▪ IM Roles framework (Aslib) ▪ AKM for ICI top team	➤ Business Information Management for D&T ➤ Taking Charge of Information for Post Office ➤ Public AKM workshops

Table 4: Distribution of research activity by domain of interest

Notes to Table 4:

- (1) *This tabulation does not imply any mutual exclusivity since all the activities have deliberately focused on the central area of overlap between the three domains*
- (2) *The concept of 'applied knowledge management' did not enter the management lexicon until late in 1996.*

As can be seen from table 4, the second-stage fieldwork set out to address three problem areas related to the literature domains that were revealed during the main fieldwork (1995-97). This refined fieldwork is discussed below.

7.1.2.1 Refined fieldwork in the SIS domain

In the context of the SIS domain it had proved very difficult to overcome the resistance of the most senior participants to use online resources themselves. The case study research had found evidence that good practice companies had tackled this problem by degrees of coercion moderated with one-to-one coaching. Examples include, Triangle Computer Services, Severn Trent Water, Thomas Miller & Co, EDS, John Laing and General Motors. Techniques included, for example, making online systems the only acceptable way to claim expenses or reserve holiday dates. Techniques for raising executive IT skills to enable compliance included the 'buddy-buddy' method (learning in pairs), 'concierge desks' and relocating IT specialists to be 'on hand' in business units.

The method used in this study was to show that use of online facilities would substantially reduce costs to the consortium partners. The high quality, full colour workbooks produced for members cost up the £20 each to print. By September 1997 consortium members had become sufficiently accustomed to retrieving information from the consortium website, for local printing, that they decided that the printing and distribution of hard copies could be discontinued. As a result some of the later research portfolios were only ever published in electronic format.

A second difficulty in this domain concerned the group decision-support software used in the electronic meetings. Initially a very easy-to-use application called VisionQuest was deployed and top executives had taken to this 'like ducks to water'. This application generated a report of proceedings that could be copied to all participants before they left the venue. This feature – which became known as a 'warm handout' - was particularly appreciated.

However, after two years of experiments the rather old-fashioned 'look and feel' of this tool clashed noticeably with the Windows interface that was now becoming familiar to participants. Accordingly, Ventana's up-rated product 'GroupSystems' was deployed in order to sustain enthusiasm for electronic meetings. After some initial complaints that the new software was more complicated, its increased functionality and better-looking reports quickly led to its widespread acceptance.

7.1.2.2 Refined fieldwork in the Management Learning domain

The fieldwork in this domain had largely achieved expectations. However, the experiments had been restricted to managers of consortium member organisations.

In order to check that this work truly contributed to a generalisable model further experiments were conducted with communities of interest unconnected with the IT Skills Forum consortium. These featured collaborative work with the Post Office's Innovation Lab in Rugby, for the Centre for Virtual Work, Commerce and Learning at City University and for senior managers of the global business of Prudential Portfolio Managers.

The common theme of the research work with these discrete communities was that all made use of electronic meetings. The Post Office and the Centre for Virtual Work both afforded a dedicated installation. A portable version was used by the Prudential, at its preferred venue. The original consortium used both a dedicated installation, the Executive Studio, and the portable version set up at various venues including Lloyds of London.

These experiences highlighted the importance of the learning environment in slightly different ways. The dedicated installations offered a close approximation of the '*atelier*' proposed by Argyris & Schon (see section 2.2.3). Both the Executive Studio and the Innovation Lab had been deliberately designed as enclosed spaces with no windows. The portable version was deployed in open, airy places such as the Lloyds building or the garden room of a country house hotel.

No session in either type of environment failed to achieve the objectives set by the participants. However, the required creativity of the user-groups was achieved differently. The enclosed spaces lent an intense, introspective ambience balanced by the excellent quality of the facilities. The open spaces used tended to provoke a more jovial atmosphere that compensated for the more primitive nature of the temporary installations. These differences could be characterised as follows:

- For the enclosed space: 'we are going into this room to use technology to help us solve a problem'
- For the open space: 'we are entering this room to solve a problem with the aid of some technology'

These findings were incorporated into the design of the dedicated installation at the Centre for Virtual Work, opened in June 1999, which benefits from large windows on two sides of the room.

7.1.2.3 Refined fieldwork in the Information Management domain

The fieldwork located in this domain had established a generic framework for enhancing information management roles and skills. If used in tandem with the TrackIT software application, performance improvement of individuals or groups could be measured. However, by 1997 managers were exhibiting a growing desire for ways to link the theory more immediately to business benefits.

This demand fuelled second-stage fieldwork in this domain. Work on practical information management centred on 'Business Information Management' (BIM) – a new concept developed collaboratively for this research. Work on 'Applied Knowledge Management' (AKM) was inspired by collaboration with Jim Noble (then Head of Innovation at Gemini Consulting) to whom some attribute its invention. These initiatives are described below.

7.1.2.3.1 *Applied Knowledge Management*

An AKM approach has been developed and tested via workshops for single and multi-company groups. This is based on the premise that, in reality, it is not practicable to manage knowledge but it is possible to manage *for* knowledge. This is achieved by focusing not on technologies but on changing human behaviours and attitudes to knowledge-sharing. Techniques tested include knowledge directories, knowledge banks and the art of storytelling. Technologies are introduced to reinforce the changed behaviours. Intranets offer an ideal support – provided the community of interest uses them interactively rather than as a read-only resource.

7.1.2.3.2 *Business Information Management*

The BIM framework (described below) has been tested via programmes with senior auditors of Deloitte & Touche and with senior managers of the Post Office. This concept is a business-oriented derivative of information management theory. It proposes that the increasingly turbulent business environment means that information may rapidly change its state in terms of the Information Spectrum (see section 2.2.1). In financial markets, for example, a piece of information may have a useful life measured in seconds, after which it becomes data for archiving. Conversely the ability to select and combine several pieces of 'old' information can provide a trader with competitive advantage in real-time markets.

As has been suggested in this thesis, the Information Spectrum can be a useful if simplistic way to explain the situation as it affects the individual. At the lower end of the continuum, data, information and explicit knowledge can exist in forms that permit

its storage as 'things' as well as in the human memory. On the other hand, tacit knowledge and wisdom can only reside in people's brains.

It can be argued that an organisation can exhibit a form of collective intelligence – as for example in a colony of bees or termites. But these inhabitants are clones of the queen. Human organisations are consensual groupings of individuals brought together, *pro tem*, by shared goals. For practical reasons it is useful to assume that a human organisation is not a sentient being. As such it cannot possess knowledge or wisdom, only data and information and explicit, codified knowledge. For the purposes of this thesis, these states are defined in the context of everyday organisational activity to mean 'business information'.

One may categorise business information into two broad types. The first type relates to its nature: 'hard' or soft'. Here, hard equates to quantitative and soft equates to qualitative. The second type describes its source: internal or external. If the two types are expressed as progressive axes, any item of business information can be mapped.

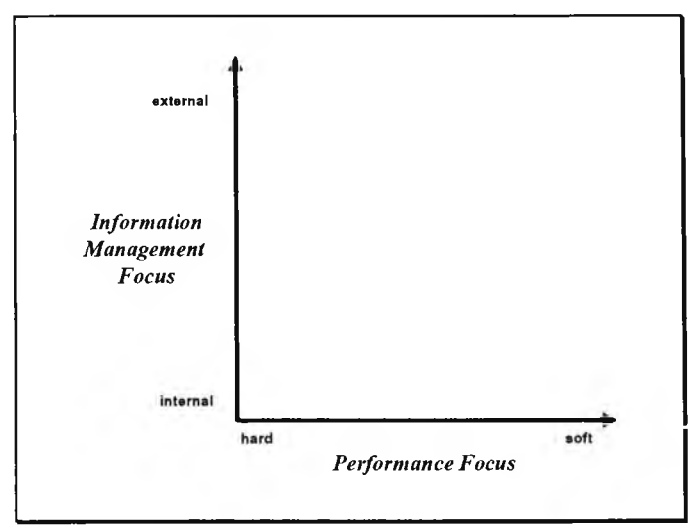


Figure 22: Mapping business information

This mapping reflects the needs of different communities within an enterprise. For examples, a clerical worker or junior manager will tend predominantly to focus on hard internal information. A personnel manager will be interested in soft internal information. A production manager will want to be aware of hard external information. A marketing or planning manager will need to take account of soft external information.

Accordingly the overall enterprise must ensure that this information is effectively managed. This means developing business information management systems that gather and distribute relevant, accurate, timely and actionable information to the appropriate people. In today's business environment, such systems are likely to comprise of both paper-based and computerised facilities. The use of computers to manage hard internal information is long established via, for examples, accounting packages for quantitative data and databases for structured textual data. The 1990s have seen the widespread deployment of GroupWare systems, such as Lotus Notes, that are designed to handle unstructured textual information. Hard external information has long been available from proprietary sources, both in paper and electronic format. The convergence of information and communications technologies has also led to the rapid popularity of e-mail and the World-Wide Web for managing and sharing soft external information.

Organisations at different stages of development of business information management capabilities were researched by means of in-depth interviews with managers and staff. Case examples produced for this thesis include Rotary Watches, Safeway Food Stores and Ferodo Friction Products (and available on request; the first two case studies are supplemented with video programmes).

In essence the BIM framework works as follows:

- Step 1: the company new to BIM focuses on hard, internal information by addressing its 'critical success factors' - which John Rockart defined as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation" (Rockart 1979). Initially, this can be achieved with paper-based information systems
- Step 2: as performance improves the need for computerised information systems increases. As these are introduced the business can promote its CSFs to also take account of soft, internal information
- Step 3: the effective deployment of IT-mediated information systems now depends on raising capabilities across the enterprise to manage information. CSFs can now be extended again, to embrace hard, external information.
- Step 4: to sustain the improvements the organisation now needs to introduce advanced systems to deploy actionable information to stakeholders more quickly. Such systems use data warehousing and mining technologies combined with presentation applications to provide a 'Corporate Radar' (Crawshaw 1993). Achievement allows the CSFs to be further promoted to take in soft, external information.

This sequence of steps is summarised and depicted in figure 23 (overleaf)

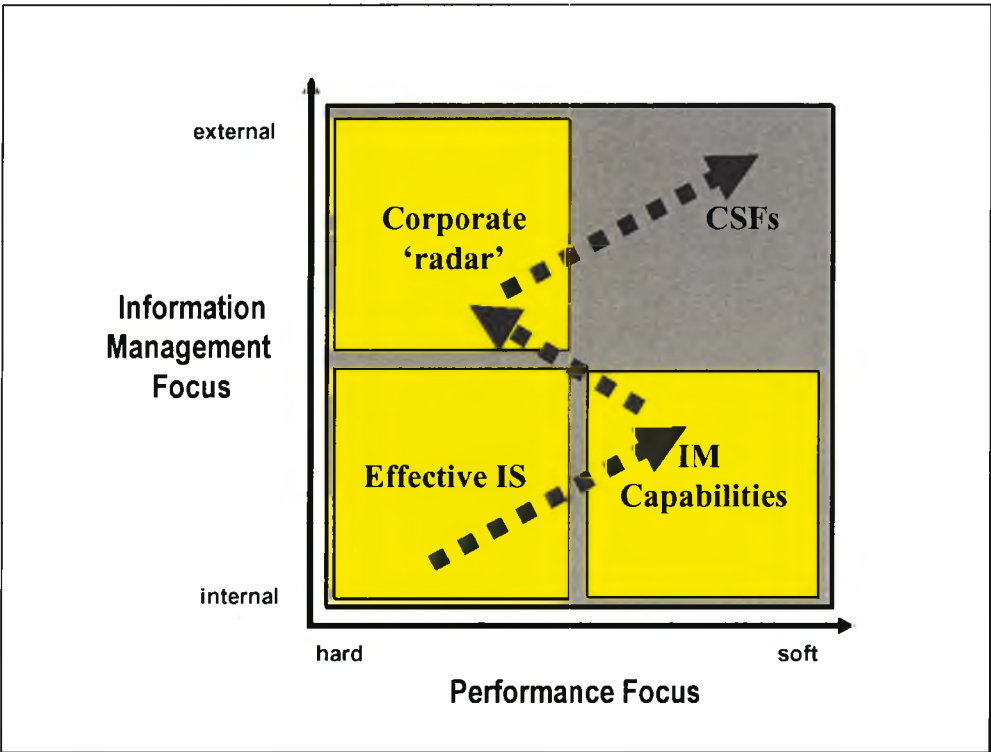


Figure 23: Business Information Management framework, at Step 4

The management control afforded by the focus on CSFs reduces the riskiness of innovatory behaviour. The fieldwork indicates that it can take between 6 and 15 years to reach step 4. Full attainment remains uncommon but can be found in, for example, major consultancies, food retailers and financial services businesses.

The results from this second-stage fieldwork to strengthen the theoretical model are discussed in chapter 8.

Part 2

8 Taking stock

The research and findings reported in Part 1 reflect a study that had expanded in both scope and time. This was because, having identified an area where a solution to research question should be found, the scarcity of published work in this area obliged the author to create and conduct elaborate experiments. As a result, the study thus far paints a broad canvas and the results also cover a broad spectrum. It was apparent that further sense-making would be required to move from divergence to convergence and arrive at a concise outcome.

This presaged a further tranche of more refined fieldwork experiments. At the same time, the burgeoning of the web and proprietary online information resources was contributing to a marked increase in relevant and accessible research by others. This virtual flood was not only in subsets of the three primary literature domains (see figure 1) but also in emerging subsets such as applied knowledge management, e-business and elearning.

In addition, much of this new literature does not fit conveniently into one of the three domains. Increasingly it spans two or more. For example, Barclay defines elearning, in terms, as an IT-mediated approach both to learning-at-distance and instructor-led classroom-based learning (Barclay 2001). Its growing use for management learning requires new thinking about strategic information systems and information management by involving the web, Internet, intranets and novel ICT devices.

If the three domains in the Venn diagram (figure 1) are tending to overlap more, then this will increase the central area concerned with executive IT skills.

On five occasions between 1997 and 2000 work-in-progress papers were presented for review by various academic specialist communities. Their response and feedback has indicated that, while the findings as a whole are viewed as usefully substantiating a range of intuitive beliefs, two aspects of the study have consistently attracted particular interest and requests for further information.

The first of these has concerned the development and use of innovative environments for fostering executive learning; the second has been the efficacy of metaphor and 'transitional objects' as mechanisms for accelerating the ability of senior executives to grasp and evaluate new potential solutions. These are but two of many experimental elements described briefly in Part 1.

The nature of this academic review is typified by comments by Professor Charles Baden-Fuller, as director of research for the CUBS doctoral programme, who felt that the use with executives of transitional objects derived from the field of child psychology was novel and should be elaborated.

Accordingly, Part 2 will firstly update the literature review and, secondly, provide further information about the two highlighted elements in the context of the body of work in Part 1. In a metaphorical sense, the overall thesis will present as a Russian Doll that opens to reveal a similar but more compact version of itself.

8.1 Additional literature influencing the study

This section discusses published work that had come to light since the original literature review and then influenced the refinement of Part 2 of the study. As described above, much of this new information could be positioned in figure 1 within the areas of overlap between literature domains. For clarity, it is grouped under four new and abbreviated headings: knowledge, learning, innovation and change. As will be seen, the headings are not mutually exclusive.

8.1.1 Thinking about knowledge

This topic area embraces knowledge management, knowledge processes, mental models and metaphor.

Since this study began published work reflects the topic's quite rapid progression from fascinating theory to business discipline to specific application. The theory phase has been discussed earlier. The next phase argued that the management of knowledge was a vital business discipline. Grant positions it as a logical extension of the resource-based view of the firm (Grant 1998; Grant & Baden-Fuller 1995). Brooking places knowledge assets on a par with labour, financial capital and physical resources and re-groups the various intellectual asset approaches to deal with it (Brooking 1996). Skyrme and Amidon went further by arguing that the ability to manage knowledge is not an end in itself. With the right roles in place an organisation can combine the (now) four fundamental economic resources with new technologies and become a knowledge-creating organisation (Skyrme & Amidon 1997). Lessem took this forward with case examples to explain how a knowledge-

creating company continually renews itself through learning and innovation (Lessem 1998).

Meanwhile, other authors focused on practical methods. Bukowitz and Petrash conducted extensive surveys to identify good practice in the measurement of intellectual capital (Bukowitz & Petrash 1997). The implication that knowledge management best practice was generalisable fuelled the development of generic, IT-mediated solutions such as Zimmerman's 'Knowledge Depot' and Roth's 'NIMCube' (Zimmerman et al 2000; Roth et al 2000).

However, theorists like Sveiby had long asserted that, while information management was amenable to generic systems that could be equally well applied in different industries, knowledge management was not. Knowledge exists in people's heads and is meaningful to them in specific contexts. This means that systems to support knowledge management have to be not only industry-specific but company-specific, perhaps even tailored for a particular business unit.

This specificity is reflected in work by Gottschalk who compared the efficacy of knowledge management systems in law firms and consulting firms, by reviewing outcomes in terms of firm cooperation, knowledge cooperation and inter-organisational trust (Gottschalk 2000). The nuances of specific organisational context are borne out in Speh's work on new knowledge management roles at Shell International (Speh 2000).

Karsten homes in on successful knowledge-sharing practices at Valmet, a Finnish business making paper machinery (at up to \$200M per machine). She found that the firm's 'communities of knowing' treated an emerging design as a 'conscription device' to ensure it is susceptible to on-going modification. When more advanced IT support

for the knowledge-sharing processes was introduced it actually inhibited effectiveness because, in effect, it crystallised the design into a 'boundary object' (Karsten et al 2000).

Maula picks up on this by alluding to criticism by some that knowledge management has become "a firm's method to exploit efficiently the employees' knowledge". His alternative approach regards 'the firm' as an autopoietic entity that, like a living organism, has a sensory function (that enables continual co-evolution with the environment) and a bounded, self-referential, memory function. He uses case examples of consultancy firms to explain how they remain separate from clients and the wider environment while knowledge flows osmotically, both ways, to spark creative solutions. Looking at things this way, he argues, leads to improved understanding of the major knowledge flows and boundaries and helps the firm to organise knowledge management in a sustainable way (Maula 2000).

Calori observed that these knowledge flows are the responsibility of the CEO who, as 'cognizer', is charged with integrating views in the top management team – noting that this becomes extremely complex in large, multinational companies. By ascertaining the cognitive maps of 26 CEOs (using techniques similar to De Chernatony's (see section 8.2.2.5) he found that superior performers learned by blending cognition, feelings and action. Those CEOs that learned fastest did so by comparing their cognitive maps with others, thus stimulating reciprocal learning (Calori et al 1994). This work provides evidence that executive learning is accelerated through opportunities for peer-group exchanges augmented with the use of metaphor to facilitate shared understanding.

More recently, the ability of an organisation's operational staff to make sense of incoming knowledge has been investigated by Jeffery. Through extensive interviews he found that customer behaviour in particular was poorly understood and often responded to inappropriately (for example, by bombarding a new customer with unsolicited and unwelcome mailshots). He proposes a metaphor, the Customer Road to Loyalty, as a vehicle for helping staff to learn more fruitful response tactics and when to employ them. Jeffery's metaphor is complete with a transitional image (a motorway interchange) and elaborated with roadblocks, accidents and the concept of 'loyalty police' (Jeffery 1998).

So, during the currency of this study, thinking about business knowledge has progressed from knowledge management as a theory, then as a discipline and, now, as a precursor to organisational learning enhanced with metaphor to aid shared cognition.

8.1.2 Thinking about learning

This topic area embraces learning mechanisms and approaches.

De Geus notes that, in advanced economies, 'knowledge has replaced capital as the scarce production factor'. He crystallises the link between business knowledge and organisational learning by pointing out that the world's oldest companies have invariably moved on from the activity that first brought them success. Indeed, many have achieved serial transitions.

The German psychologist William Stern's theory of Personalismus appeared to explain how this could happen. [note: Stern was persecuted by the Nazis for his

beliefs. His work is similar to Maula's but predates it by 70 years]. Stern started with the premise that only a living organism can learn from change and create adapted versions of itself. He noted that companies, as entities, appeared to display the ability to learn. Therefore a company could be regarded as a living being (De Geus 1997).

De Geus deduced that, to achieve longevity, an organisation must learn 'memories of the future'. His team at the oil company Shell drew on work in child psychology by Piaget, Winnicott and Papert who believed 'to play is to learn'. Play is not the same as 'games'. The player accepts a toy as a representation of reality that can be experimented with without having to fear the consequences. The toy becomes a transitional object by enabling the child to transit from one phase of life to the next; from one level of understanding to another. De Geus's team set out to re-teach managers how to play. Their metaphor of a 'manager's Lego set' was developed with Forrester at MIT to present as a computer simulation allowing exploration of a scenario. Practice with such scenarios has equipped Shell's managers to cope with oil crises better than competitors (de Geus 1997).

The early attempts at IT-mediation had limited success until advances in computing enabled the creation of 3-dimensional 'microworlds' that reacted to applied changes to variables (now familiar to children via SimCity and the like). Many operations in the Gulf War of 1990 had already been played out by the military in computer simulations.

De Geus focused on the learning needs of his employer to plan for change. In the wider picture of organisational learning Harvey and Denton identify change as one of six drivers that include the need to generate knowledge and to satisfy customers (Harvey & Denton 1999). Freeth warns of the discontinuity between academic

learning and workplace learning. Her study of accomplished graduate actuaries entering work show that many do badly in company appraisals and encounter failure for the first time. She commends 'dynamic concept analysis' to help graduate recruits map their new and complex learning milieux and identify the trade-offs that will restore their damaged self-concept of competence (Freeth 1998).

Learning discontinuities are recognised by Williams as 'disconfirming experiences'. He proposes a model for organisational learning that relates individual learning with the organisation's belief systems and its decision-making processes (Williams 2001).

Handy consistently emphasises that trust is the key ingredient for successful organisational learning and knowledge-sharing because it cultivates an atmosphere conducive to effective teamwork and creative behaviours (Handy 1985, 1995). This is borne out by Weller's study of Baldrige prizewinners (US annual awards for quality management). He perceives that the prevailing attitude of less effective organisations is, in terms: 'adapt quickly to the way we do things or you will be ejected as unintelligent'. He commends to such employers Gardner's 1983 theory of multiple intelligences: (linguistic, logical, spatial, physical, musical, interpersonal and intra-personal) in order to appreciate and nurture the rich diversity of talents existing in their workforces (Weller 1999). This opens up opportunities for goal-based training for employees (Schank 2001) and self development initiatives for senior executives (Hague 1974).

For the latter group, this involves re-teaching them how to learn (Hatch 1997) and, in particular, how to relate learning priorities to business objectives (ITSF 1997; Lessem et al 1998). In addition, since many executives left school before computers entered the classroom, how to use computing devices themselves both to aid the learning

process (Gault 1996), to avoid information overload (Bawden 1999) and to appreciate the business potential of new information and communications technologies (Zmud 1996).

The proliferation of cheaper computing devices and rapid take-up of the Internet has paved the way for elearning solutions (IT-mediated learning-at-distance). Early offerings aimed chiefly at basic skills training but the increasingly peripatetic nature of managerial work is provoking growing interest in applying elearning techniques to executive education (Barclay 2001). To date this enthusiasm has been disproportionate to results. Project K supporting this study (see section 9.2.2.2) elicited that, in 1999, elearning vendors accounted for 40% of US private investment in the education field to secure sales of \$500M - a mere 0.5% of all sector revenues (Stein 2001). This offers slim pickings for the over 5,000 elearning vendors identified by Barclay, none of which has achieved more than 3% market share.

Academic thinking on elearning has chiefly centered on descriptions of elaborate technological tools and the new pedagogical competencies they require (Kirschner et al 1999; Retalis & Skordalakis 1999). One school of thought is that Artificial Intelligence techniques such as fuzzy logic and case-based reasoning can support learning (Self 1998) but their complexity has held back widespread adoption. The mechanistic nature of the tools requires new and heavily rules-based pedagogical approaches (Hale et al 1996; Jones et al 1997) but, with these, it becomes feasible to deploy powerful business simulations (Pilkington & Grierson 1996) and collaborative exercises (Osborn 1996) that were not previously possible.

Experiments in multimedia courseware development by Benyon et al led them to conclude that there is little pedagogical benefit from simply hypertextualising existing

materials. It does allow the student to carve a path through large amounts of information but learning styles are still greatly influenced by the linear structure of printed texts. From an end-user perspective, multimedia technologies are quite easy and intuitive to use. However, the educator who must configure the tools faces a challenging task. And as the authors soberly observe, mastery of the tools is not enough. Too few educators take the next step – which is to structure and organise the learning material in a way that is educationally meaningful (Benyon et al 1997)

In general, elearning vendors tend to take the academic content for courses as 'a given' – it exists in the business schools and proprietary databases and simply needs to be re-represented. In reality, vendor/college alliances (eg: FT Knowledge/Wharton in the US; SmartForce/Heriot-Watt in the UK) are finding that it can cost up to \$0.5M to develop a 30-hour elearning course (Courtney 2001). The rationale is that elearning obviates the travel and venue costs and lost productivity incurred with traditional education and training approaches. For elearning vendors the business case is: 'build it once; sell it many times'. But with customers reluctant to pay \$100 per course, the elearning marketplace seems set for slow returns and considerable consolidation.

Face-to-face interaction remains a vital ingredient of the learning process. Distance-learning degree students of the Open University (OU) take an average of five years to graduate and drop-out rates are high. OU research has found that students who attend the one-week induction camp to meet tutors and fellow students increase their chances of graduating by 60% (Kaye 1996).

An emerging trend is for blending elearning with traditional, classroom-style events. Deloitte & Touche has started to require all staff to take specified elearning courses

with online assessment. Staff who do well in these tests are seen as more likely to benefit from attending in-depth workshops on the subject. Those, in various subsets, who pre-qualify themselves in this way represent about 7.5% of staff. So the firm is not only reducing overall training costs but gaining business benefits by directing the right training to the right people (Beament 2001).

Overall, the message from these thinkers is that, although the enabling technologies pay scant regard to personal learning styles, IT-mediated learning can deliver substantial benefits. To release these, teachers have to learn not only how to select and use technologies appropriately but also how to blend these techniques with classical pedagogical methods to deliver an effective learning experience.

8.1.3 Thinking about innovation

This topic area embraces methods and tools to foster innovation and creativity.

Maula was not alone in perceiving the limitations of knowledge management as a tool to apply to a business and, more particularly, to its people. Even organisations with very polished systems have to fight a constant battle to prevent them degenerating into rarely visited repositories of old knowledge - or 'data dustbins' (Cooper 1997; Chapman 1999).

Wilkins' views characterise a growing school of thought: an organisation's future success lies not only in its ability to leverage what it knows but, even more importantly, in its ability to innovate (Wilkins 2000). Wojcik's practical experiments at Hoechst Celanese (see section 8.2.1.4) show that an effective knowledge management system is not an essential precursor for creativity. On the contrary, it is

possible to foster creativity, and even embed it into the organisation's culture, with quite low-tech tools.

The key is to cultivate a climate conducive to mutual trust – starting with small teams (Handy 1995). Wojcik's technique at Hoechst could mean taking a team out of the workshop environment to nearby mountains for roped-together rock climbs. Once trust has been engendered between members of a small team they tend to take it with them to other teams and spread the ethos quite quickly within the organisation and with external partners. Brigham and Corbett believe that mutual trust is the glue that holds these extended networks together. This, when supported with appropriate information and communications technologies, gives the members confidence to adopt new working practices and even to become part of one or more 'virtual organisations' (Brigham & Corbett 1996).

The most innovative inter-firm networks are those that are strategically guided by a member firm that is permitted to take a central role (Lorenzoni & Baden-Fuller 1995). Subsequent improvements in communications technologies have accelerated the benefits for participants but the central or 'anchor' role remains key – as exemplified by Dell Computers (Aldrich 1999).

Electronic communities can link geographically separated people and enable them to share valued resources. However, van Alstyne and Brynjolfsson warn that important policy choices are necessary to prevent 'cyberbalkanization' - fragmentation into self-absorbed groups who screen out less preferred contact (van Alstyne & Brynjolfsson 1996). But their proposed remedies of cheaper access and easier affiliation seem almost as utopian as the idea of an IT-mediated 'global village'.

This view is shaped by first-hand experience – for example, study project 14: 'Eleftherotypia Online' (see table 7). This project was conducted in Athens in 1996. The proprietor of Eleftherotypia, the largest circulation daily newspaper in Greece, wanted a free 'online' version similar to that just launched by the Daily Telegraph (Courtney 1996). The motivation was that advertising revenues would be boosted by charging for page views as well as the traditional method of guessing how many people pick up a copy.

The technologists quickly achieved a prototype. This cleverly reconfigured the content to suit the individual reader's preferences. If a reader went straight to the sport page, then this page became his/her front page on subsequent visits. In effect, each reader is presented with his/her 'Daily Me'. The editor was enchanted and chose to ignore the author's observations; first, that only 0.002% of Greek citizens then had Internet access and, second, that when people read a paper newspaper they tend to flick through in the hope of discovering something interesting – and are exposed to advertisements in the process. The experiment collapsed when it became clear that almost all online readers were ex-patriot Greeks in Australia and the US and therefore immune to bargains on offer in Athens.

This story indicates that audiences may affiliate with electronic communities for reasons not envisaged by the founders. Defensiveness by the founders can lead to balkanisation and, if the hi-jackers persist, the community is likely to split into rival factions. When this happened to the Mac User Group both factions suffered mass defections. Research by Clark and Greatbatch suggests a remedy that maintains the theme of a community. They investigated how the most successful management gurus initially popularise their new ideas and found that all are past masters in the art of storytelling (Clark & Greatbatch 2001).

These gurus unashamedly portray themselves as lone creative geniuses who dabble in their organisational laboratories and emerge with 'the answer'. This they convey with energetic rhetoric and persuasive communication at live appearances to promote their book. Clark and Greatbatch observe that the guru's aim is to change his/her audience's beliefs rather than to provoke action. They do this by celebrating with their audience the concept of management as a virtuous, heroic and high-status role. The technique is reminiscent of religious conversion and habitually employs Lewin's unfreeze/change/refreeze approach (Lewin 1946). The newly annointed converts become a community that can be sustained by occasional articles that praise their good sense in adopting the guru's beliefs.

Pascale dismisses this as 'management faddism' (see section 2.2.2) and his long-term studies show that fads rarely last for five years. Indeed, a mark of the true guru is that just as their idea crumbles they offer a curt recantation and immediately reveal a fresh miracle cure. Such serial gurus include Tom Peters, Michael Hammer and Tom Davenport and, it has to be said, they are genuinely inventive.

Another and more academic school of thought has sought to innovate management thinking by introducing complexity theory. Boviard observes two types of networked organisation: those that are self organising systems with minimal rules that allow for rapid adaption and rules-bound organisations that become 'permanently failing'. He likens the former, metaphorically, to a flock of starlings or a shoal of sardines whose apparently chaotic movements can be explained by three simple rules: move at the same speed as your neighbour, maintain the same distance from your neighbour, stay as near as possible to the centre of the flock - ie furthest from predators (Boviard 1996). A computer model of these three rules will simulate flocking behaviour.

The bizarre fractal images first produced by Benoit Mandelbrot in 1979 are also derived from a deceptively simple formula. In this case it is (in terms): 'take a number, multiply it by itself and add the starting number; take the result (the new starting number), multiply it by itself and add the new, new starting number ... and so on, thousands of times'. When the result of each calculation is mapped as a dot on a grid a fantastical image appears, the salient features of which re-appear at any level of magnification. Very pretty – but what lesson can managers learn from it? Well, the appropriate starting number will produce the image of a fern the genus of which is readily identifiable to a botanist (Gleick 1987). It seems that some apparently deeply complex things are determined by a very small number of factors and variables.

Organisational metaphors tend artificially to reduce the number of variables. For example, war games assume a stable landscape. Lissack argues that in the real world of business this landscape is so turbulent that managers have to agree a shared language comprised of 'frames' of view (that endow meaning) and metaphors (that provoke new images) in order to make sense of it (Lissack 1997).

Morgan believes that metaphor is fundamental to the way we think and express ourselves on a day-to-day basis (Morgan 1998). He illustrates this with metaphors that characterise and classify eight types of organisation. For example, 'machines' espouse a rational, efficient approach while 'organisms' seek to adapt to the changing environment and 'brains' are seen to be inventive and able to self-organise.

Language and metaphor lies at the root of knowledge creation (Nonaka 1994) and give rise to two types of metaphor; chaotic and infrastructure. Chaotic or 'descriptive' metaphors acknowledge complexity and change; they improve understanding of the environment but rarely indicate what action managers should take. Infrastructure

metaphors reify 'sunk costs' – such as emotional investments, legacy systems, existing material investments etc – that convey to managers a basis for control.

Lissack believes that the managerial application of complexity theory leads to increasing returns by helping managers to select descriptive metaphors to extract value from new knowledge and infrastructure metaphors to help them make better investment decisions.

The French academics Theitart and Forgues have tried to put this theory into practice to drive innovation (Thietart & Forgues 1995). At a lecture, Professor Thietart was asked for a practical example. He replied that he had been engaged as a consultant by Alcoa. The CEO had told him that it cost about £70M and took at least two years to build an aluminium smelting plant. However, the spot market price of aluminium was extremely volatile and unpredictable. His question was: 'should we invest in a new plant?' Theitart's advice: 'Ask yourself: do we want to stay in the aluminium business or not?' (Thietart 1996). In other words, the decision must be based on gut feelings; financial analysis has no bearing on it.

Nonaka, Toyama and Konno liken knowledge creation to a chaotic spiral. And, because innovation is a vital source of competitive advantage, it is the responsibility of top management to initiate dialogues that help their middle managers to use existing knowledge to make sense of the new. These dialogues use a process of socialisation, externalisation, combination and internalisation to translate knowledge from tacit to explicit and finally back to 'new tacit' – the so-called SECI process (Nonaka et al 2000). To bring this theoretical language down to earth the authors offer a range of practical approaches. They commend, particularly for middle managers, the concept of *Ba*. This Japanese word literally means 'place' but as a

concept it means 'context' – a shared time and space. It unifies physical space such as an office, virtual space such as email and mental space such as shared beliefs. In this it resembles the Western concept of a community of practice within which ideas are shared, discussed, transferred and tried out.

Ba provides people with the energy to innovate. Inventiveness is the vital spark for innovation but it is only the beginning. A different set of skills is required to turn an idea into something that will prove useful. When exercised well these skills can even produce a winning innovation from a second best idea (cf: VHS unseating BetaMax and the IBM PC beating the Apple Mac). The practical aspects of innovation will be discussed further in section 8.2.1.

8.1.4 Thinking about change

This topic area embraces change dynamics and tools and new business models.

When this study commenced the literature of strategic change was dominated by business process re-engineering (BPR). Typically, this was presented as technology driven 'neo-Taylorism' (Conti & Warner 1994) and an absolute precondition for business success (Bashein et al 1994). The capabilities of new types of computing systems, such as client-server networks, presaged decentralisation which, if not gripped firmly, could result in power passing from the commanders to the cowboys (Wyner & Malone 1994). Although these technologies were expensive and complicated the risks inherent in outsourcing the problem could be managed by increasing the IT awareness of executives (Earl 1996).

What these executive learners wanted more than anything else was success stories, and plenty of them. Indeed, in 1995/6, the consortium companies backing project 12 for this study (see table 7) demanded over 450 case examples of good practice in the management of strategic information systems. The spin-off from this was that, in order to extract nuggets from the growing mound, the participating executives had to learn first to use searchable databases and later to access the resource via the web.

By 1996 the BPR gurus had recanted ('Sorry; we forgot about the people'). Taking a resource-based view of the firm, Andreu and Ciborra formalised a role for IT in organisational learning and core capabilities development (Andreu & Ciborra 1996). There followed an extended debate on the subject of core IT capabilities and whether or not these should be treated as core competences of the business as a whole (Feeny & Willcocks 1998; Javidan 1998). Research in the retail industry found that IT systems delivered no measurable performance advantages unless applied simultaneously to the enhancement of intangible resources such as user skills and supplier relationships (Powell & Dent-Micallef 1997).

The concept of the 'hybrid manager' (Keen 1988; Earl 1989) had failed in practice; employers found it took too long to develop people with the desired blend of IT and business knowledge. Besides, even the few that had made the grade found it almost impossible to keep up with the increasing pace of technological change. Skyrme, among others, realised that it was unrealistic and inappropriate to expect an individual to fulfil such a multi-faceted role. Far better to recognise that a set of roles was required that enabled people with different talents to contribute and, jointly, to progress (Skyrme 1996). A practical application of this thinking was developed in project 10 for this study: Capabilities for Information Management (see table 7). This proposed a model with six inter-related roles: business user, business sponsor, IT

builder, IT Architect, Information Resources Manager, Knowledge Navigator. These roles were derived from empirical observation and a project-based view of the firm (De Fillippi 1998). The model was first published in 1996 as a diagnostic tool (Holtham & Courtney 1996) and has since been used and developed with many hundreds of practising managers.

This focus on the softer aspects of IT-driven change has been accompanied by studies of technological solutions that could help with its management. These seek to highlight the business benefits of technological breakthroughs and to encourage managers to venture outside their comfort zone in order to harness them. Examples include a 'manager's eye view' of web project management (Friedlein 2000); an explanation of the deployment of 3-dimensional graphics to help managers gain insights by combining multiple data sources (Sutcliffe & Patel 1996); a discussion of the social implications of avatars or 'tele-embodiments' that enable managers vicariously to explore remote locations or even hostile environments such as the interior of a nuclear reactor (Paulos & Canny 1997).

Murphy criticises such approaches for failing to distinguish the processes enabled by technologies from the tools and machinery that embody them. His long-term studies of decision support systems (DSS) as enablers of the decision-making process convince him that, to be effective, they must be constituted as a permanent and global aspect of the management of an organisation (Murphy 1996).

This is echoed by Turrell who observed that early adopters of DSS tended to confine the equipment to a special room and restrict its use to top managers (Turrell 1994a). Initially this had been because of expense and technical constraints and also because of the perceived value of a corporate 'war room' of the type pioneered in the

1970s by Stafford Beer for President Allende of Chile (Beer 1972). But the 'war room' approach is both confrontational and a barrier to institutionalisation. In the UK, industrial partners in the DTI-sponsored Business Flight Simulator project had thrashed out a facilitated, IT-mediated decision-making process for multi-company groups who wished to solve a shared problem. Here, the dedicated meeting place presented neutral ground rather than a confrontational arena (Holtham 1994).

Focusing on the single organisation, Turrell pointed out that since many large organisations had moved to distributed IT systems it was both feasible and desirable that DSS were made available to as many managers as possible. Furthermore he noted that low-cost solutions existed. For example, the multinational Asea Brown Boveri (ABB) had divided its 200,000 employees into some 5,000 autonomous profit centres with a minimal HQ staff. The strategic intent was that the benefits of local customer focus would outweigh resource inefficiencies (eg: every unit having a financial controller). The implementation of this massive change programme had proved highly successful and was widely reported by gurus including Tom Peters. However, senior ABB executives freely admitted to Turrell that this success had, in large measure, been dependent on the widespread distribution of DSS in the form of relatively inexpensive Lotus Notes groupware to enable a two-way reporting process and to ensure organisational coherence (Turrell 1994b).

Early attempts like this to roll out new applications across large enterprises were fraught with difficulty. On the face of it these related to lack of technical skills and the fragility of infrastructures. Pioneering initiatives were said to be 'at the bleeding edge'. But Orlikowski's investigations elicited that the true determinants of success or failure were much more likely to be behavioural. Hewlett-Packard, a technology company with a robust technical infrastructure, was one of the first organisations to

give all employees (then some 56,000) workplace access to email. H-P allowed Orlikowski to observe the roll-out for several months. She found that newly connected people were almost immediately receiving up to 200 emails per day. The typical reaction, on discovering that most of the content was an irrelevant distraction, was to delete the lot unread – the rationale being: 'if it's important they'll send me a fax'. She identified several factors contributing to the initial failure. *Inter alia* that users should have induction training in 'email protocols' (eg: don't email the whole office with: 'someone's parked their car with the lights on'). Secondly that senior managers who 'gave themselves permission' not to use email would destroy the business value of the initiative (Orlikowski & Gash 1994). The lessons learned have become folklore and roll-outs are now a little less traumatic. However, even today, it is not difficult to find organisations afflicted by top management abdication.

In their studies of large-scale organisational change, Akin and Palmer note that metaphor is one of the most widely used tools of change agents (eg: stepping stones across a torrent to reach a better place). However, they warn that while an appropriate metaphor will illuminate, a poorly-chosen one can invoke paradox and confusion. To avoid the four commonest pitfalls: it must be perceived to 'fit' the situation; it must be unambiguous; it must not affront existing, deeply-ingrained metaphors; and it must not imply a narrow range of options (Akin & Palmer 2000). For examples: likening the changed business to a microchip is pointless if the audience don't know the main characteristics of a microchip; using the metaphor of a broken engine may suggest to some that it should be replaced but to others that it should be restored to its original pristine condition.

One of the most profound pan-industrial changes of recent years has been the advent of e-commerce (trading via the Internet) and e-business (basing a business

around digital technology as the main communications medium). The theme of early authors such as Hagel was that the electronic communities (see section 8.1.3) that had developed mainly as social networks offered IT-literate businesses an opportunity massively to expand their markets (Hagel 1997). Chattell proposed that the business value of digital contact lay in better customer information, faster responsiveness and hugely reduced costs that allowed the organisation 'to pursue new exciting purposes' (Chattell 1997).

In the main, managers of established businesses treated these rather woolly exhortations with disdain. But this began to turn to alarm as they saw that tin pot start-ups like amazon.com were able in a few months to seize market share that had taken leading incumbents decades to secure. They drew comfort from the fact that Amazon was racking up annual losses of \$200M to buy sales (despite Amazon's riposte that it was building a brand as well-known as Coca-Cola). But the alarm was accentuated when troublesome interlopers like Dell Computers and easyJet - having already seriously upset pricing models with their telesales approach – began to shift to e-business, cut prices and post even larger profits.

Aldrich attributes Dell's success to its ability to assume an 'anchor' role in its supply chain. Dell carries no inventory; it hands on the customer's order to assemblers and ensures delivery within days. Dell avoids being displaced by its suppliers by offering customers added value services – such as an equipment inventory - which it can do at marginal cost simply by reconfiguring existing customer information (Aldrich 1999).

Kalakota crystallised the generalised business case for e-business by observing that it had reversed the value chain. In the past, a business had set out its market stall and simply waited for customers. Customers seeking a popular product had no

alternative but to queue or pay a premium. The digital economy started to replace these marketplaces with market spaces (Rayport & Sviolka 1994). A customer with access to these virtual market spaces could ascertain who actually had a desired product in stock and at what price – and could even barter (Kalakota & Robinson 1999).

This sense of customer empowerment led many members of the general public to invest in new e-businesses – despite the warnings of ‘irrational exuberance’ by Alan Greenspan, Warren Buffet and other sages. Nevertheless, established companies began to pay huge sums to annex the new e-skills they needed; some like Thomas Cook set up in-house e-business units and others like Iceland decided to reposition the entire company as an e-business.

Surprisingly few of the established business gurus joined the feeding frenzy but there was no shortage of new literature on the subject of e-business. The new truth was even affirmed in guidebooks by professional institutions such as the British Computer Society (BCS 1999).

Over-inflated expectations of investors led to the ‘dotcom bubble’ which finally popped in March 2000. Managers who had put their head in the sand have taken this as exoneration. Those who attempted to move with the times have sought reassurance that business will not slip back into a ‘queue here’ relationship with customers.

In response, the author developed the metaphor of ‘the dotcom ricochet’. In essence this proposes that the legacy of the dotcoms is that they have indeed had a lasting impact on the business domain. With technical audiences this metaphor alludes to the outcome of a collision in a nuclear accelerator between a heavy and a light

particle – the heavy particle is deflected from its course while the light particle disintegrates into derivatives, some of which are new and extremely interesting.

For a managerial audience the metaphor imagines business enterprise to be a lumbering super-tanker steering a course between the demand side and the supply side. This vessel is struck from the supply side by a smaller, fast-moving boat (representing a technological innovation). Although the small boat is barged aside and shattered by the impact, the super-tanker is deflected very slightly off course – towards the demand side. Lessons are learned and some spin-offs from the incoming vessel are found to have unexpected utility. A succession of these innovation impacts pushes the super-tanker progressively onto a new course that brings it closer to the customer (see figure 24).

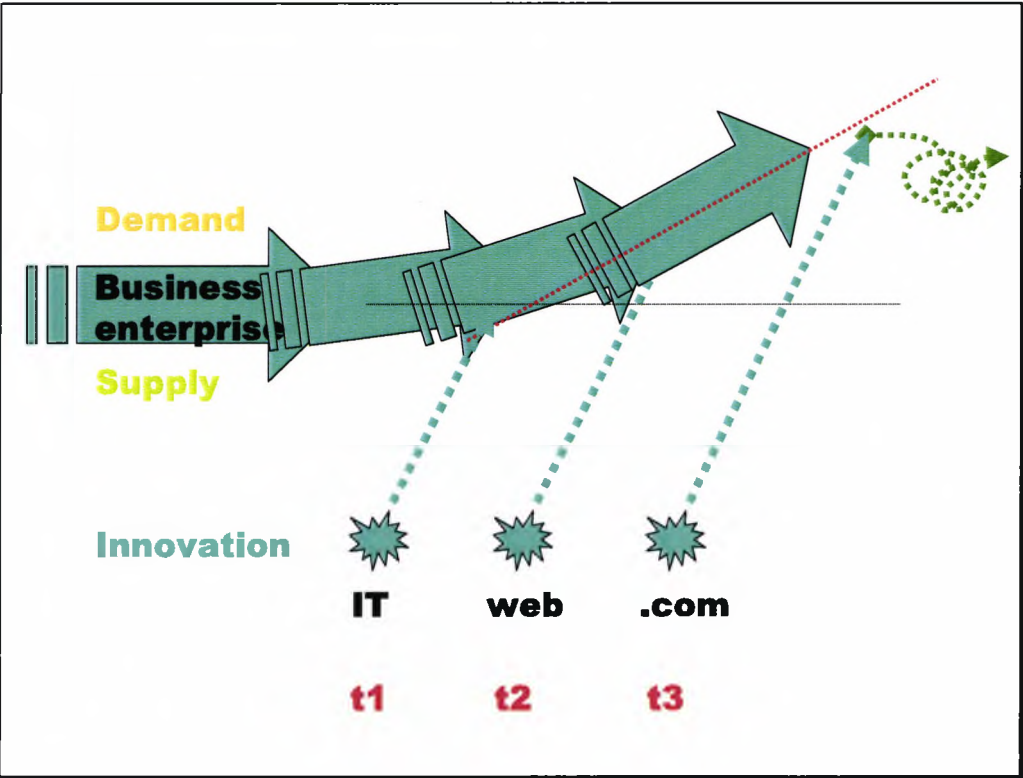


Figure 24: The 'dotcom Ricochet'

Audience response has shown consistently that this descriptive or chaotic metaphor has helpfully raised understanding – even though, in itself, it offers no specific solution. However, according to Akin's tests the World Trade Centre atrocity may now rule out the metaphor of a small object impacting a large object.

Empirical evidence of the dotcom legacy is emerging. An increasing number of 'old economy' companies are exploiting it to develop a multi-channel approach. Julian Stainton, CEO of health insurer Western Provident, has created an online business unit as an internal competitor. At its launch he announced, in terms: 'this new business may destroy our traditional business – but it's better that we do it than just wait for a competitor to do it to us' (Stainton 2000). In July 2000 Jack Welch, CEO of General Electric, was seen by analysts to have enhanced his legendary status by publicly announcing his 'destroyyourrownbusiness.com' strategy. All divisional managers would be obliged to set up a real or imaginary (see De Geus in section 8.1.2) online unit in order both to protect and augment existing business practices.

Some established businesses, recognising that specialised skills are required for online trading, have been quick to acquire bombed-out dotcoms at fire sale prices (eg: Woolworths' purchase of jungle.com). The multi-channel strategy of such retailers is reinforced by Jupiter Media Matrix research showing that, in the US, 45% of potential customers use the web to locate a desired product and then visit the store in person to finalise the purchase (Silicon.com 2001). This is reminiscent of 1993 research in the motor trade by Bacon. He found that the average customer will visit six showrooms to browse and gather information. However, once the customer books a test drive there is a 66% probability s/he will buy the car (Bacon 1995).

The Halifax advertises that customers can obtain its financial services by walking into a branch, by telephoning its call centre or by visiting its website – whichever route is chosen the Halifax warrants the same level of service. The Australia-based insurance multinational AMP is developing different multi-channel strategies within its major businesses; in the Hendersen asset management business it enables a consistent global service; in the Virgin Direct business it allows customer relationships to have a regional focus (Stace et al 2001).

These trends indicate that during the currency of this study there has been a marked improvement in the ability of executives to grasp the potential of new information and communications technologies to transform business performance – the definition used here for 'executive IT skills'. However, there is contemporary evidence that this improvement is patchy. Research by Hays IT in August 2000 found that 31% of managers believe their 'senior executives do not know how to use a computer or even send an email'. 65% of the 1,000 respondents believe that 'IT-illiterate bosses are now at risk from a younger, more IT-friendly generation' (Ward 2000). The Jupiter research mentioned above also found that 65% of 'Bricks and Mortar' retailers judge the success of their online business units by entirely the wrong metrics. Worse still, the Financial Times (27 Sept 01) reports that a KPMG survey of 200 senior board members revealed that: 'only half had any idea of what their IT budget actually was. Furthermore, a staggering 80% were unaware of the cost savings attributable to their company's information systems'. KPMG assessed that, between them, the interviewed executives had racked up unnecessary costs of £17bn by mishandling company IT assets (Hanaghan 2001).

These dismal reports show starkly that executive learning in the information management domain remains an urgent priority. The remainder of this chapter

describes a range of practical and proven remedies. Chapter 9 will show how the fieldwork for this study validates the research hypotheses and has given rise to a generalisable method that has proved very effective in addressing the problem.

8.2 Learning innovations and the use of metaphor

This section elaborates the issues of innovative learning environments and the use of metaphor to accelerate executive learning – two topics that have attracted particular interest in public discussions of work-in-progress for this study.

8.2.1 Innovative learning environments

When this study was initiated the conventional way in which busy executives learned about information management and systems was to attend public seminars and visit computing-related exhibitions - both of which tended to be driven by vendor interests. Exhibitions could offer some momentary opportunities for 'hands-on' experience but, in the main, keyboard practice was limited to training company classrooms deploying serried ranks of computers. Computers were rarely used as part of the management education process. Exceptions include the masters-level distance learning courses run by Fiona Galpin at Henley Management College and Professor Roland Kaye at Open University which required remotely-sited executives to submit coursework electronically and participate in 'virtual' classes (Courtney, 1993).

The success of these isolated experiments pointed up the importance of innovative and novel forms of learning environment for executives. These thoughts were

brought to a head after Professor Clive Holtham visited the 'Executive Sandpit' at Wake Forest University in North Carolina in 1995. His notes and photographs depicted a large dedicated space packed with new technologies where senior executives could 'play' with (hence 'sandpit') possible business-IT solutions and receive one-to-one coaching in their application and use. The rationale was: 'come here for hands-on experience. It doesn't matter if you make a fool of yourself because your staff won't be here to see it - only other executives who know as little as you do.'

On his return there were animated discussions about the need to establish a similar installation in the UK. The question was: could a replica be transplanted successfully to the UK? Having lived in California for a spell, the author had experienced American culture at first hand and tended to subscribe to Sir Winston Churchill's remark that the British and American peoples are divided by a common language. One cultural difference is that British and continental Europeans are more inventive whereas Americans are better at innovation. Research by the Japanese Ministry of International Trade and Industry reveals that since 1900 55% of all innovative and successful products produced in the world have been based on British inventions (O'Donnell, 2000). Here, 'invention' is defined as the creation of new knowledge and 'innovation' means its systematic development, application and exploitation in the marketplace (Burrows, 1992). The Sandpit presented a fairly mechanistic and 'take it or leave it' approach that appeared to suit American business-people, although close examination of Professor Holtham's photographic record indicated that the facility was decidedly under-used.

We deduced that a Sandpit transplanted this side of the pond would not succeed. It would have to be modified if it was to appeal to European business people. We

identified and inspected several experimental installations in the UK. These appeared in three categories: technology learning centre, learning resources centre and innovation laboratory.

8.2.1.1 technology learning centres

Two 'technology learning centres' were viewed; one in Bristol, established for the local community with assistance from ICL, and another with similar facilities built by Teesside Training and Enterprise Council to raise IT skills in the region. Both were particularly interested in promoting remote communications technologies such as email and videoconferencing.

8.2.1.2 learning resources centres

It proved easier to find examples of 'learning resources centre'. Typically these were on company premises and restricted to employees. British Airways had built these as 'drop-in' centres for staff at Heathrow and Gatwick airports to underpin its Catalyst programme. Those built by Thomas Miller & Co, the marine underwriters, Rotary Watches and Western Provident Association had been symbolically situated at the heart of their headquarters buildings (Courtney, 1994, 1995 and 1998). The facility at the Slough campus of Thames Valley University, designed by Sir Richard Rogers, was restricted to students and faculty.

Typically, these feature a technology-rich zone for taught courses or individual self-learning and an adjacent library of books, journals etc together with audio-tapes,

video programmes and CD-Rom training packages. In all cases these facilities are permanently manned by facilitators and technicians.

8.2.1.3 innovation laboratories

In 1996 it proved difficult to find examples of an innovation laboratory as a dedicated installation. At that time, UK specialists in promoting creativity, such as Andy Wilkins at Bull Information Systems, tended to use their expertise and teaching artefacts to convert an ordinary room into an innovation lab for the duration of a workshop. However, two candidate installations were identified, both abroad. One was lateral thinker Edward De Bono's residential school for executives on his private island off the coast of Italy. The other was the Office of Innovation, developed and managed by Tom Wojcik at the Hoechst Celanese research campus in Charlotte, North Carolina.

Since this doctoral research has been entirely self-funded, the cost of international fact-finding trips had to be reckoned with. The decision was crystallised by the news in June 1997 that Hoechst AG had sold its chemicals business, incorporating Hoechst Celanese, to the Swiss chemicals giant Clariant. Among its first actions the new owner had ordered the closure of the Office of Innovation - perhaps further evidence of the invention/innovation dichotomy referred to above. Hasty arrangements were made to spend four days in Charlotte interviewing key executives and researching and filming the installation before it was too late.

It transpired that the Hoechst project had achieved considerable renown. Both Harvard Business School and Pfeifer University had sought to acquire the

condemned installation and reconstruct it on campus. Unfortunately its 2-storey height had made this unfeasible. Since the knowledge gained from this visit was to have a major influence on subsequent fieldwork, the following account sets out to record salient features of the lost resource.

8.2.1.4 A case study of innovation at Hoechst Celanese

The Office of Innovation was the brainchild, in 1988, of Hoechst Celanese (HC) deputy chairman Joe Patterson. HC constituted the heavy chemicals division of the German chemicals and pharmaceuticals giant, Hoechst AG, and contributed about \$15bn to the group value of \$40bn. HC's main competitors were Du Pont, Allied Signal, Eastwood Tennessee and Nan-Ya, in Korea.

In the past, HC scientists had invented and patented a range of innovative polyester polymer compounds that had led to lucrative profits from the mass production of plastic films and fibres, tyre cord and PET (a clear plastic for making soft drink bottles). HC had earned world No 1 ranking in this marketplace, re-investing 7.5% of annual turnover in R&D. Contemporary research by Fortune Magazine warned that ploughing back much less than 7% could precipitate a fatal decline. Mr Patterson was increasingly concerned that his company had become complacent. HC's rather prosaic product portfolio required a good deal of expensive marketing and, to fund this, the R&D budget had gradually been whittled down to 3%. By 1988, HC had been supplanted as world No 1 by Allied Signal, which had consistently re-invested about 6.5% of revenues in R&D.

Legend has it that Mr Patterson made his point by turning up at a board meeting wearing a sweat-shirt emblazoned with a picture of a steer and the words: 'Some day our cash cows will be pot roast'.

8.2.1.4.1 *Re-igniting the ability to innovate*

This shock tactic secured him a budget to explore how Hoechst could re-invent its ability to innovate. He turned to Bruce Wright, one of his 'old guard' of inventive scientists, to build the team that would make it happen. Among the first to be assigned was Tom Wojcik, a research chemist responsible for technical and product development. Tom is by nature a creative person but he had to learn how this attribute could be transferred to others. He consulted leading experts including the lateral thinker Edward De Bono and Teresa Amabile, Professor of Business Administration at Harvard Business School, for her expertise on creativity (Amabile 96) and Bob Cooper, Professor of Marketing at McMaster University in Ontario, who had invented the 'stage-gate' process for new product development (Cooper, 1993).

In early 1990, Tom met John Sullivan, whose Centre for Creative Leadership was based in Charlotte. John showed himself to be a brilliant, if contrarian, thinker (eg: 'where does narrow-minded end and focus begin'; and 'ask why five times and you will get the answer to any problem'). He was soon established as a core member of the team and started by helping Tom with a 'work environment inventory', using a survey and interviews to take the corporate pulse. This revealed an alarming demographic pattern. HC had plenty of bright PhD's in their twenties and a good number of very experienced people now approaching retirement. But, as the result of a prolonged recession if the 1970s there was a marked shortage of employees in their thirties and early forties who could be classified as 'change makers'. Tom realised that, to re-ignite innovative behaviours across the business, a process was required to compensate for this gap. This process was characterised by a metaphor

Chapter 8: Taking stock

- 'The Office of Innovation' - with the idea that employees at any one of HC's plants across the US would come to think of their workplace as 'The Office of Innovation'.

The project had a serious purpose but Tom had resolved that the experience of participating should also be rewarding. He brought in a consultant to train him and his team in facilitation techniques. One of the first meetings invited staff to brainstorm ways to publicise the project. They suggested sponsoring a race car to compete in the Indianapolis 500 series bearing the Office of Innovation name. When the board immediately put up the necessary one million dollars people started to take notice.

To give substance to the Office of Innovation metaphor, the board commissioned an architect to design a dedicated space, presenting as an innovation laboratory, at the Charlotte campus. This was to become known as the I-Lab. The architect produced a model and estimated the building cost at \$310,000. A self-selected group of converts – or 'innovators' in terms of Moore's 'technology life cycle' model (Moore, 1993) – rejected this model and decided that more could be done with less. They observed that one of the campus buildings (a very ordinary, sprawling, low-rise office block) contained an extensive plant room-cum-warehouse area with a clear height of some 8 metres. This, they decided, offered the ideal location. An area of approximately 10 metres square was walled off and given a new access door set at an angle to the main entrance corridor.

Within this huge cube of space a partition was erected, oval on plan, to create a tall, drum-shaped chamber. The inner surface was clad with soft panelling, whiteboards, projection screens and an assortment of bizarre artefacts – including a mysterious doorway about 4 metres above the floor. The industrial ceiling was simply painted

black and festooned with various lighting arrangements on dimmer switches. The redundant corners between the inner oval and the outer square were used for stores, a library and a kitchen all accessed through doors concealed in the panelling. The kitchen had a hatch to the outside so that food could be delivered without disturbing a session in progress. Narrower spaces were used to house a back-projector, TV, a bank of audio-visual equipment, loudspeakers and environmental controls all mounted flush with the inner wall surface. Another spot was made into a walk-in alcove housing a computer workstation. The interior was finished with carpet tiles and simple furniture that could easily be re-arranged for different types of meeting.

This transformation, including all equipment, was accomplished for less than \$70,000 and the \$240,000 left in the building fund was re-allocated to the provision of 'content'. When the I-Lab was officially opened on 25th June 1992, the board endowed the project with a budget of \$30M, positioning it as a cost centre for experiments that would drive the development of new products with a target of \$3.5bn of new sales.

Much was to happen over the next five years. The outcomes and their impact could be viewed as having three flavours - creativity, innovation and culture – as follows.

8.2.1.4.2 *Fostering creativity*

The \$240,000 left over from the building budget was used to develop 'content' – ie: tools and techniques to stimulate and foster creative thinking and behaviour. Some of the content was intended to stay in the I-Lab. This featured a library of reference books and journal articles, videos, soundtracks and a variety of artefacts and devices

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to stimulate creativity such as De Bono's '6 hats'; 'Crazy Ideas' cards, 'Blue Slips', an aroma generator, puzzles, games, computer programmes and so on. However, much more emphasis was devoted to things that visitors could use and then take with them. These included a range of highly original learning materials, souvenirs, posters and garments all branded with the Office of Innovation name.

It is important to note that these tools and techniques were developed over an extended period, as shown in Table 5.

- 1989: - consultations with Edward De Bono
- 1990: - first architect's model of an innovation lab concept
- 1991: - search for creativity and facilitation tools and techniques
 - poster campaign to publicise the Office of Innovation
 - creation of 'safe scissors' (see below)
- 1992: - team redesign of the I-Lab (as actually built)
 - development of audio tapes and video cassettes about innovation
 - distribution of calendar with an inspiring idea for each day
 - Grand Opening of the I-Lab, 25th June 1992
 - first workbook of creative tools, techniques and puzzles
- 1993: - handbook of creative problem-solving tools and techniques
 - deployment of Bob Cooper's 'stage-gate' innovation process
 - building of I-Labs at HC plants at Corpus Christi and Summit
 - start of 'externalisation' – via 'unlikely partnerships' (unis, customers)
- 1994: - I-Lab gets into its stride; numerous artefacts/souvenirs created
 - Hoechst AG Ceo's bombshell in Chemical Week (see below)
 - second workbook of creative tools, techniques and puzzles
- 1995: - start of lecture tours by I-Lab staff
 - book on critical thinking techniques
- 1996: - major re-organisation of Hoechst chemicals division
 - publication of CD-Rom to disseminate I-Lab resources for local use
 - creation of business cards incorporating floppy disc of resources
- 1997: - company awash with takeover bid rumours
 - exploration of MBO for Office of Innovation; Bruce Wright retires
 - June: Clariant buys HC and closes Office of Innovation 30 June 1997

Table 5: Timeline of Innovation Lab 'content' creation and life-cycle

In 1992 there was no store where one could buy such materials off-the-rack. Tom brought in individual practitioners so he could build up a dossier of 'tricks of the trade' - some original and some arcane. An example of the latter is 'pass the ball'. Creativity is quickly stifled when one or two people try to dominate a group. The facilitator screws up a sheet of paper to make a ball, proposes that only the person holding the ball can speak and adds that if anyone asks for the ball it must be given up immediately. This apparently childish device succeeds by using humour to help people moderate their behaviour without taking offence.

The I-Lab's content and physical space was only a focal point in the overall project. The innovation process entailed taking teams (selected for variety using Myers-Briggs) to the nearby Blue Mountains wilderness to undertake challenging climbs, catch and cook their own food and generally fend for themselves and each other. Participants were encouraged to use 'Blue Slips' to jot down thoughts and ideas. Then, six weeks later, these teams would reconvene for four intensive days in the I-Lab.

A typical session would start with 'idea connections', selecting at random from a pack of cards bearing 'crazy ideas' to stimulate thinking about new ways to use HC compounds, fibres and films. Tom recalls one group drawing a card marked: 'Crazy Idea # 7: wrap fibre from the earth to the moon and back'. Within 60 hilarious minutes the group had devised a way to use an existing fibre product to make badminton shuttlecocks. This crazy idea enabled HC to enter and gain a slice of a \$2Bn market. Another group came up with an inkjet printable film that allowed a machine-readable 'smart label' to be applied to low-cost packaging. On another occasion a group had the crazy idea that HC's 'fibret' product for making cigarette filters could be used as an edible food texturiser. Although it may be difficult to

believe, McDonalds became very interested in this idea – until the need for Food & Drugs Administration approval ruled it out.

One of the earliest sessions had produced an idea of such utility that it became an icon for the project. HC produced tyre cord – an extremely strong polyester rope used to reinforce the walls of tyres. Workers had to use powerful hand-shears to cut this cord into usable lengths and serious accidents occurred with alarming frequency. Tom facilitated a meeting on site to seek a solution. After considering a variety of expensive machines one member of the group taped a hair-comb to the side of one blade of the standard shears so that the teeth of the comb extended below the cutting edge. He showed that if a finger was between the blades the comb made first contact and pressure was instinctively released before any damage was inflicted. Within days an industrial-quality prototype had been made easily and cheaply. This simple solution was deployed at all plants and accidents were eliminated. Thereafter every visitor to the I-Lab was offered a pair of these scissors as a souvenir.

8.2.1.4.3 *Measuring innovation*

From the start of the project the development of a system of metrics was given priority so that improvements could be gauged. The scientists at HC were accustomed to measuring hard facts but their knowledge of comparative benchmarks was slim. The academic specialists referred to helped to redress this and to develop ways to measure intangible factors such as the 'work environment inventory' to gauge staff morale. This identified about 100 innovators among HC's 16,000 strong workforce.

A study of HC's existing product portfolio indicated that it could take as long as 15 years to bring a new idea to market. From his research in many industries Professor Cooper had classified five stages of new product development: idea generation & screening; feasibility assessment; business planning, prototyping & pre-commercial validation; semi-commercial development & market testing; commercialisation (Cooper 1993). The I-Lab project was set the ambitious but necessary target of reducing the time for this transition to three years.

HC's track record showed that about 3% of its scientists' ideas eventually made it to market. Bob Cooper estimated that the national average for US chemicals firms was 6.5%. The project was required to raise HC's performance above this average.

It was recognised that while it was important that the creators of good ideas should be involved in development it was unrealistic to expect them, unaided, to maintain their interest over extended time frames. The project came up with a formula:

Good idea sources + disciplined system = marketable business concepts

Professor Cooper's 'stage gate' methodology was adopted as the disciplined system. This delineates pass/fail rules and time limits for each of the five stages in the new product development process.

In 1993 the project was transferred from the film & fibres division to the Advanced Technology Group. ATG set these stage gate parameters. By Dec 95, the results for the Summit, NJ. plant showed what could be achieved with a disciplined system:

Stage	Target period (months)	Actual period	
		1994	1995
1: idea generation & screening	< 3	3.5	2
2: feasibility assessment	9	17	9.5
3: business planning, prototyping & pre-commercial validation	12-24	9.5	-
4: semi-commercial development & market testing	24-36	-	-
5: commercialisation	> 36	-	-

Table 6: Application of Cooper's innovation 'stage gate' process

By 1993, the I-Lab was gathering momentum and HC morale showed a marked uplift. The population of identified innovators had risen to 550 and the idea conversion rate had broken through the national average of 6.5%.

As a practical example, the Summit plant had, in Dec 1993, allocated 89 existing ideas to stages in the stage gate process. By Dec 1995 it had processed a further 141 new ideas; stopped 130 of the total of 230 before undue expense was incurred and already brought two winning ideas to market.

The stage gate process is essentially a risk management process. As such it rigorously and transparently determines which ideas should be endowed with or

denied funding for further development. By 1996 the proportion of new HC ideas reaching the market had stabilised at a very healthy 12.5%. The number of staff classified as innovators had grown to 2,000 even though the total workforce had declined by about 3,000 to 13,000.

By any measure the Office of Innovation was achieving its goals. However, the wider picture suggested that all was not well.

8.2.1.4.4 *The impact of innovation on culture and business*

In 1993, versions of the I-Lab were established at HC plants at Corpus Christi, Texas and Summit, New Jersey. Tom was to spend his time shuttling between these sites, both some 1,500 miles from Charlotte, and spending a week at each in turn.

By 1994 these I-Labs had become a popular and productive venue for HC's scientific community. However, the powerful sales and marketing community became increasingly wary. The prevailing regime had given the marketers a fast track to the top. When RJ Reynolds (Philip Morris etc), a major buyer of the cigarette filters product, formally proposed a joint 'Innovative Partner Business Development' initiative the marketers became alarmed and hostile. They mobilised all their authority to block this and any attempt by the scientists to share new ideas with existing customers.

This Mexican stand-off was soon to be disrupted. The cover story in the 15th June 1994 edition of Chemical Week was an interview with Herr Dormann, CEO of HC's German parent, Hoechst AG. In this, Herr Dormann noted that his group was world class in three lines of business; pharmaceuticals, gas derivatives and polyester

polymers. The cost of competing in pharmaceuticals was increasingly large but this, he believed, was the route Hoechst must take to ensure its future success. He was enigmatic about the implications of this vision for the other businesses.

As HC constituted the polyester polymers business, the article provoked alarm in Charlotte. Could the company innovate its way out of danger or was HC already 'pot roast'? The I-Lab became inundated with demand for its services but, in Tom's view, from then on the company as a whole chose to remain in denial.

However, news of the I-Lab had already leaked. Tom was collaborating with academics at Harvard, Rutgers and Pfeifer and lecturing on innovation to their MBA students. And Amanda Roe, of Virginia State, had published her PhD thesis based on work in the I-Lab (Roe 1993). Tom began to receive direct and unsolicited requests from some of HC's leading customers to bring staff to experience the I-Lab. Among the first was Boeing, whose team of visitors looked at HC's Typar product (a fibre matting for reinforcing road foundations) and came up with an idea for randomising the stress distribution in airframes. Pretty soon the visitor's book resembled the Fortune 500 list. Although Tom displayed their visiting cards outside the I-Lab, Hoechst's marketers refused to notice and this traffic went unremarked within HC.

In June 1997 the author analysed the records and discovered – to the evident surprise of senior HC executives - that 76% of all I-Lab visitors had been from outside the Hoechst group of companies. Further investigation revealed that this phenomenon had worked both for and against the host. It was clear from interviews with executives that these vicarious interactions had helped Hoechst to cement many very strong customer relationships. The downside was that the benefits generally left

with the visitors. For example, RJ Reynolds employees had sent no fewer than 803 staffers to sessions in the I-Lab, including the three top executives, but the HC vp of marketing had only learned of this much later, at a dinner party.

On occasion, the outcomes of visits were to prove extremely painful. For example, HC supplied huge quantities PET to PepsiCola and Coca-Cola in the form of plastic bottles. PET is a complex compound demanding sophisticated process engineering capabilities. The output is cooled until solid and chipped into granules for transportation. This high-tech phase is extremely expensive. The material then enters a low-tech phase when the granules are sent to regional plants for reheating and extrusion into the required bottle shapes. These bottles are then palletted and transported to the customers' bottling plants. Hoechst saw this as an end-to-end process and its pricing model reflected this view.

A team from Coca-Cola executives visiting the I-Lab thought about all this from their point of view. In effect, 99% of what was being freighted to their bottling plants was fresh air. They asked Hoechst to re-quote for supplying PET granules direct to Coca-Cola bottling plants, where extrusion machines would be installed. Hoechst sales people saw this as referring to half of the process so they quoted half of the price. Within 12 months this offer was to cost HC over \$110 million in lost revenues.

8.2.1.4.5 *Review of lessons learnt at Hoechst Celanese*

When this fieldwork was conducted, on the eve of closure of the Office of Innovation, there was no suggestion that this particular disaster had contributed to Clariant's lack of enthusiasm for the project. It is not the purpose of this thesis to examine Clariants'

strategic intent. Perhaps the purchase was simply intended to kill off HC as a competitor; stranger motives have been known. The received message was that the new European owners felt perfectly capable of dealing with innovation in their own way.

Despite its sudden demise, HC's Office of Innovation had certainly done much to realise Bill Patterson's vision. He knew his scientists were creative people but that they needed a culture within which this creativity could flourish. The examples given bear witness to numerous incremental improvements. On a broader front, the implementation of Cooper's stage-gate process had enabled HC to measure its improved ability to convert new ideas into marketable products.

The project had been run by scientists, for scientists. This narrow focus was clearly effective but it had failed to win over the marketers. Their refusal to moderate their defensive mindset had prevented HC from capitalising on the strategic alliances so eagerly proffered by many of their customers. And it is not difficult to imagine how the Coca-Cola disaster might, instead, have provided in a win/win.

It is easy to criticise with the benefit of hindsight. Arguably, the marketers were following good practice at that time, namely; that if you have a best-selling product you just need to tweak it to keep your key customers delighted. Clayton Christensen's counter-intuitive warning that we ignore a disruptive technology at our peril was published just too late (Christensen, 1997).

As an afterword, Tom Wojcik left HC with the rights to the Office of Innovation name and his services are now much in demand by a variety of industry sectors, particularly financial services, both in the US and in Europe. He reflects that: "companies must not leave it to Higher Education to promote innovativeness.

Equally it's no use telling all employees to spend 10% of their time 'being innovative' and hope that some do-able ideas will emerge. Some people are just not innovative. It's better to identify the 10% of people who have the ability and help them to make it part of their job. You have to coax the genie out of the bottle."

8.2.1.5 Executive learning environments in the UK

The message from these pioneering efforts in the US seemed clear. The Executive Sandpit had apparently failed, despite the marvels on offer. In effect, it offered little more than a private viewing at a public exposition and executives voted with their feet to show that they did not find this a compelling way to learn. This message still seems to be ignored, five years on. Messrs Compaq has recently sponsored an open learning centre at the Institute of Contemporary Arts in central London. This is furnished with a stunning array of some £500,000 worth of state-of-the-art computers and peripherals. A visit in August 2000 revealed a solitary visitor using an enormously powerful machine to check his email. No resident helper was in evidence.

Conversely, the Office of Innovation had focused on using a state-of-the-art space to help executives to learn new attitudes and behaviours; computers and audio-visual technologies were much in evidence but only employed, as and when appropriate, as tools to help people achieve the transition.

8.2.1.5.1 *Experiments in IT-mediated executive learning*

At this time, quite independently, the same approach was underpinning an initiative in the UK to exploit computer-supported collaborative working. This government sponsored project enabled a multi-company group of executives to evaluate and use, in a business context, group decision support software originally developed for the US Navy. The process involved deploying the software across a local network of ten computers. Having agreed on a shared business problem to be solved the group would split into teams at each computer and input ideas anonymously. The system displayed the consolidated list on a large screen while teams input their votes and prioritisation until a consensually agreed solution emerged. The system then generated and printed a report of the decision for each participant to take away. This IT-augmented meeting process has become known as an 'electronic meeting'.

The project ran for three years from 1994 and was directed by Professor Clive Holtham. The prime purpose was to disseminate the capabilities of collaborative technologies to help raise business performance. It emerged that, while the project obviously depended on technology, its effective use was predicated by two other factors: environment and facilitation (Holtham, 1992). If these were in place the participating executives, many of whom were not regular computers users, were not deterred by the clunkiness and instability of the prototype software. Initially, participants had to go to the technology – in a university computer laboratory. But the inflexible layout, the to-ing and fro-ing of students and the need to leave the room for refreshment were not conducive to success.

A portable installation was purchased and subsequent sessions were held in company board-rooms, hotel suites, government meeting rooms and the House of

Commons - with politicians and members of the Parliamentary IT Committee. The nature of the venue turned out to be less important than the ability of participants to move about freely and converse, take refreshment in the same space and easily obtain just the right amount of coaching and technical assistance, as and when required. Above all, each group of participants had to have a shared business problem that they wished to address; preferably one that had been agreed in advance. Without this pre-requisite, a session was likely to be viewed as a demonstration of technology. With it, the technology would be treated simply as a means to an end.

To date, the technique has been used with well over 100 groups of executives (including events for the IT Skills Forum consortium - see section 6.4). The system software enables the facilitator to monitor activity levels. The normal pattern is for quiet spells, when participants discuss and reflect, interspersed with peaks of intense activity. Given a two-minute period to respond anonymously to a topic, a typical group of 15 participants will generate 150+ ideas. The software then supports convergence by enabling the group to select tools for sorting, ranking and prioritising the ideas and reaching a consensual conclusion and a printed copy of the proceedings and outcome is given to each participant before departing.

Pre-planning is essential. Participants will treat the event as a technology demonstration unless the business problem to be tackled has been agreed in advance. Experience of over 100 pre-planned e-meetings shows that most groups achieve an agreed solution within three hours. And that they estimate, on average, that the same process without IT-mediation would have taken at least two days – with no guarantee that the eventual decision would be acceptable to all participants.

8.2.1.5.2 *Successful IT-mediated learning environments*

A combination of these experiences led to the acquisition, in 1996, of DTI funding to enable the Executive Studio to be built in West London (see 5.3.3.1). As has been described, a significant portion of the Part 1 fieldwork was conducted in this installation. The lessons learned – in particular, that a windowless room is likely to inhibit creativity - were embodied in a second installation built at City University. This was the Centre for Virtual Work, Commerce and Learning, which secured £1M of DfEE funding in 1998. On the back of this grant the portable installation was significantly improved. At about the same time, NCR, part of AT&T, commissioned Professor Holtham to help design a variant suited to the financial services industry. The result – the Knowledge Lab – was built in London's West End.

Meanwhile, Post Office executives who had made use of the Executive Studio had commissioned a bespoke Innovation Lab to be built at their management development campus in Rugby. The author has been privileged frequently to use this facility to deliver a senior executive education programme on information management. Initially the installation was an experiment housed in a redundant temporary building – a construction site Portacabin to be precise. Within this unprepossessing shell over £750,000 was spent to create two extraordinary oval-shaped spaces plus a computer plant room and an office for the manager/facilitator and his staff.

The first space entered is the Enterprise Zone – where managers can try out a variety of advanced systems, such as data mining and route planning, being evaluated for deployment within the Post Office. One then passes through into the Creativity Zone. This houses pods each carrying 4 laptop computers running group

decision-support software and other applications to enable knowledge-sharing. Puzzles and other artefacts to promote creative behaviour are widely distributed. The entire surface of the curved walls is 'whiteboard', punctuated with plasma and back projector screens. When groups write or draw ideas on the walls their information can be captured with a digital camera and transcribed later.



Figure 25: Executives in action in the Creativity Zone at Rugby

The Innovation Lab project is backed by a £3M Innovation Fund to develop good ideas created. The dramatic success of the prototype installation prompted the construction of a £3M building to house a much-enhanced facility, opened in

September 2000. Interestingly, the prototype was an enclosed, windowless place whereas the new building is light and airy.

All these examples allow a group of users to share powerful software. The more important, but intrinsically hidden, features are the design of the environment and the presence of expert facilitation. But the critical success factors are the timing and the way in which technology is introduced into the proceedings and the perception of participants that they are members of a peer-group (cf: the findings from Part 1).

The study, use and development of these innovative learning environments is on-going. However, it has to be acknowledged that the widespread availability of such installations as part of the solution to the research question is constrained by expense. As has been noted, the Executive Studio cost £1.75M, the Centre for Virtual Work cost £1M. The first version by the Post Office's Innovation Lab cost £0.75M and the second cost over £3M. Accordingly, access to the facilities described is not cheap and the proprietary examples are restricted to employees or invited guests.

8.2.2 The use of metaphor to accelerate executive learning

The further element of the Part 1 research that reviewers have remarked on concerns the use of metaphor and 'transitional objects' to accelerate executive learning in the field of information management and systems.

Practical aspects have been described and illustrated in some detail in section 2.2.3.1. In briefest summary, the fieldwork found that these mechanisms normally worked well with and for senior executives, apparently by triggering memories,

associations or deeply held beliefs in a way that provided the individual with a contextual platform for making sense of a new concept. The more experienced the executive the more quickly one could expect the 'Aha!' to occur. For example, at an early stage in the research, Professor Holtham's Information Fabric metaphor was presented to the head of technology at Philips' Eindhoven headquarters. He and his team listened politely to the author's prepared explanation for several minutes before interrupting with a smile: 'Please ... we got the point within ten seconds. Let's discuss how we might apply this very interesting concept'.

For the sake of clarity we should revisit the fundamental definitions of 'metaphor' and 'transitional object' in order to identify distinctions.

8.2.2.1 Definition of Metaphor

The Oxford English Dictionary (1965 edition) defines metaphor as: '(noun) a figure of speech in which name or descriptive term is transferred to an object to which it is not properly applicable (e.g. a glaring error)'. Fowler's Dictionary of Modern English Usage (edition c.1920) devotes an exceptional four pages to the explanation, citing as an example: '... in the Prime Minister's speech, exactly the right note was struck'.

Warren Bennis, writing about creative and collaborative leadership, reminds us that 'For Charles Darwin, the fecund metaphor was a branching tree of evolution' (Bennis, 2000).

It seems reasonable to assume that Darwin had read Aristotle, who said: 'Metaphor (*meta-phora*) consists in giving the thing a name that belongs to something else; the

transference being either from genus to species, or from species to genus, or from species to species, or on the grounds of analogy' (Poetics p1457 *in* Scott 1998).

Since pre-history, humans have made use of existing beliefs to explain a new concept. Every new religion must pass through four stages before it can supplant an existing faith: miracles; parables; apostles; holy writ. The seemingly inexplicable is explained with metaphorical stories that are used by witnesses to spread the word and underpin a catechism of carrots and sticks that locks in new believers (Czerniawska 2001).

In the field of science, every child must have heard the story of an apple falling on Isaac Newton's head. In 1687, when Newton published 'Principia' – 'the greatest mental effort ever made by one man' (Moore 2001) – few could understand it. To explain his Laws of Gravitation to his peers, he devised what he called a 'thought experiment'. He asked them to imagine a very high mountain with a cannon on top set to fire horizontally. When fired, a cannonball would follow a curved path down to the foot of the mountain but, with a very large charge, it would go into space. Newton explained that this was because the tendency to fall to the ground – ie the effect of gravity - would be weaker than the tendency to continue moving ahead. Clearly, with an intermediate charge that balanced these tendencies the cannonball would permanently orbit the earth. The 'trueness' of this metaphor persuaded Newton's audiences to consider seriously his mathematical calculations and proposed natural laws (Sang 2001).

Newton's thought experiment dramatically accelerated understanding by using a simple metaphor to mask the complexity of his ideas. His offer of an 'accepted truth' (about the trajectory of a cannonball) prepared his listeners' mental models for his

radical explanation. And his imaginary cannon presented them with a transitional object that would allow them to explore the 'new truth' before letting go of the old.

8.2.2.2 Definition of Transitional Object

The Dictionary of Psychology (Corsini 1999) offers two definitions:

- 'The infant's first separate 'not me' possession containing qualities of both mother and child, such as a baby blanket or stuffed animal, and that provides comfort to the child in times of separation from mother and home'
- 'Usually a toy employed by children as a means of having fun but which has a future purpose'.

Plainly, both definitions are rooted in the field of child psychology. In July 2000, a web search identified 242 learned articles – all in a medical context, even when referring to art, music, religion and so on. Many of these papers draw on the pioneering work of Donald Winnicott at the Tavistock Institute during the 1960s. Winnicott coined the terms 'transitional object' and 'transferential relationship' and his close associate John Bowlby developed 'attachment theory' (Winnicott, 1958, 1965). Winnicott's focus was on physical artefacts (eg: a cot blanket or teddy bear) that epitomised for a child the sense of security provided by its mother and, being portable, enabled the child to feel safe while tentatively exploring its wider environment.

As has been described in Part 1, Seymour Papert found the theory worked with the teenagers in his IT classes (Papert, 1980). And for at least 50 years countless young people have been introduced to atomic physics by means of models comprised of coloured balls joined with sticks. But this ball-and-stick model is far from accurate.

An un-named scientist recently said on Radio 4 that if an atom was envisaged to be the size of a cathedral, the nucleus would be the size of a flea on the floor of the nave. And we now know that an atom can contain over 300 different types of particle, many with very strange properties. The ball-and-stick model merely serves to enable the student to enter and explore the unfamiliar micro-world of the atom. As his/her awareness develops a transition is achieved allowing the student to replace the crude representation with a more meaningful 'mental model' (see below). The transitional object can then be discarded - just as a child eventually leaves aside its priceless cot blanket.

8.2.2.3 The use of transitional objects with executives

In the management domain it is arguable that an architect's scale model of a proposed building is a transitional object. However, the concept of 'a building' is well understood; the model is used to show how a particular solution will be realised. The use of transitional objects to help executives understand new and less well understood concepts remains comparatively rare.

The example of the Strategy Pegboard (see 2.2.3.1.2), created in 1993 by the change management team at Andersen Consulting, appears to have emerged from osmotic assimilation rather than from an exercise derived from attachment theory. Whatever its antecedents, the Pegboard proved very effective with the C-level executives (CEO, CFO, COO etc) to whom the author presented copies in the process of conducting case study research for Andersen Consulting.

With the benefit of hindsight, the message delivered by the model seems astoundingly obvious, namely; that for an IT-mediated strategy to succeed, people, processes and technologies must be advanced concurrently, not consecutively. But in 1994 many organisations were seeing little benefit from huge investments in IT and their non-technical top managers needed an explanation. Their reaction to the Pegboard indicated that it gave them a satisfactory and instantaneous answer. And during this period Andersen consolidated its market leadership in systems integration services.

The pegboard was not the only contemporary example. Quite independently, Messrs Novell had produced a set of coloured and labelled Lego-style interlocking bricks which showed how its networking software seamlessly linked mainframe, database, middleware and end-user terminal. This toy-like object was distributed in a simple cardboard carton. What differentiated the Pegboard was that it was delivered in a velvet-lined box and was superbly crafted with a hardwood base carrying solid bronze figurines. This ostentatious quality somehow elevated it from toy to 'collectible' thereby enabling an executive to show off his/her perspicacity to colleagues without embarrassment – as some choose to do by having a chromium-plated rack of 'Newton's balls' on their desks.

As far as could be afforded, this lesson was embedded into the transitional objects developed by the author for this research. A doll's-house maker was engaged to machine the set of wheels that, once painted and labelled by the author, became the 'fruit machine' object that helped interviewees quickly to contribute to the research into 'Future frameworks for client-server technologies' (see 2.2.3.1.2).

Later, the author exercised the sort of techniques used by an architect's modeller to create a physical artefact to help disseminate work on information management roles developed with Professor Clive Holtham (see paper at section 12.5 in the appendix). As can be seen from the published paper, the theory proposed that, for business to succeed in the 'Information Age', well-established business roles (executive sponsor, IT user and IT builder) must be integrated with three additional roles (IT architect, information resources manager and knowledge navigator). Since any six entities can have 15 possible relationships, the listener had to visualise a 3-dimensional structure while trying to evaluate their relative importance. To obviate these mental gymnastics, modeller's board was formed into a prism-shaped object, with pairs of roles marked along each of the three arrises. This shell was filled with a polystyrene core to represent accumulated corporate information and knowledge. Rods representing the organisation's business processes projected from both ends of the prism's core. While interviewees are momentarily handling and studying this object they are encouraged to slide out the core. They then discover that the core resembles Gruyere cheese and that the rods stop short of the many large holes.

This description of the use of this object is, of necessity, somewhat laborious. In practice the message is received instantaneously: if role-holders do not share information and knowledge there will be discontinuities in business processes.

We have found that many exclaim that the object reminds them of a Toblerone chocolate bar. This 'Toblerone' spares interviewees from enduring some thirty minutes of potentially off-putting, if not baffling, explanation of the proposed theory. After a few seconds they move to questions about how to achieve solutions. When interviewees are re-convened as a focus group, we have found that the mere sight of a bar of Toblerone is enough to propel multi-company groups of seasoned

executives into an animated debate about what does or doesn't deliver the desired results.

8.2.2.4 The emergence of the 'transitional image'

The classical definitions predicate that a metaphor is conveyed in a spoken or written form whereas a transitional object is a physical artefact. And yet images, pictures and symbols can be laden with subtle meaning. The Christian symbol of the cross stands for a complex set of beliefs; Hogarth's satirical cartoons reduced the monarchy to public ridicule. In Hogarth's day; a house affixed with a lead plaque depicting a radiant sun signified that the owner had paid for fire insurance. The Bass Brewery claims to have the first abstract logotype – a red triangle applied to its products as a mark of excellence. Beck's stylised map of the London Underground in 1930 provided clarity by replacing actual positions and distances between stations with their logical relationships in the manner of an electrical circuit diagram. By discarding the need for local knowledge, Beck's conceptual map could be readily understood by any traveller. It quickly became an icon of good design that today is mimicked to map the metro systems of most cities in the world.

In the 1970s, the word 'icon' acquired an additional meaning. Computers then could only display plain text on green screens; commands had to be typed in arcane language. Xerox's scientists at Palo Alta Research Centre devised a way to display a tiny image symbolising a command and link this to a concealed set of instructions. Using another Xerox invention, the mouse, the user clicks on this 'icon' and the computer executes the relevant command. This technique – the 'graphical user interface' – obviates the need to learn machine code using borrowed English words

such as 'kill' and 'quit' and replaces it with the multinational language of image. Xerox PARC's gifts have probably done more than any other to lay the foundations for today's ubiquitous computing.

The computing icon qualifies as a transitional object because it allows the ordinary user to by-pass technicalities and take advantage of a new realm of opportunities. But since it is a virtual artefact we might more accurately dub it a 'transitional image'. As such it has quickly been absorbed into international public consciousness in rather the same way as has the red/yellow/green traffic light convention.

This notion was tested during the fieldwork for Part 1. A transitional image was designed to convey the proposed action research plan to consortium partners. This used no fewer than 13 tiny images to illustrate the nature of outputs from each of four stages – Discovery, Design, Development, Deployment (see figure 12 on page 105). No-one ever called for an explanation of any of these images. The plan was readily agreed and the participants dubbed it the '4-Ds'. Thereafter, this nickname enabled partners to discuss the plan without needing to see the transitional image again.

As the number of published research portfolios grew, picture icons were introduced to aid navigation. These 'picons' are page images from related documents reduced to about 4cm x 2 cm. Even at this scale, main headings and graphics are sufficiently legible to enable the reader to select and open the desired document. When the senior executives representing the partners became accustomed to using the consortium website they decided to reduce central costs by stopping print runs of hard copies. Thereafter, members went to the website and clicked on the picon of a required publication to initiate its download in Portable Document File format for local colour printing.

8.2.2.5 On mental models

For the purposes of this thesis it is argued that a common feature of the concepts of metaphor, transitional object and transitional image is that all resonate with the mental model of the recipient. An early explanation of this term was offered by Bartlett, a Cambridge psychologist in the 1930s, who proposed that memory is not just a copy of what one has seen but a symbolic representation or mental model of one's external world (*in* Williams, 2001). This notion implies that a mental model is a deeply personal and complex thing that is shaped by the possessor's life experiences. We start building these models from infancy. An ability distinguishing humans from all other creatures is that by the age of around three months we can follow our mother's gaze and register how she reacts to what she sees (Miller 1999). In other words, humans can learn about the world through another human's eyes. As we embark on a new phase of life – for example, employment – we have to start building a new 'lobe' onto our mental model. And the method that has best stood the test of time is to sit next to a master.

Research by Dr Leslie De Chernatony at City University Business School throws an intriguing light on the personal nature of mental models (De Chernatony, 1993). He had been commissioned by the government to study business managers' perceptions of their competitive environment. He interviewed groups of sales and marketing managers in a number of large companies about their work. His real purpose was to find out how many competitor companies were monitored by the typical manager. He noted on a card each competitor company named during the interview.

When the flow of names dried up he stopped the interview, laid the cards on the table and asked the interviewee to arrange them in a way that made sense. This generally took 15-20 seconds. He then took a Polaroid photograph of the array for later analysis.

One manager mentioned 21 competitors but the majority named between 5 and 10. This strongly corroborated Miller's view that the human brain has evolved to react quickly to events – ie: typically an attack by an animal displaying yellow and black markings - and this life-preserving consideration had led to a restriction of the number of ideas held in active memory to about seven (Miller, 1956). De Chernatony's paper focused on the business risk of monitoring such a narrow range.

One remarkable finding that he shared with faculty went unreported in his paper. This was as follows. At one of the subject organisations he re-assembled his interviewees to share his preliminary results. In the course of this he used an OHP to display one the photographed arrays of cards. A voice in the audience said: "That's Jim's". It was. De Chernatony displayed more arrays and, each time, its owner was quickly identified by members of the audience. Clearly, the supposedly personal and complex mental models of individuals could be identified by colleagues on the basis of a crude two-dimensional image.

9 Applying the lessons learned

The stock-taking aspect of the Part 2 research laid the foundations for a review of the success or failure of the four hypotheses.

9.1 A trial exercise for validating the hypotheses

To initiate this review an exercise was applied to hypothesis 1 to check the extent to which metaphor, incorporating transitional objects and images, accelerated executive learning when used in a business context.

9.1.1 Applying a single-issue test to hypothesis 1 - the efficacy of metaphor

First, a list was compiled of 23 discrete research projects conducted during the Part 1 work up to May 1997 (see table 7 below).

A copy of Holtham's conjecture (see figure 15 on page 115) was selected for mapping these projects. This was done by providing each project with a pair of co-ordinates by gauging its position on a spectrum from pure research to practical learning (the x-axis on the model) and in terms of the level of managerial expertise of the intended audience (from inexperienced to expert – the y-axis on the model).

Next, those projects featuring a transitional object or image were identified. There were 10 of these (see table 7). The objects were physical artefacts that project participants were able to handle (see, for example, the 'client-server fruit machine' described in section 2.2.3.1). The images were mainly presented in electronic format

both to encourage participants to access project resources online at their own convenience and to help them then navigate to required information.

Research project (from Part 1)	Transitional object/image
1 Understanding executive information requirements	
2 Longitudinal case study: Western Provident Assoc	
3 Case insights for book: "Infolution" [for Andersen]	TO: Strategy pegboard
4 Futures frameworks for client-server technologies	TO: Fruit machine
5 BPR: Part of the Managerial Toolset	TI: Stepping stones
6 The TrackIT report	
7 The TrackIT diagnostic software	TI: 3-D topography
8 The DirectIT report	
9 The DirectIT interactive CD	
10 Report: Capabilities for Information Mgmt	TO: Toblerone bar
11 The Information Fabric [by courtesy of its inventor]	TO: Woven fabric
12 Forum Online [searchable online case database]	TI: 4-road signpost
13 The Executive Studio	TO: the space itself
14 Eleftherotypia online [Athens newspaper]	
15 Distance learning report [for CUBS MMBA]	
16 The Needs of Small IT Firms	
17 In depth case study: Forte Airport Services	
18 BPR Sources & Resources ["BPR: Myth or Reality"]	
19 Improving your Message Flows [DTI ISI publication]	
20 Maximise the Potential [DTI ISI publication]	
21 Information for Profit	TO: artefact installation
22 How Tos for Information Management	
23 Executive Development Road Map	TI: Motorway signboard

Table 7: 23 projects underpinning the Part 1 research

By highlighting these augmented projects on the mapped array (see figure 26 overleaf) it was immediately apparent that they covered all levels on the y-axis

(managerial experience) but that most were clustered at the left end of the x-axis (practical learning).

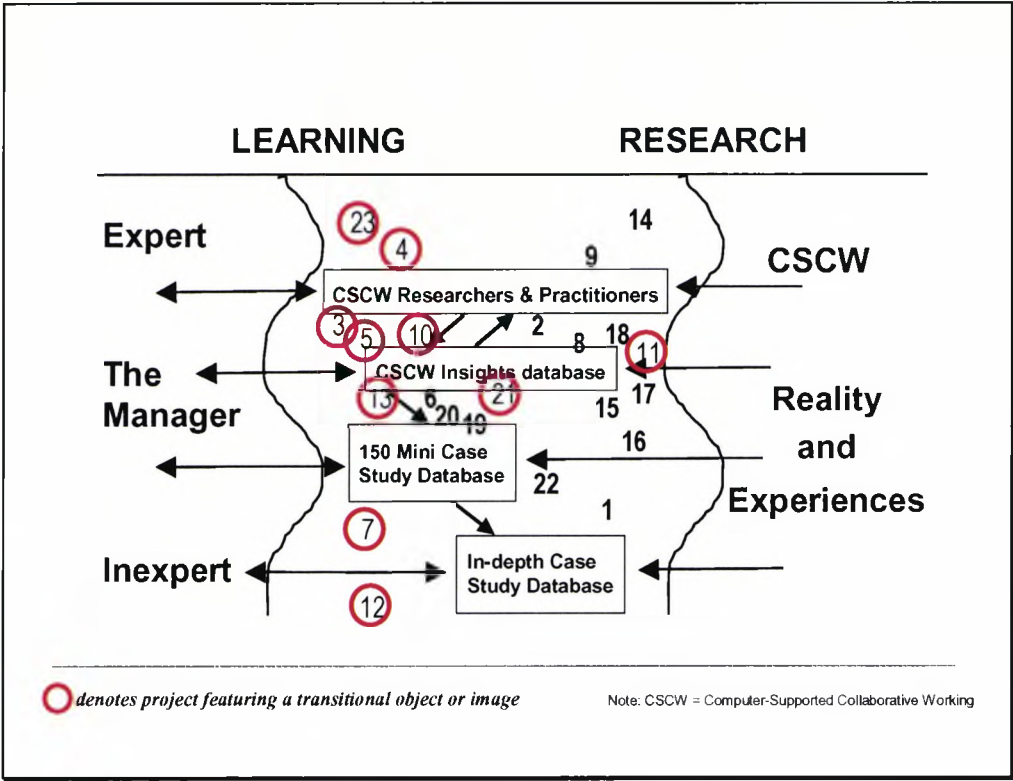


Figure 26: The map of Part 1 projects on Holtham's conjecture

9.1.2 Verification of the positive results for hypothesis 1

This pattern was so marked that, to validate the finding, a further eight projects were identified that had been conducted during the Part 2 review from June 97 (see table 8 overleaf).

	Research project (from Part 2)	Transitional object/image
24	The Executive Journey [DfEE IT Centre of Excellence]	TO: charted waypoints
25	Skills 99 Report [IT National Training Organisation]	
26	Centre for Virtual Work [DfEE IT Centre of Excellence]	TI: Virtual playing field
27	Papers reporting work-in-progress for this thesis	TI: Exec learning ladder
28	Business Info Mgmt Programme [Deloitte&Touche]	TO: tile-board puzzle
29	Insource/outsource report [Wentworth-GartnerGroup]	TI: Sourcing grid
30	Skills Framework for the Info Age [DTI & DfEE]	TI: hypertext skills map
31	Interactive CD [Prudential PM Global Business Prog]	

Table 8: Eight projects underpinning the Part 2 research

This batch of eight projects had been designed specifically to support executive development programmes rather than as pieces of pure research – ie: all were clustered in the top left area of the map – and had been well received. On inspection, six featured a transitional object or image.

This exercise indicated that, as this doctoral study had progressed from theory to practical application, metaphors – and transitional objects in particular – had increasingly been employed. On reflection, the researcher believes this is because of their perceived efficacy for helping executives to make sense of and internalise novel ideas and, in particular, as mechanisms for accelerating the ability of executives to grasp and evaluate the capabilities of new information and communications technologies and the potential of this to raise business performance.

And it is important to note that, in almost every case, fees were paid to produce these research outputs. So the increasing usage of metaphors was driven by 'customer pull' rather than a pre-conceived intention to impose them.

The findings from this exercise are relied upon as reasonable proof that hypothesis 1 has been found to be true. What this means is that the adaptation and adoption of ideas first used 40 years ago in the field of child psychology and developed 20 years ago in the field of secondary school IT training make an important and relevant contribution to executive learning in the information management domain through IT-mediated methods.

9.2 Deriving a multi-issue test for validating the hypotheses

The mining of outputs from Part 1 and Part 2 projects to verify hypothesis 1 also gives partial support to the remaining three hypotheses – they are discrete but not mutually exclusive. Although most of the projects were initiated by clients to meet their particular objectives, they also provided a vehicle for testing of the research hypotheses.

9.2.1 Six salient features for verifying the hypotheses

The structure and content of the projects included numerous features but, by distilling these down to families, six salient features emerge. These can be inserted into a matrix and mapped against the four hypotheses.

These families and the subordinate features they embrace are set out in table 9, overleaf.

- **Face-to-face networking**
 - peer group dynamics
 - inter-personal candour and trust
 - credibility of facilitator ('one of us')
 - interactions with guest practitioners

- **Physical places conducive to knowledge-sharing**
 - temporary insulation from routine interruptions
 - hands-on practice with relevant business software
 - electronic meetings using problem-solving software
 - videoconferencing to integrate remotely-sited parties

- **Virtual spaces conducive to knowledge-sharing**
 - moderated discussion groups
 - online access to knowledge banks
 - directories of expertise
 - dispersed communities of practice

- **Case studies**
 - explication of good (and bad) practice
 - tailored search taxonomies for navigating portfolios
 - sense-making and validation through syndicate work
 - cherry picking for a tailored solution (no 'best way')

- **Apposite metaphors**
 - transitional objects or images
 - road maps
 - mental models
 - techniques for inducing creative behaviours

- **Bespoke toolsets**
 - options to suit individual's learning styles
 - self-assessments and checklists
 - diagnostic frameworks
 - techniques for team-building and managing change

Table 9: The 6 salient research features and their families

Where these family descriptions are used in subsequent tables they are condensed to Faces, Places, Spaces, Cases, Aces and Bases.

9.2.2 Increasing the project sample for statistical significance

The 31 projects from Parts 1 & 2 had provided the single-issue test of hypothesis 1 with statistical significance. However, the variegated nature of the projects meant that a multi-issue test could fail this yardstick. Accordingly it was decided to embark upon a final round of projects prior to applying the tests. Fourteen were undertaken, increasing the test-bed sample to a total of 45.

9.2.2.1 The 14 additional projects for testing the hypotheses

These additional projects, in chronological sequence, are:

- A. Post Office: Taking Charge of Information programme
- B. CUBS DMBA 00: AKM elective
- C. Unicom Seminars: Interactive intranets
- D. CUBS Executive Development: Taking Charge of e-commerce programme
- E. Elan Conferences: Information & Knowledge Management series
- F. City&Guilds: Creation of a Higher Level Qualification in 'Using IT'
- G. Legal & General: introduction to e-business
- H. Kane-Thompson Forum/CUBS: programme of e-business events
- I. CUBS EMBA 01: e-business electives parts 1 & 2
- J. DTI: Skills Framework for the Information Age, extension 2
- K. Deloitte & Touche/CUBS: e-business elearning partnership
- L. BT/CUBS Exec Development: The Minerva programme
- M. Metropolitan Police Service: Information Strategy project KIISMET
- N. BT eVangelist programme: fostering communities of practice

Table 10: 14 additional projects undertaken for the testing process

9.2.2.2 Brief details of the additional projects

A. Post Office: Taking Charge of Information programme

2-day series at the Innovation Lab in Rugby for PO non-technical top managers; exploring multimedia assets and online analysis tools to identify best practice; using Group Decision Support software to identify and prioritise business solutions; experiencing the ParcelForce Dashboard (user-created online management reports via a Balanced Scorecard approach)

B. CUBS DMBA 00: AKM elective

10-week module exposing the 36 students to AKM best practice; inter alia, requiring them to access an online Lotus Notes database, use a proforma to subscribe a unique AKM case study, review the other 35 cases and vote for Top 2 by secret ballot; all students given electronic copy of case portfolio

C. Unicom Seminars: Interactive intranets

intensive workshops for multi-company groups to experience, inter alia via guest presentations, best practice in design and deployment of interactive intranets; syndicate working to develop and describe bespoke solutions

D. CUBS Executive Development: Taking Charge of e-commerce programme

2-day series for multi-company groups; using a Road Map of the e-commerce arena to position critical success factors, barriers and tools; syndicate working with case examples to internalise best practice

E. Elan Conferences: Information & Knowledge Management series

4-day events for multi-company groups: developing a personalised I&KM strategy; syndicate work with case examples and implementation tools;

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practising remedies for overcoming information overload; utilising processes for extracting business value from knowledge

F. City&Guilds: Creation of a Higher Level Qualification in 'Using IT'

using a logical framework to organise and populate a 16-module Level 4 Award for in-depth study via the Further Education system

G. Legal & General: introduction to e-business

1-day 'immersion' events for the chairman, CEO and 70 top executives; using carefully selected syndicate groups to promote interaction, competitive behaviour and the development of implementable solutions

H. Kane-Thompson Forum/CUBS: programme of e-business events

multi-company events over 12 months; online enrolment and booking via a public website; using a Road Map to delineate and facilitate in-depth knowledge-sharing of the business issues of e-business

I. CUBS EMBA 01: e-business electives parts 1 & 2

Two 10-week modules for 49 and 23 students; converted into an elearning programme by using a bespoke website to augment face-to-face interaction with leading e-business practitioners; all handouts and resources distributed electronically; all coursework submitted online; syndicate work with every student making a presentation; online e-business case portfolio created, ranked and distributed (in similar fashion to project B)

[eg: <http://cubs.city.ac.uk/emba00/ebiz1/home.nsf>

userID: Nigel Courtney; password: NigelC]

J. DTI: Skills Framework for the Information Age, extension 2

using a bespoke website over 6 months to enable 40 public and private sector

industrial partners to extend SFIA 1 (framework for information systems skills) to embrace telecoms and e-government information and communications technology skills; face-to-face meetings for decision-making; all draft documents, minutes etc deployed online; all revisions taken via listserve discussion group; on completion, outputs deployed for public use. The framework is now administered for DTI by e-skills NTO and can be viewed at: <http://www.e-skills.com/cgi-bin/cms.pl/175>

- K. Deloitte & Touche/CUBS: e-business elearning partnership
collaborative research to identify (from 5000+ candidates) the two most suitable elearning offerings on e-business for global deployment by D&T; development of a bespoke workshop to enable selected D&T staff to evaluate the recommended products; fostering an e-business community of practice via a themed monthly update service, deployed via D&T's intranet, supplying abstracts of notable articles plus downloadable full texts
- L. BT/CUBS Exec Development: The Minerva programme
series of 1-day workshops on AKM and on e-business for the 150 Deputy General Managers of BT Global Business; pre-event questionnaire by email to engage participants; 'theory refresher', Road Map and case studies distributed in advance via BT intranet; handbook deployed at face-to-face events with facilitated syndicate work to encourage knowledge sharing
- M. Metropolitan Police Service: Information Strategy project KIISMET
provision (over a 9-month period) of research-based inputs on best practice solutions to assist a cross-functional team of senior MPS staff and Accenture to design a radical strategy and 5-year migration plan (now approved by the

Commissioner) to integrate MPS's disparate information, administration and intelligence systems

N. BT eVangelist programme: fostering communities of practice

intensive workshop to rekindle an e-business community of practice within BT's peripatetic Systems Engineers; distribution in advance (via intranet) of case examples animating a conceptual model linking client, community and e-business know-how together; syndicate work to use and evaluate a bespoke toolbox for e-business practitioners

The participants in this third tranche of projects represented a wide range of communities including single and multi-company groups of managers from both the private and public sectors and both full and part time post-graduate students with prior business experience. The level of managerial experience also covered a wide spectrum although the median could be characterised as nearer to the 'expert' end of the scale. However, in terms of the subject matter of the specific projects, the same individuals (when asked eg: by pre-event questionnaire) tended to rate themselves as relatively inexperienced.

The size of the groups ranged from a dozen to 70+ with an average of about 35. In a number of cases these groups were self-selected and represented workforces running to many thousands.

9.3 Mapping the research salient features against the hypotheses

The researcher's review of the 45 projects enables the incidence of a salient feature to be mapped against one or more of the four hypotheses. To reduce the subjectivity

of this approach the matrix incorporates reference to the work of Tom Wojcik at Hoechst Celanese' I-Lab (see 8.2.1.3 from page 174). Table 11 shows which salient features (using the abbreviated label) were used in which project and to which hypothesis this was relevant. The wording of the four hypotheses is also greatly abbreviated in order to fit the cells. For full texts see pages 79-81.

Key: projects are referred to by reference # or letter from tables 6. 7 & 9, and I-L for I-Lab

	Faces [re face-to-face networking]	Places [re physical places for k-sharing]	Spaces [re virtual spaces for k-sharing]	Cases [re relevant case studies]	Aces [re apposite metaphors or artefacts]	Bases [re bespoke toolsets & diagnostics]
Hypo 1 [re hands-on use of ICT to evaluate new ideas]	1,2,3,5,6,7,8,9,11,12,13,14,21,23 26,I-L A,B,C,D,E,G,H,I,J,K,L,M,N	1,3 24,26,31,I-L B,D,E,F,G,H,I,J,K,L,M,N	8,12,14,19 24,26,31 A,H,I,J,K,L,M,N	3,4,6,9,12,13,15,16,18,19,20,22 24,26,31 A,B,C,D,E,G,H,I,K,L,N	3,4,5,9,10,11,13,21 24,26,27,28,29,I-L B,D,E,G,H,I,J,L,N	4,5,6,8,14,15,16,22,23 24,29,I-L A,B,C,D,E,F,G,H,I,L,N
Hypo 2 [re sharing knowledge for mutual benefit]	1,6,10,13,21,23 28,30,I-L A,B,C,D,E,G,H,I,J,L,M,N	8,13 26,I-L B,E,H,J,L	12,13,15 24,30,31 H,I,J,K	8,12,13 24 B,C,D,E,G,H,I,K,L,M,N	10,12,21,23 27,28,I-L D,E,G,H,I,L	13,19,20 30,I-L B,C,D,E,G,H,I,L
Hypo 3 [re exploiting ICT to create new markets]	3,12,13,17,21,23 — C,G,I,L,N	13 26 B,F,H,I,L,M,N	13 31 H,I,K	2,3,4,6,8 24 A,C,F,G,H,I,K,L,M	13,23 26,28 A,B,D,E,F,G,H,I	6,11,19,20 25,26 B,F,G,I,M,N
Hypo 4 [re augmenting executive IT skills]	6,7,8,9,13 30 B,I,J,K,L,M,N	7,13 24,26,28 B,F,J	7,12 28,30 A,B,H,I,J,K,M,N	2,8,9,12,17,22 24,29 A,B,D,E,F,G,I,L	7,10,12,13,21,23 30 I	6,9,10,19,20,21,22 24,25,26,27,29 B,F,G,H,I,K

Table 11: Matrix of salient features per hypothesis – by project #

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The following version of the matrix replaces the project references with a total number of incidences in each cell. The figures are built up from the subtotals from the three discrete periods of research so that we can ascertain any tendency for salient features to become more or less important as this study has progressed.

Key: *P1* = Part 1 projects (23#) conducted between 1995 & 97

P2 = Part 2 projects (8#) conducted in 1998 & 99 (incl. the Hoechst I-Lab)

Sup = the supplementary projects (14#) conducted in 2000 & 01

	Faces	Places	Spaces	Cases	Aces (metaphor)	Bases (toolsets)
Hypo 1	P1: 14	P1: 1	P1: 4	P1: 12	P1: 8	P1: 9
	P2: 2	P2: 4	P2: 3	P2: 3	P2: 6	P2: 3
	Sup: <u>13</u>	Sup: <u>12</u>	Sup: <u>8</u>	Sup: <u>13</u>	Sup: <u>9</u>	Sup: <u>11</u>
	Total: 29	Total: 17	Total: 15	Total: 29	Total: 23	Total: 23
Hypo 2	P1: 6	P1: 2	P1: 3	P1: 3	P1: 4	P1: 3
	P2: 3	P2: 2	P2: 3	P2: 1	P2: 3	P2: 2
	Sup: <u>12</u>	Sup: <u>5</u>	Sup: <u>4</u>	Sup: <u>11</u>	Sup: <u>6</u>	Sup: <u>8</u>
	Total: 21	Total: 9	Total: 10	Total: 15	Total: 13	Total: 13
Hypo 3	P1: 6	P1: 1	P1: 1	P1: 5	P1: 2	P1: 4
	P2: -	P2: 1	P2: 1	P2: 1	P2: 2	P2: 2
	Sup: <u>5</u>	Sup: <u>7</u>	Sup: <u>3</u>	Sup: <u>9</u>	Sup: <u>8</u>	Sup: <u>6</u>
	Total: 11	Total: 9	Total: 5	Total: 15	Total: 12	Total: 12
Hypo 4	P1: 5	P1: 2	P1: 2	P1: 6	P1: 6	P1: 7
	P2: 1	P2: 3	P2: 2	P2: 2	P2: 1	P2: 5
	Sup: <u>2</u>	Sup: <u>3</u>	Sup: <u>8</u>	Sup: <u>8</u>	Sup: <u>1</u>	Sup: <u>6</u>
	Total: 8	Total: 8	Total: 12	Total: 16	Total: 8	Total: 18

Table 12: The incidence of salient features per hypothesis

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We can now simplify the matrix by rating the significance of each salient feature and the tendency for its importance to change over the period of research.

The ratings awarded for significance are:

Low = <10 incidences; **Medium** = 10-20 incidences; **High** = >20 incidences

The tendency to change is measured by expressing the subtotal number of incidences as a percentage of the possible maximum. Comparison of successive percentages in a cell indicates if the tendency is *Declining, Steady or Increasing*.

	Faces	Places	Spaces	Cases	Aces (metaphor)	Bases (toolsets)
Hypo 1	High <i>Increasing</i>	Medium <i>Increasing</i>	Medium <i>Increasing</i>	High <i>Increasing</i>	High <i>Increasing</i>	Medium <i>Increasing</i>
Hypo 2	High <i>Increasing</i>	Medium <i>Declining</i>	Medium <i>Declining</i>	Medium <i>Increasing</i>	Medium <i>Steady</i>	Medium <i>Increasing</i>
Hypo 3	Medium <i>Increasing</i>	Low <i>Increasing</i>	Low <i>Declining</i>	Medium <i>Increasing</i>	Medium <i>Increasing</i>	Medium <i>Steady</i>
Hypo 4	Low <i>Declining</i>	Low <i>Declining</i>	Medium <i>Increasing</i>	Medium <i>Increasing</i>	Low <i>Declining</i>	Medium <i>Steady</i>

Table 13: Significance trends of salient features

The comparative conditions can be highlighted by using colours to symbolise a spectrum from 'red hot' to 'ice blue':

Significance	Tendency		
High	Increasing	Steady	Declining
Medium	Increasing	Steady	Declining
Low	Increasing	Steady	Declining

Using this 'temperature gauge' convention, the matrix conveys more clearly the evolution and current status of each hypothesis and the comparative value today of the six mechanisms for accelerating executive learning in the information management domain through IT-mediated methods.

	Faces	Places	Spaces	Cases	Aces (metaphor)	Bases (toolsets)
Hypo 1						
Hypo 2						
Hypo 3						
Hypo 4						

Figure 27: The research hypothesis 'temperature gauge'

The meaning and implications of these results are discussed in Chapter 10.

10 Discussion and Conclusions

In this chapter we will review the four hypotheses, draw conclusions from the study and identify areas for necessary further research.

In assessing whether or not the research hypotheses have been proven it is appropriate to recognise that the research question is set in time against a dynamically-changing business and technical environment. Having identified three principle literature domains of relevance it soon became clear that, while the research literature was plentiful in some parts, it was decidedly thin in others. It was necessary to conduct action research experiments to generate the data needed to verify the research hypotheses. Dynamic changes impacting the research question necessitated two further tranches of fieldwork and the study became longitudinal:

Stage of study	Chptr	1994	1995	1996	1997	1998	1999	2000	2001
Part 1:									
Identify the research problem	1	xx							
Review relevant literature domains	2	xxx							
Formulate the hypothesis	3	x	x						
Select research methodology	4	xx	x						
action research for theoretical model	5		xxx	xxxxx	x				
Testing & validating the model	6				xxxxx	x			
Refining the validation & model	7					xxxxx	xxx		
Part 2:									
Taking stock	8						xxx	xxxxx	xx
Applying the lessons learned	9								xxx
Conclusions	10								xxx

Table 14: The emerging timeline for the study

10.1 Review of the four hypotheses

In broad terms, table 13 on page 217 shows that hypotheses 1 and 2 have been upheld quite strongly whereas hypotheses 3 and 4 are upheld only moderately. But education is affected by many factors, including personal learning style; there are better ways but no 'best way'.

In the context of the education in information management of an executive the factors extend to time pressures, personal motivation, organisational culture and the extent to which the organisation's working practices rely on ICT. We therefore need to examine the findings more deeply so that an executive learner, knowing the important factors in their own situation, can judge how best to achieve the objectives embedded in the hypotheses.

The six 'salient features' used to validate the hypotheses represent approaches that include tools, environments and techniques for accelerating executive learning. In part they were derived from the research literature and from good practice. Some components are original creations. The assemblages were refined by practical trials and those that were more effective were obviously more likely to be re-employed in subsequent projects – as reflected by the 'temperature gauge' (figure 27 on page 218).

The examination will assess firstly the overall outcome for each hypothesis (ie: review each row in table 13) and secondly, the utility of the six salient features (ie: review each column in table 13).

10.1.1 The overall outcome for each hypothesis

10.1.1.1 Review of Hypothesis 1

[see 3.2.1 at page 79: "The business value of an unfamiliar business-IT solution can be unleashed if the learner can test it in a business context. This testing can be by means of a software application that clearly addresses a real and current problem or by a model or metaphor that allows the manager to evaluate the novel idea by comparing it to his/her mental model of the business environment."]

This hypothesis has not only been reinforced by the longitudinal testing process but its utility continues to grow. This finding is affirmed by the following key points from the research:

- Managers prefer to try out new IT-mediated solutions with peers – it screens their initial ineptitude from scoffing subordinates and they can help each other
- The approach works best when the new tools are used to address a shared business problem – either in a dedicated place or by joining an online community
- With an ever-expanding array of solutions on offer executives require case study evidence that other managers have mastered the same tools and achieved business benefits
- The learning of experienced managers is accelerated by metaphors that resonate with their mental models of the business environment
- Less experienced managers tend to seek out toolsets to help them expand their mental models and make sense of new ideas.

10.1.1.2 Review of Hypothesis 2:

[see 3.2..2 at page 79: *"Today, the immediacy of business information and the ability to exploit it is matched in both cases by rapid obsolescence. Managers have nothing to lose by sharing what they know in order to discover novel solutions by combining validated and new knowledge."*]

The study firmly supports this hypothesis when the appropriate knowledge-sharing mechanisms are used. This finding is affirmed by the following key points from the research:

- Knowledge-sharing by managers is not altruistic; it is shaped by a 'give to get' ethos. They find face-to-face networking more conducive to fair exchange
- The spontaneity of chance encounters tends to release more valuable knowledge than formal meetings or away-days
- Managers will share knowledge by email with specific individuals but tend to view online facilities as one-to-many environments best used as knowledge repositories. Most discussion groups are dominated by a vociferous minority; most corporate intranets are treated as read-only resources
- The appetite of managers for case examples means that they are increasingly being used for subliminal advertising
- Metaphors are good for initiating a knowledge-sharing relationship; thereafter, tools, frameworks and diagnostics help to sustain the engagement

10.1.1.3 Review of Hypothesis 3:

[see 3.2.3 at page 80: *"Technology-driven change is shaking established marketplaces and opening up entirely new marketspaces. The ability to manage*

effectively in this information age requires management learning to be replenished in a dynamic, iterative way. This process is accelerated by familiarisation with ICT solutions that enable new ways of working.”]

The early stages of this study gave weak support for this hypothesis; then, managers were pre-occupied with understanding the basic capabilities of ICT. The latter stages show that managers are now increasingly able to use ICT strategically. This finding is affirmed by the following key points from the research:

- Managers do not view face-to-face networking or online media as suitable for formulating competitive strategy
- However, single-company groups are increasingly taking advantage of dedicated IT-mediated meeting places for fostering creativity and refining consensually-agreed plans
- When a problem-area has been agreed, metaphors have seemed superfluous but they are increasingly being adopted to overcome conceptual barriers to progress
- Competitive advantage is rarely achieved by copying ICT pioneers. But managers increasingly seek portfolios of relevant case examples so they can cherry-pick and create new and unique business-ICT solutions
- Road maps and similar tools continue to be valued for helping implement ICT-related change.

10.1.1.4 Review of Hypothesis 4:

[see 3.2.4 at page 81: *“the area where the three literature domains converge (executive learning in the information management domain through IT-mediated methods) is concerned with the development of ‘executive IT skills’. Namely, hands-*

on skills to use everyday applications plus the ability to identify and exploit the capabilities of information systems to deliver business benefits.”]

During the currency of the study this hypothesis has shifted from mighty challenge to truism. At the outset, most senior managers had been educated before computers were available in the classroom, corporate IT was mainly employed to automate routine processes, the Internet was hardly known to businesses, the web browser had only just been invented and mobile phones were the size of a shoebox. Since then ICT vendors have dramatically improved the functionality and usability of computing devices, operating systems and applications. The result is that many of today's managers have grown up with ICT and it is a natural part of their everyday life.

In a sense the hypothesis has been reversed: hands-on IT skills are no longer a *sine qua non* to be strived for; are now well distributed and so provide managers with a platform from which to achieve executive IT skills - the ability to exploit ICT strategically for business benefit. This finding is affirmed by the following key points from the research:

- Most executives view networking events and visits to IT-enabled installations as opportunities for information gathering; few see them as suitable occasions for acquiring hands-on ICT skills. Most now prefer to try out new ICT in their own time, with access to 1:1 coaching when required
- General improvement in levels of executive IT skill combined with increasing time pressures presages a growing trend for senior managers in business and the professions to use elearning methods for continuing professional development
- elearning tends to be a solitary practice that causes managers increasingly to seek out exemplar cases for motivation and inspiration

- Metaphors are no substitute for hard graft. Online assessment tools have become an essential, if somewhat distasteful, way of measuring the acquisition of new ICT knowledge and skills

10.1.2 Changes in the perceived utility of the salient features

With the notable exception of case examples, examination of the impact of the six families of research approaches for accelerating executive learning reveals both strengths and weaknesses. For the most part, an approach can be very effective in some situations and eschewed in another.

In the following review the shorthand names for the approaches are used for the sake of brevity (see column headings in table 11 on page 215 for fuller details).

10.1.2.1 Review of the 'Faces' family of research approaches

Face-to-face meetings with peers are highly prized by executives seeking to understand and evaluate potential business-ICT solutions. The opportunity these present for 1:1 discussions to foster knowledge-sharing relationships rules them out as occasions for extended periods of solitary practice using the solution.

10.1.2.2 Review of the 'Places' family of research approaches

Dedicated IT-mediated meeting places are particularly effective for group work to solve a shared problem or to formulate an IT-enabled business strategy. When such places deploy expertly facilitated decision-support software that anonymises inputs, knowledge exchange is significantly enhanced. Otherwise meeting formality tends to

inhibit the candour of executives, especially if both senior and junior managers are present.

10.1.2.3 Review of the 'Spaces' family of research approaches

Online facilities for interaction between managers are a relatively recent innovation (an example devised in 1995 for this study was dubbed by a journalist, probably incorrectly, as the UK's first extranet). Today, many managers are adept users of the Internet and web and attach a growing value to suitably moderated online fora for knowledge exchange. However, with notable exceptions such as the Virtual Debate, these exchanges still tend to be intra-company rather than inter-company.

10.1.2.4 Review of the 'Cases' family of research approaches

Of all the research approaches used, access to relevant case study examples stands out as perennially and increasingly valued by managers for enhancing all the aspects of executive learning addressed in this thesis.

10.1.2.5 Review of the 'Aces' family of research approaches

The appetite of executives for metaphors that accelerate their understanding of new concepts is insatiable. Transitional objects tend to appeal to experienced managers while their more junior counterparts seek out road maps. Techniques for stimulating creativity are particularly suited to new product development. However, metaphors

have become less relevant to the acquisition of hands-on IT skills where the issue has now progressed from awareness-raising to elbow grease.

10.1.2.6 Review of the 'Bases' family of research approaches

Diagnostics, checklists and easy-to-remember tools and toolsets remain consistently effective for executive learning at all levels. Indeed, those tools and techniques that are tuned to behavioural change are increasingly sought after.

10.2 Synthesis of the results

In summary, the research has considered 24 conditions for accelerating executive learning in the information management domain through IT-mediated methods. Some of the research approaches used have been entirely original; some are tried and tested techniques that have been borrowed from other domains. Over a seven year period the perceived utility of 15 of these conditions has increased. It remains steady in three cases and has declined in six cases.

The research hypothesis 'temperature gauge' (figure 27 on page 218) shows that any one approach strongly supports at least two but not necessarily all of the hypotheses. In other words, there are horses for courses.

It is clear that all the approaches can positively reinforce hypothesis 1 (re the internalisation of new ideas) and most will support the realisation of hypothesis 2 (re knowledge-sharing behaviours) and hypothesis 3 (re envisaging new market

opportunities). But in the case of hypothesis 4 (re raising executive IT skills) three of the approaches have become decreasingly effective.

At first blush this suggests that hypothesis 4 is failing. If so, this would be very disappointing because this hypothesis attempts to link the other three hypotheses (see figure 10 on page 81). On reflection, the evidence from the three successive tranches of fieldwork experimentation, over a seven year period, shows that there has been a dynamic shift in this linkage. Far from becoming weaker, it has become more pervasive.

In the early stages of the research the quest for improved executive IT skills was a principal driver behind the voluntary participation of many hundreds of managers. Some of these top executives were so unfamiliar with ICT that they brought a PA to key in their inputs at electronic meetings. Before long these same executives had become proactive members of online discussion groups. One of the early participants was Joseph De Feo, then Head of IT at Barclays Bank. At one event he said, in terms: "For too long we have excused CEO's who profess, even boast, ignorance of IT. Would you excuse a Finance Director who admitted to ignorance of accountancy? A CEO who cannot understand and use the firm's IT deserves to be sacked!"

The feedback and behaviour of the participants affirms beyond reasonable doubt that the approaches deployed were highly effective in raising executive IT skills. And, in a wider industrial context, the emergence of more user-friendly software and the promotion of younger, more IT-literate managers was reinforcing this trend.

In 1991 Mary Boone struggled to find 16 CEOs who were exemplary users of IT. Today, it is observable that executive competence with IT is becoming an assumed

part of the managerial toolset – on a par with interpersonal and leadership skills. An obvious example of this shift is the increasing take-up by people in management and the professions of 'elearning' as a practical means for continuing professional development.

Today's managers, being time-pressed, may still benefit from one-to-one coaching in the use of novel technologies. But what has diminished is the need to cajole them into getting started. In the early days we had to run courses in 'the protocols for videoconferencing'; today videoconferencing is increasingly an every-day tool for management in leaner, more dispersed organisations.

With a little imagination Moore's technology life-cycle helps to explain this trend (Moore 1999). Moore studied numerous technological innovations to try to understand why so many failed to achieve widespread usage. He concluded that without extensive support even the best offerings would remain unattractive to the majority of potential users and fall into a chasm of oblivion (see figure 28 overleaf). For example, the VHS video recording system overwhelmed the superior Betamax offering by subsidising support and manufacture to achieve an installed base more quickly. As discussed earlier, Clayton Christensen went on to elaborate such chasm-bridging strategies (Christensen 1997).

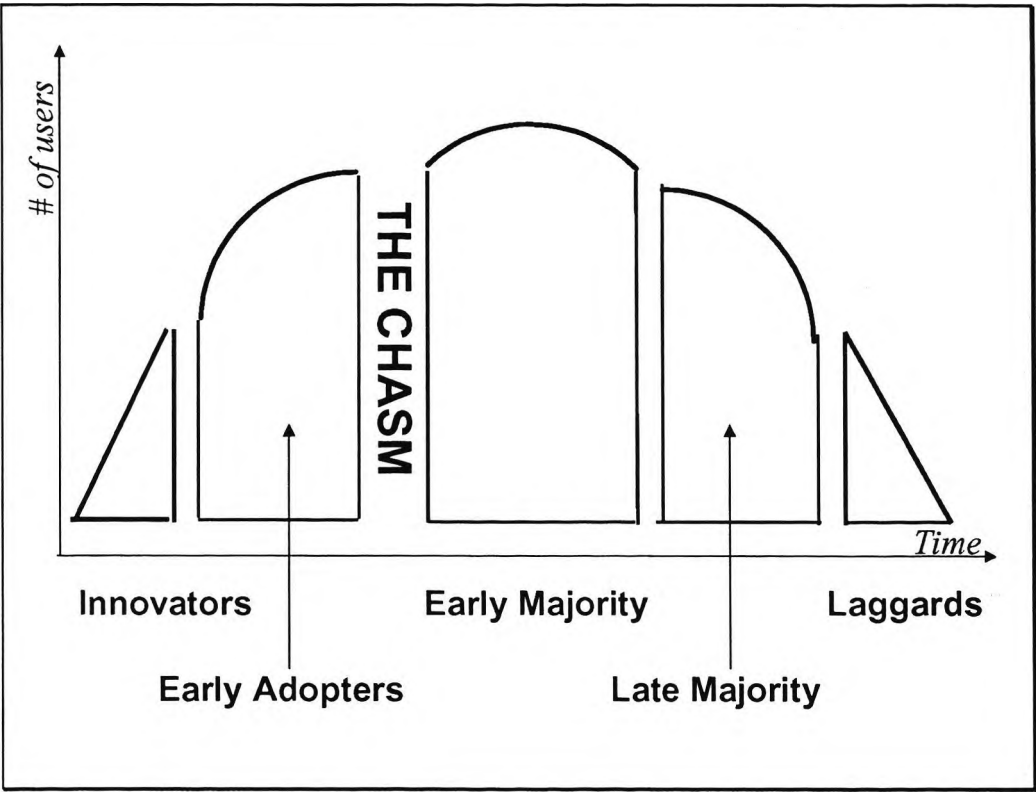


Figure 28: Moore's 'Chasm' in the technology life-cycle

In terms of executive IT skills, authors like Mary Boone identified the 'innovators' in 1991. The early research for this thesis in 1995 was conducted with self-selected groups of 'early adopters' whose feedback helped shape a set of techniques that, in essence, focused on cascading learning about business solutions rather than technical wizardry. The literature survey shows that parallel initiatives, before and since, have embraced similar approaches. This, combined with the liberalisation of telecommunications and intensive work by IT vendors to simplify the human-computer interface, has bridged the chasm and fostered the emergence of an 'early majority'. Evidence for this trend is found in the exponential growth in the number of users of computers and mobile devices, now exceeding 500 million globally.

This healthy trend towards improved executive IT skills means that management learning, information management and strategic information systems – especially IT-mediated methods for communication and education – are becoming increasingly integrated. This effect of this trend is depicted in figure 29:

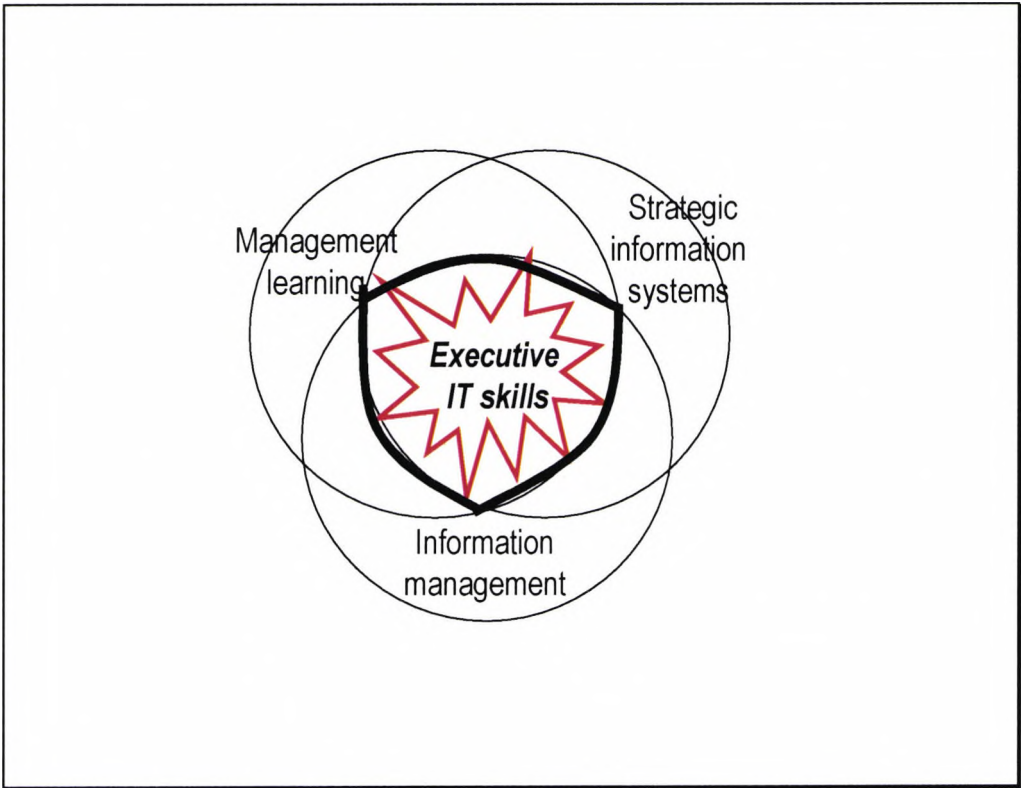


Figure 29: The evolution and maturity of hypothesis 4

In summary, the research evidence is that executive learning in the information management domain can be accelerated by deployment of IT-mediated methods in a business context.

10.3 A practical and generalisable approach – the blended method

As has been shown, it was necessary to identify the underlying problems influencing the research question and then conduct experiments to test possible remedies for each type of problem.

The results of the first tranche of experiments varied and some lines of inquiry were retired. The second tranche of experiments focused on the more promising lines of inquiry, often in combinations, and key findings began to emerge. The third tranche was set up for two purposes; firstly, to affirm the emerging key findings and, secondly, to develop and test proposed solutions that were holistic and potentially generalisable.

These experiments were numbers A, B, I and K (see table 10 and section 9.2.2.1). In essence, these presented a series of face-to-face executive learning sessions condensed into one day, spread over two consecutive days or at ten weekly meetings. What distinguishes them from traditional events is that they were variously supplemented with IT-mediated methods before, during, between and after the component sessions. The effect of this was to transform a series of events into an extended, action-oriented learning programme.

In every case the participants' feedback was very positive. For example, the tenor of the feedback from experiment B could be characterised as: "Why aren't all courses conducted this way?"

The ingredients for this extended approach (not all of which will be used in a particular instantiation) are shown in table 15 overleaf.

Section 12.2 contains an illustration of the tools used to foster pre-event engagement, face-to-face interaction and internalisation of lessons learned and post-event action. This sample set is taken from one of the five events for the Minerva Programme delivered to the 150 deputy general managers of BT's Major Business division.

	F2F	online
Pre-course engagement		
- questionnaire & self assessment		✓
- pre-course 'buy-in' meeting	✓	
- launch of website: directories & course resources		✓
- deployment of Prep Book & cases		✓
Teaching period(s)		
- deployment of Handbook with review sheet	✓	
- advance distribution of speakers' materials		✓
- syndicate work with cases	✓	
- deployment of Group Decision Support software	✓	
- collaborative action learning to create a shared output		✓
- intra-period 1:1 IT skills coaching	✓	
- intra-period discussion		✓
- post-course Action planning	✓	
- delegate satisfaction survey	✓	
Post-course engagement		
- follow-up discussion with/between delegates		✓
- development of delegate mutual support groups		✓

Table 15: Ingredients for the author's blended learning approach

[notes to table 15: the pre-course questionnaire is used to gather, by private email, each delegate's self-assessment of competence in the course subject matter and particular outcomes s/he hopes to gain from the course. The returns (usually 100%) are anonymised]

and distilled onto a one page handout depicting the competency profile of the group, the specific requests and the session(s) that will address these. Delegates, given this when the group convenes, are willing to start work immediately.]

This idea of a mixture of face-to-face and IT-mediated learning approaches into a seamless entity demands a descriptive word. Both 'hybrid' and 'blend' are candidates. The OED defines hybrid as: 'thing composed of diverse elements'. Blend is: 'mixture of various sorts' but also, as a verb applied to sorts, 'to pass imperceptibly into each other; harmonise'. The word blend seems better to capture the meaning and intention of the approach.

The following sections briefly describe how the blended approach was used in each case so that the applicability of the generalisable method to different course subjects and durations can be discerned.

10.3.1 The 'Taking Charge of Information' programme for the Post Office

This was a 2-day programme designed for top managers of the (then) Post Office. It was delivered six times at the Executive Development Centre at Coton House, Rugby to cohorts of some 15 managers representing all the major business units.

About the selected blend of ingredients:

Notable inclusions:

- the questionnaire was extensive and included questions about two in-depth case studies
- for logistical reasons a 5-minute video was made enabling the executive sponsor (a main board director) to welcome delegates and state the importance of the programme to the business
- a half-day was spent in the Innovation Lab (see figure 25 on page 192) where delegates tried new IT applications and devices. Each then used a networked

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laptop to take part in an e-meeting (see section 8.2.1.5.1 on page 189)

- a 30-minute video case study of Safeway plc, structured around the course Road Map, was made to focus the e-meeting. This video was converted to mpeg and played through a plasma screen. As delegates watched they used a mind-mapping application (that none had ever used before) to capture ideas that could be applied by the Post Office. They then used the e-meeting process to reduce their ideas (typically 180+) to a consensually-agreed Top 5.
- Delegates, given a print of the e-meeting report, worked overnight to develop plans to implement a selected Top 5 idea in their business unit – for presentation to the group in the morning of day 2
- After supper on day 1 three IT trainers offered 1:1 coaching in the use of office applications in a classroom set up with laptops connected to the Post Office's IT systems (this was voluntary but attracted 90% attendance)
- Sessions on day 2 included a debate on IT strategy with department heads and an appraisal of a world-class IT solution developed in-house (the ParcelForce 'Dashboard')

Omissions

- there was no 'buy-in' meeting
- there was no course website, so speakers slides were included in the Handbook and the collaborative action learning project was achieved (as described) with the e-meeting, overnight study and presentations on day 2

Observations

- the aggregated satisfaction ratings were above average – hence the six repeats. Within this, some delegates were extremely satisfied while a minority was very dissatisfied
- the post-course techniques were initiated but little used

10.3.2 The CUBS Day MBA 00: AKM elective

This was a 9-week Applied Knowledge Management programme, with 2-hour sessions every week, designed as an MBA elective module. 36 students enrolled, making it the most popular of some 25 electives.

About the selected blend of ingredients:

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Notable inclusions:

- the buy-in meeting was the sales pitch that generated the enrolment
- the website was replaced with distributed access to a Notes/Domino server hosting instructions and bespoke templates enabling the students to create and share a portfolio of original case studies
- email was used extensively for intra-session exchanges, the secret ballot process, submission of all coursework scripts and the distribution of speakers' slides and 'takeaway' copies of the completed case portfolio
- the Road Map followed a timeline: process redesign – business transformation – e-business – applied knowledge management
- each session was opened by the author (as course leader) with some theory as context for a presentation by a guest speaker: 2 academics; 3 leading consultants; 2 chief knowledge officers; 2 board-level industry practitioners
- each speaker worked up to a 'challenging question' for syndicate break-outs and then received and commented on the syndicate presentations
- post-course engagement was active and persisted for over 12 months

Omissions

- as full-time MBA students it was unnecessary for this cohort to do the pre-course questionnaire and post-course action planning
- these students had already participated in an e-meeting and IT skills coaching so these were not repeated

Observations

- student feedback to the Director of Studies placed this elective the best bar one of all the School's 99/00 MBA courses
- enthusiasm for the course attracted an average of 15 extra students to sit in on sessions. One remarked: "you have to get here an hour early if you want a seat"
- One student was strongly supported when she said: "I'm certain the quality of our coursework shot up as soon as we knew it would be subjected to peer-group review and not just posted to a lecturer"

10.3.3 The CUBS Evening MBA 01: e-business electives parts 1 & 2

This was designed as an MBA module for evening students in full-time employment, many holding very senior positions in commerce and the public sector. Because of the breadth of the subject matter, the course Road Map was used to split the course into two consecutive 10-week electives, with 3-hour sessions every week. Part 1 covered strategy and implementation; part 2 covered exploitation and innovation. To avoid repetition, students wishing to take Part 2 had first to complete Part 1.

The total intake of 80 students was limited to a choice of seven from 25 electives offered. In the event 49 enrolled for Part 1 (making it by far the most popular choice) and a subset of 23 took Part 2. This polarisation meant that many alternative electives were cancelled and this raised the expectations of faculty as well as students to very high levels.

About the selected blend of ingredients:

Notable inclusions:

- the buy-in meeting was the sales pitch that generated the enrolment
- the course website quickly became the hub of the entire programme. (see design illustration appended at section 12.1). It rapidly grew to enormous size as presenters and students subscribed relevant information running to thousands of pages. Almost no printed materials were required.
- weblinks to the library collection and to proprietary online information archives were used avidly to enrich the quality of coursework
- perhaps because these part-time students had fewer opportunities for informal meetings, the website became a social hub. The participants directory was used extensively for 1:1, 1:many, workgroup and many:many email exchanges. The author, as course leader, dealt with over 1,000 emails

Omissions

- as for the AKM course (section 10.3.2), the pre-course questionnaire, post-course action planning, e-meeting and IT skills coaching were superfluous

Observations

- a student satisfaction survey was conducted by academics unconnected with the course. They found an overall rating of 81% compared to the 45% average reported in the HEIST Student Satisfaction Survey Report (2000)
- the qualitative feedback included: "This course embraced the future"; "Make this standard for all classes"; "Extremely useful, wish all courses run this way"; "Excellent: would suggest to encourage all City lecturers to follow the same"
- the independent surveyors concluded that: 'this course is perceived by students as highly successful in meeting their needs'

10.3.4 Deloitte & Touche/CUBS e-business elearning partnership

This was a 1-day workshop designed to punctuate an on-going partnership arrangement. It was initiated with a research project to identify an elearning course on e-business to be taken by all Deloitte & Touche staff globally. This recommended two short-listed suppliers. Most of the ingredients were deployed but, as will be seen, this instantiation of the blended approach was subtly different from the three earlier examples.

About the selected blend of ingredients:

Notable inclusions:

- A summary of the report, together with a call for volunteers to evaluate the offerings, was emailed to all UK staff who had already attended an in-house e-business course delivered in the traditional way. Twelve of the respondents were sent joining instructions and asked to bring their own (company) laptops
- The venue was set up with tables around the perimeter, served by ports to the company network and the Internet, and a large central table with three facilitators, one IT trainer and the vendors' representatives in attendance.
- On arrival the delegates were allocated to four syndicates of three that did not know each other and asked to connect their machines to the Internet.
- At the central table, delegates were then briefed with a multi-stage evaluation process (see note 1 below). The morning would be devoted exclusively to offering 1 (Internet-based); the afternoon to offering 2 (CD-based). The vendors' representatives provided access passwords but were not allowed to explain how to use the products
- The final session sought the group's overall perceptions of elearning (see note 2 below). Following a candid debate, delegates cast votes by secret

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ballot for the best offering

- All inputs were collected by proforma or flipchart and subsequently synthesised into a report that prominently displayed the names of the volunteer participants. This was emailed to all participants and to the senior management

Omissions

- As this was a very focused and short-notice event, it was felt that email was more practicable than a website
- For freshness, access to the two vendors' offerings was deliberately withheld until 'the moment of truth'

Observations

- At the outset, a straw poll revealed that 5 delegates were predisposed to e-learning, 2 thought it would be a waste of time and 5 were undecided
- At the conclusion, 11 were enthusiastic to undertake more e-learning while one had decided that the method was 'not for him'

[notes re the evaluation process]

Note 1: Both products were 15-hour courses. Three pro-forma were provided for evaluating:

'look & feel'; 'relevance of content' and 'online test procedure'. Each syndicate was asked to navigate to and evaluate a different 'chunk' of the course; spend 15 minutes in solo work sampling the 'look & feel', 5 minutes to reach a syndicate consensus and then 15 minutes to present this view to the group and agree an overall verdict. This was repeated with the other two evaluation proforma.

Note 2: Throughout the day delegates used a fourth proforma to record their overall perceptions of elearning and specifically: 'appropriateness', 'anticipated learning time' and 'location of study'.]

In summary, participants view this blended method as highly effective in meeting their needs. The chosen mix of ingredients is never arbitrary but is dictated by variables, the chief of which are timeframe and the required emphasis on accelerated subject matter learning or improved and consensual decision-making.

10.4 Areas for further research

A great deal has changed since this research was initiated. The convergence of information and telecommunications technologies has heralded the introduction of new IT-enabled working practices and to the emergence of more dispersed organisations. Entire industries have been transformed by the impact of new entrants using novel business-IT solutions.

At the same time, the public take-up of online communications has led to a fundamental shift from 'vendor push' to 'customer pull'. These better informed customers are influenced by convenience at least as much as price. And, for example, busy doctors will admit that they often learn of new drugs and procedures from their patients who have gleaned the information from the web.

Today's manager must be able to exploit ICT not only to manage the business but also to stay ahead of or counteract competitors and to attract and retain profitable customers. The opportunities for research to help meet these challenges are legion.

When this study commenced a similar multiplicity of choices existed. This had to be narrowed to a manageable number of lines of inquiry before progress could be achieved. The research approach 'temperature gauge' (figure 27 on page 218) indicates how these lines of inquiry are waxing and waning in relative importance. Arguably, the most fruitful research approaches to pursue further are those that are increasing in perceived utility from a medium base line. 10 approaches match this criterion and they could usefully be linked into the following proposals:

1. The ability of managers to keep abreast of emerging technologies is best nurtured in dedicated work places augmented with elearning facilities.

2. The ability of managers to prioritise emerging technologies is best nurtured by deploying metaphors and tools.
3. The ability of managers to innovate IT-enabled markets is best achieved by mining case examples as a source of creative ideas.
4. The personal IT skills of managers are best enhanced through online participation in peer-group communities of interest focused on good practice.

The author intends to play a part in developing these four research areas via the Learning Centre being inaugurated at City University Business School and to report results in future papers.

10.5 Afterword: concluding thoughts for the action researcher

This thesis has set out to answer a research question by applying the principles of academic research. In the process it documents a personal learning journey that has been both extremely challenging and rewarding. Because it follows a time line and was written in stages it is hoped that the reader will forgive the imperfections and discern some signs that lessons were learned *en route*.

Looking back, the author's keenest wishes would be to have completed the journey more quickly and that Bent Flyvbjerg's book 'Making social science matter' had been published at the beginning of this journey rather than at the end. His study of Danish local government to explain the tensions between power and democracy is a masterpiece of action research.

Flyvbjerg had observed that natural scientists habitually dismissed social science as incapable of achieving classical research rigour. So he revisited the work of the classical scholars. The logical analysis taught by Socrates and Plato had laid the foundations for natural science research: a theory would be true as long as it passed every imaginable test. Later, Aristotle asserted the equality of three intellectual virtues: *episteme* (scientific knowledge), *techne* (art in the sense of craft) and *phronesis* (which, loosely translated, means 'prudence'). The first two, and, remain highly visible in contemporary life but Flyvbjerg could find no contemporary analogous term for *phronesis*. Machiavelli wrote about princely work as statecraft but his advice was essentially 'practical common sense' – ie: *phronesis*. More recent philosophers, notably Nietzsche and Foucault, have managed to understand some complex life-problems by 'getting close to the reality', taking account of the power dynamic and making sense of the mass of details.

From this Flyvbjerg developed what he calls *phronetic* social science. Its purpose is not to develop theory but (in terms) 'to help in elucidating where we are, where we want to go and to contribute to society's capacity for value-rational deliberation and action'.

Flyvbjerg chose to examine a historical case about town planning that had been very fully documented by officials. However, this option was not available to the author of this thesis; the research question addressed a current problem and very little had yet been written about it. The evidence to be tested first had to be generated by experiments and derived from contemporary case study research.

In these circumstances three research methods would be feasible: deductive – a theoretical structure is created and tested; inductive – theory is derived from

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observed actuality; or action research – whereby researcher and actors collaborate to solve life-problems and so create new knowledge. The decision in this instance to opt for action research was conditioned by a timely opportunity to work with a community of business-people who sought to solve a problem that was essentially the same as the author's research question. The method actually developed and applied by the author might now, with the benefits of hindsight, be labelled phronetic social science. In any case, it was to prove a challenging and time-consuming choice.

The action research method has both strengths and weaknesses. It is particularly suited to addressing 'difficult to measure' life-problems because it allows – indeed encourages – the researcher to apply practical common sense. In addition it recognises that full understanding of a problem may require the researcher to become closely involved with the 'actors' experiencing the problem. Such involvement would offend classical deductive and inductive research methods because of the risk that it could contaminate the results. Action research also helps the actors to re-learn how to learn; to learn from each other; to participate in formulation of an effective solution and be able to apply it progressively rather than wait for an eventual report.

On the other hand the researcher's involvement can make it very difficult to remain objective. S/he must introduce the actors to new ideas and help them to discard old ones whilst ensuring that intervention does not become interference. Another significant hazard is that action research can easily become over-elaborate and produce a large amount of data, both quantitative and qualitative. As is no doubt evident in this thesis, the author fell into this trap and narrowly escaped total submersion on several occasions.

As a result, the study took much longer than originally planned. Rather than subject the reader to the copious data accumulated during this 7-year study the thesis has been written to present a story. The corollary of this approach is that at some points in the thesis the reader is asked to accept that a reasonable judgment was made in preparation for the next step. If this causes offence then forgiveness is respectfully requested. Chunks of the data and the quantitative and/or qualitative data analysis methods applied to it have been published in interim papers during the course of the study. An illustrative example is offered in chapter 12: Appendices, from page 304.

In action research the raw data requires careful scrutiny. Take, for example, that arising from the fifty consortium events reported in section 6.3 (page 121). Table 2 offers quantitative evidence concerning attendance levels. However, the subjects of this experiment were not laboratory mice; attendance by employees of consortium member organisation was voluntary. Non-attendance by an eligible individual could result from a variety of reasons totally unconnected with the subject matter.

The qualitative data derived from this experiment was largely based on attendees' perceptions of the future value of the learning they experienced at an event – as measured by what was said and done at the event and how they acted subsequently. The 'cascading effect' is a case in point.

In social science research the researcher may be compelled to rely, in large measure, on such 'proxy' measures. This is particularly so in action research where the researcher is, in effect, attempting to cause a discernible change in the behaviour of the actors.

The best that a proxy measure can do is to point towards a finding. If this finding is what was expected or hoped for it is tempting to settle for it. To avoid this trap it is

necessary to search for other proxy measures and see if these point in the same or a different direction. Examples relating to the consortium experiments are given from page 129 and in table 3 on page 132. One of these describes a finding that was initially misconstrued.

This highlights an inherent weakness of the action research methodology. The researcher must become closely involved with the actors and the proceedings but, simultaneously, must maintain an objective standpoint. Failure to achieve this split can mean that the research turns into a 'self-fulfilling prophecy'. The risk of 'playing back' to the actors an emerging deduction that may or may not be correct is that it could cause them to change their behaviour and start to act in the described manner. The action research methodology allows the researcher to intervene but not to interfere.

This author has yet to find a simple, ready-made remedy to this inherent weakness. Rather, its solution is rooted in the researcher's ability to make time for the exercise of independent critical thinking. This entails both periods for solitary reflection and for discussing emerging findings with people who are in a position to exercise an objective viewpoint. In this case the author's preliminary findings were discussed with academics, individually and in communities in the UK, Finland, France and the US. Their feedback was then reflected in further and more focused fieldwork.

The researcher should also seek opportunities to have data sets analysed by independent people with relevant or specialised knowledge. For example, a consortium administrator was asked to establish and classify the levels of management experience of the 561 managers featured in table 2 (page 123). A second example, long after the consortium was disbanded, concerns the 10-week

Executive MBA module (see item 'I' on page 212). On completion of that programme the 49 students were asked to complete an extensive questionnaire. The responses were handed to an academic researcher specialising in course appraisals on the basis that his analysis would go to the university's director of studies. Happily, the reported results made good reading.

In action research the ability to reach and relate with the actors is vital. Interviewing skills are a case in point. Clearly some general management experience is a boon – executives discern this instinctively and respond with openness. Even without such experience some techniques can prove helpful. Time spent on preparation is never wasted. The ability to state one's purpose compellingly in three sentences will help the executive's PA or 'gatekeeper' to help you. Confirming this in a brief email or fax will remind the executive, as you arrive, why the appointment was granted. During the meeting ask for advice rather than bald facts – the facts and recommended contacts will come with it. The respondent's most telling remarks are often made after the interview, as one is being shown to the lift – write these down immediately. And when you find a relevant 'nugget' in the literature, record a detailed reference – it will save you hours of fruitless searching later.

Above all, action researchers must be prepared to see interim findings, whether predicted or unexpected, as an opportunity. As Churchill said in 1941 of victory in the Battle of Britain: "this is not the end or even the beginning of the end; it is the end of the beginning".

It is hoped that other action researchers will pick and choose from the author's own learning journey. This was long and sometimes frustrating but, ultimately, very satisfying.

Part 3: EXHIBITS

This part of the thesis lists sources that have been relied upon or which have influenced the study. Chapter 11 contains a bibliography and references to work by others that has influenced and informed the research. Chapter 12: Appendices, sets out a practical example of the author's 'blended method' described in section 10.3 and includes a paper to illustrate the author's practical approach to learning event design and method for analysis and sense-making of action research data.

Work conducted in support of this research study has resulted to date in 18 published papers and articles some of which are tangential to the core research. Many of this published work has been co-authored. The chapter subscribed to Colin Coulson-Thomas's compendium book 'Business Process Re-engineering: Myth & Reality' includes the author's structured listing of over 300 contemporary citations. The publication itself is referenced in the bibliography that follows but the cited items have not been imported.

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Chapter 11: Bibliography and References

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12 Appendices

This sections offers:

12.1 An illustration of website design for the blended method

12.2 A practical example of blended method components before, during and after a learning event

12.3 Brief details of the author's published papers directly relating to this thesis

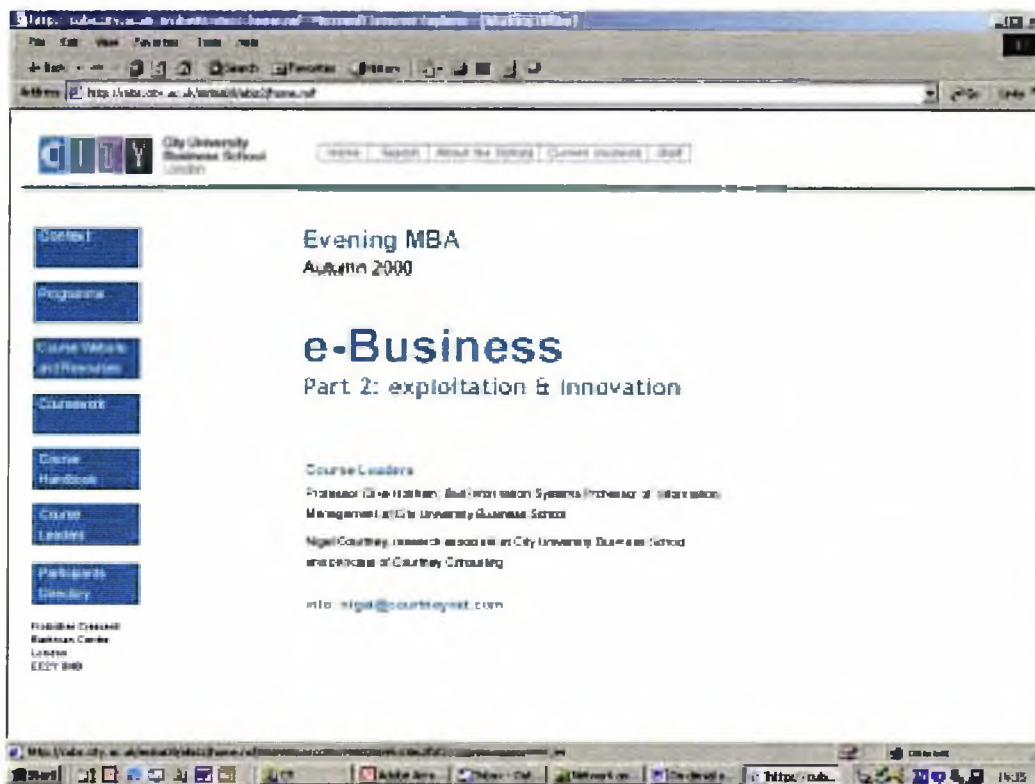
12.4 Brief details of supplementary research influencing this study

12.5 a full copy of one paper as a practical illustration of the author's application of research methods and techniques and the communication of findings to academic or business audiences

12.1 Illustration of website design for the blended method

This illustration features the website designed for the Evening MBA elective on e-business, Part 2. (for context see section 10.3.3)

The course required 10 weekly three-hour sessions. A webPC connected to the CUBS network and the data projector was deployed at each session. The website was launched prior to the first session and the 23 enrolled students were sent userIDs and passwords. This dedicated website presented an uncluttered homepage offering a menu of seven options or 'buttons':



The first menu button '**Content**' leads to a page depicting the taxonomy for the programme and how the content has been designed and positioned in the wider business context.

At the first session the author, as course leader, sought and gained the students' agreement to two key points.

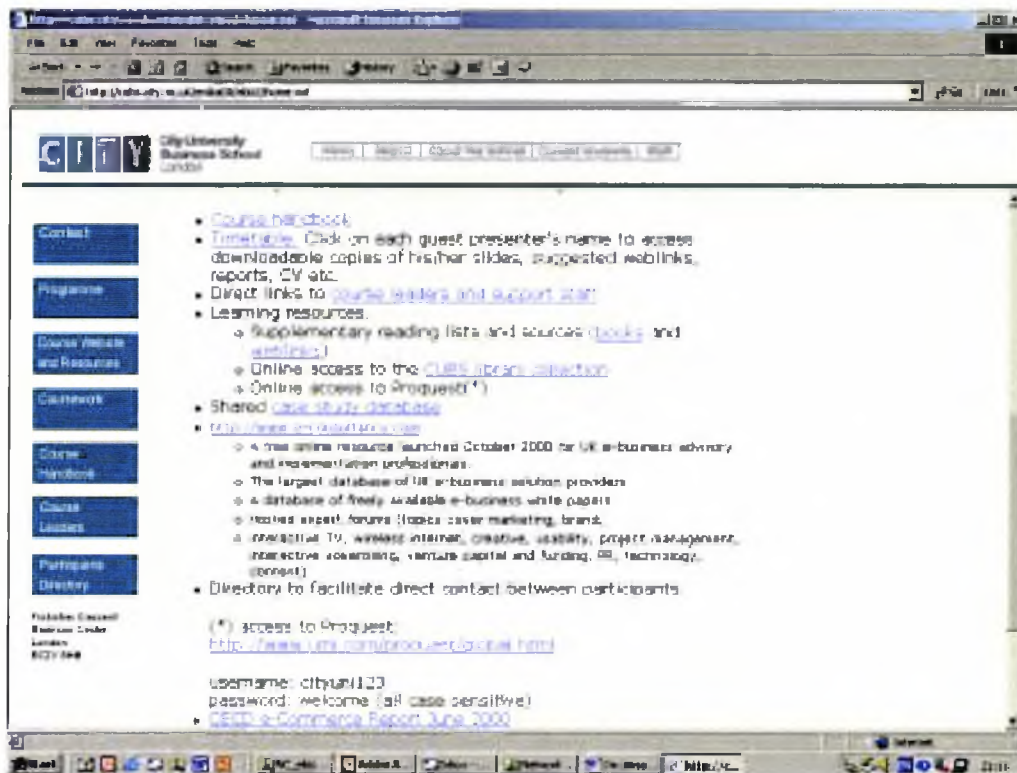
- First, that all course materials would be exchanged via the website. This was readily agreed and led to an almost complete elimination of paper handouts.
- Second, that students would publish their coursework on the website for peer-group review and shared copyright. Subsequently the consensus of student opinion was that this had provoked them to apply significant attention to the quality of coursework submitted.

The second button '**Programme**' displays the course timetable, session venues and gives details of contributions to be made by guest experts – typically one per session. This feature proved to be a powerful way to brief the guest experts and assist their preparations. Electronic links from the timetable to speaker's materials were activated progressively so that students could download, study and, if desired, print out the materials. These materials included presentations, contact details and extensive and expensive proprietary reports; many hundreds of pages in all.

4	4 Dec	a-business content extracting added value Coursework Refresher: This weeks choice: a) A coursework 1 exercise prepared by Carol b) a class debate with Carol on lessons learned at Alcoria	Geoff Vincent, partner, Mediation Technology Carol Macaskill, Knowledge Manager, Alcoria.com (JP Morgan)
5	11 Dec	Organisational roles for effective e-business PwC Innovation Survey (see RICS)	Dr Yvonne Lyndow, CEO, Imaginatic (Axa Les Bains)
6	5 Jan*	Deciding and managing the insource/outsource question	Sharon Duckworth, Manager, Nelson Croom
7	6 Jan	Networking to support communities and affinity groups	Victoria Ward, CEO, Spark Knowledge
8	15 Jan	e-business differentiators to drive for	Dr Roger Wallis, CEO of SKAP (Stockholm)
9	22 Jan	What's coming: innovate or be amazoned?	Tom Wojcik, President, Office of Innovation (Charlotte, N Carolina)
10	29 Jan	Review of e-business exploitation and innovation issues	Professor Clive Holtham & Nigel Courtney

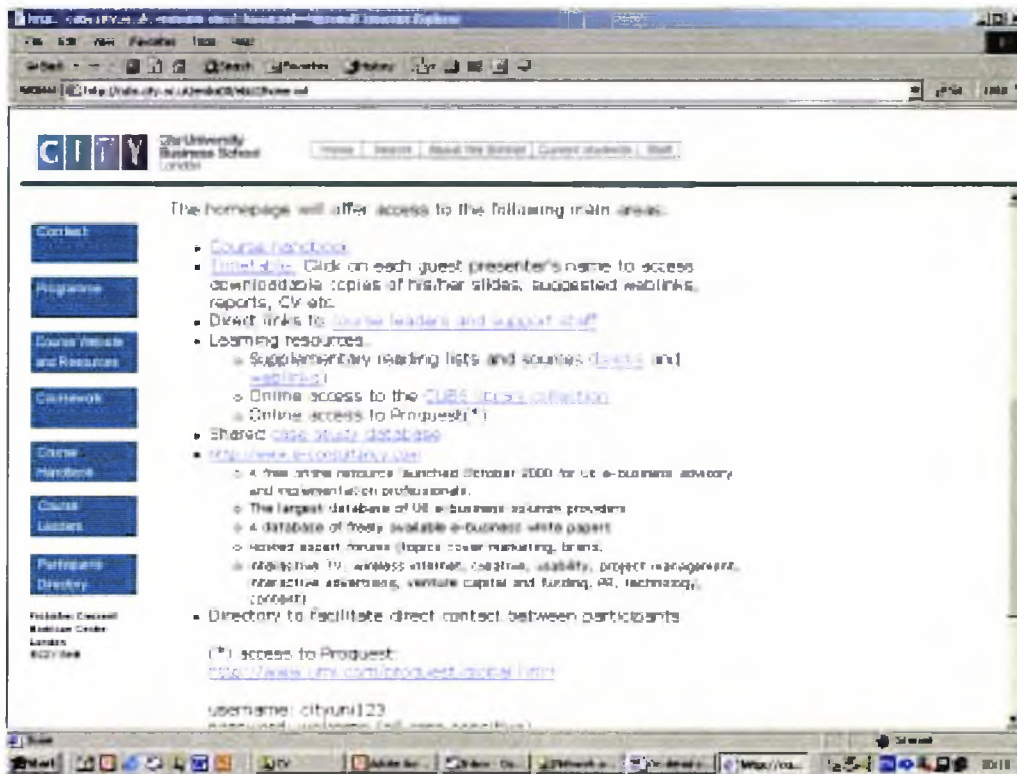
Chapter 12: Appendices

The third button '**Course website & Resources**' leads to a wealth of online resources and sources including – with the active co-operation of the CKL librarians – CUBS library online facilities and licensed information assets such as Proquest:

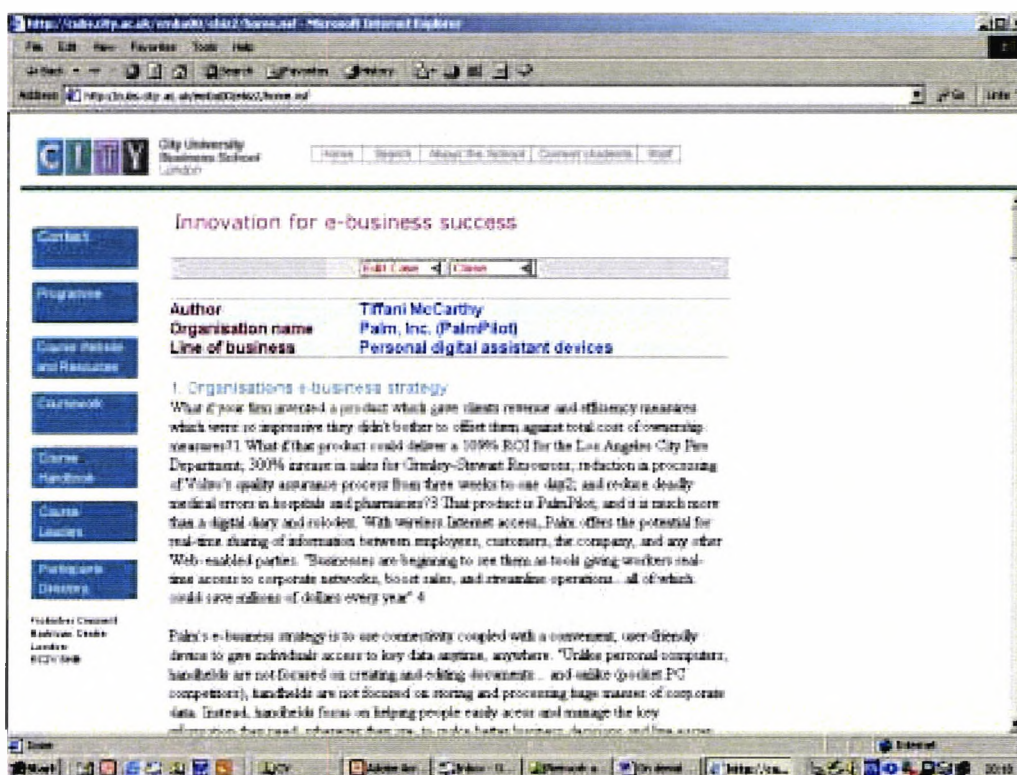
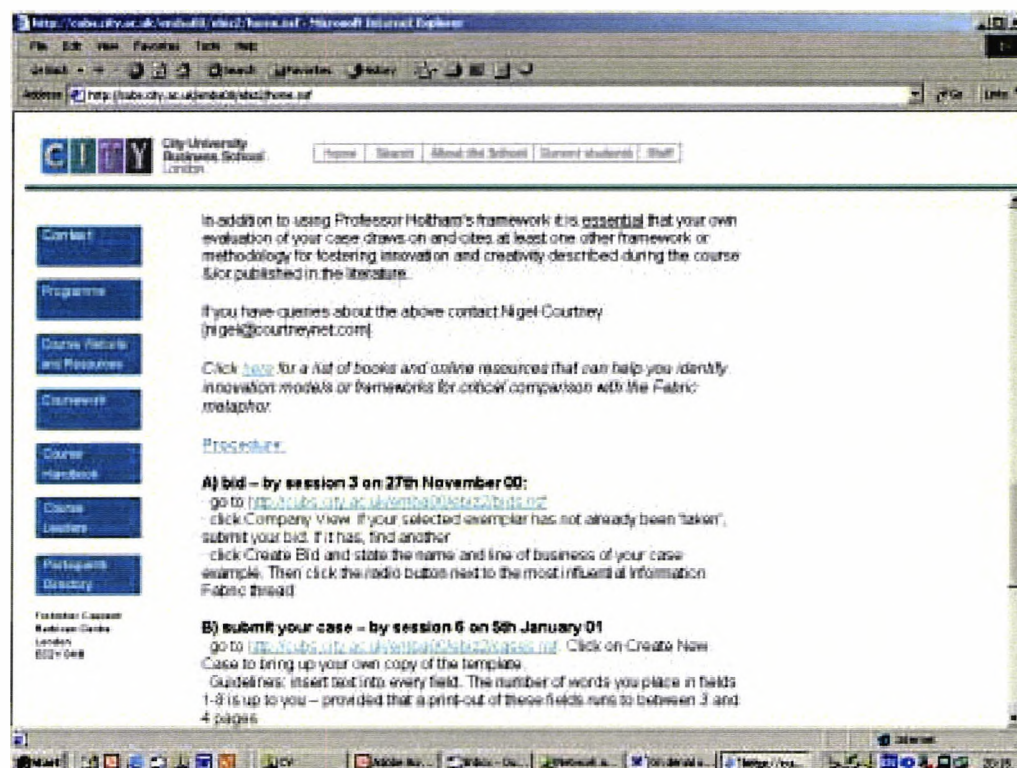


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The fourth button '**Coursework**' sets out instructions for the students' academic coursework which, in this instance, was to select, write up and subscribe a case study that addressed a tightly specified aspect of e-business:

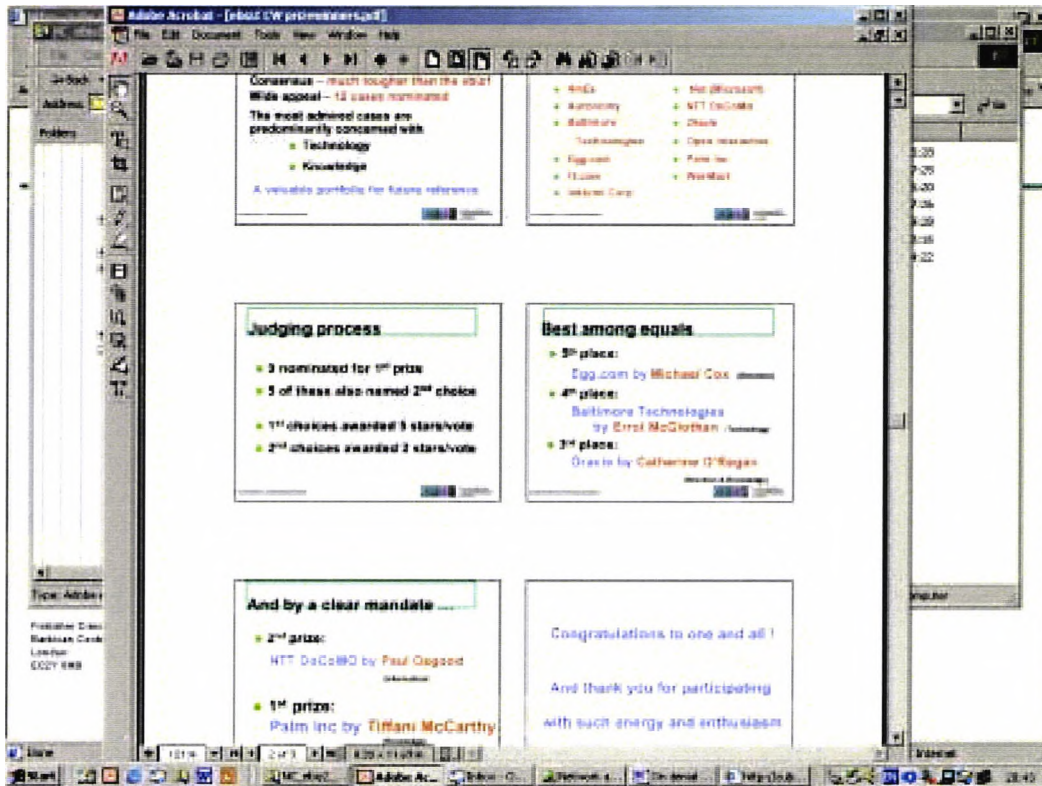


These instructions included a timetable for a shared process including 'bidding' (for rights to a specific case example) and a 'space' for uploading work-in-progress and then final work:



Chapter 12: Appendices

Participants then conducted a peer-group review and voted for the best work by secret ballot. The results were announced at the last session and prizes presented.



In parallel with the voting process the work was marked by the course leader to pre-published academic criteria. The academic marks and the complete case study portfolio were then published to the community the day after the end of the course.

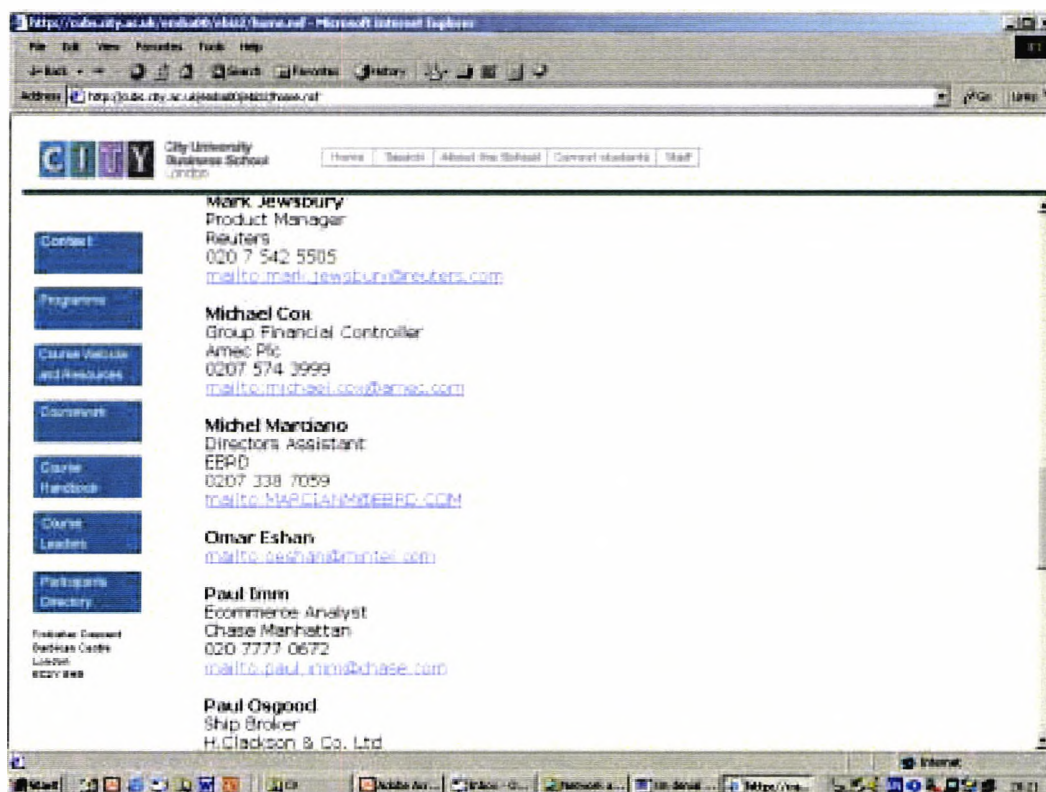
The fifth button '**Course handbook**' gives access to the course syllabus, learning objectives and academic marking criteria approved by the Director of Studies.

Chapter 12: Appendices

The sixth button '**Course leaders**' provides to biographical information and contact details for the course leaders and the quest expert presenters.

The seventh and last button **'Participants directory'** leads to a directory of all enrolled student participants – with name of employer, job title, work and home and mobile numbers and email address (as decided by each student):

This latter feature, which is apparently rather innocuous, actually requires special attention. This is particularly true when the method is used to support executives from multi-company consortia and students in full-time employment such as the EMBA cohort in this example. Experience shows that up to 20% of directory information can change every month during a module. Unless this is dealt with straight away participants quickly feel cut off and annoyed.



On reflection, the critical success factors for this e-learning method have proved to include:

- a) initial agreement of all participants to freely share their information, knowledge and learning with a named peer-group within a protected and private online space
- b) low risk implementation by using a 'no frills' website design and simple navigation to mask the innovative use of application features
- c) stated limits to the supported range of remote access devices and operating systems that could be used by peripatetic participants
- d) timely posting of relevant course materials, as required to meet the published timetable
- e) very rapid response to requests for technical assistance or notification of changed personal information (eg: new job/phone number)
- f) objective moderation of and response to online interactions - in real time as far as possible
- g) publicised recognition of individual student's valuable contributions to their learning community
- h) promotion of good 'netiquette' (eg: 1:1 response where 1:many could constitute spamming or a breach of confidence)

12.2 Practical example of blended method components

These components constitute a menu of options for use before, during and after a learning event.

Pre-course engagement (via email):

- Pre-course questionnaire

Face-to-face involvement (interactivity supported with handbook):

- Questionnaire feedback: group profile and mapped objectives
- Delegate's session review proforma
- Diagnostic tool
- Prescription tool

Post-course reinforcement (supplemented with email):

- Post-course action planning proforma
- Delegate feedback and publicly stated priorities

[reviewed with delegates to identify shared interests (eg: information audit and Stage-Gate process) and sign up mutual support groups]

12.3 Published papers directly related to this study

[Note: the entry marked with the suffix § is appended in full to illustrate the author's application of research methods and techniques (such as transitional objects) and the communication of findings to academic or business audiences.]

A Case Study in Applied Knowledge Management: Developing Managerial Competencies in the Strategic Application of Information Technology

(1998) Co-authored with Professor Clive Holtham

This paper reports on an applied knowledge management approach that has been developed to enhance the skills of middle and senior managers in relation to the strategic application of IT. The approach has involved close collaboration between a university and a consortium of companies using IT, including both large and small organisations.

This project has involved developing and refining theories of executive learning, then implementing practical knowledge management tools and methods based on these theories. The success and failure of elements of the project is reviewed.

In proceedings of 4th Annual Society for Information Management Academic Workshop in Helsinki; Dec 1998

Paper: 15 pages plus Presentation: 12 slides

The Executive Learning Ladder: a Knowledge Creation Process Grounded in the Strategic Information Systems Domain

(1998) Co-authored with Professor Clive Holtham

A precursor study for the paper read at Helsinki

In proceedings of the Annual Americas Conference on Information Systems in Baltimore; Aug 1998

Paper: 3 pages

Applied Knowledge Management: a Case Study in Executive Education

(1998) Co-authored with Professor Clive Holtham

A precursor study for the paper read at Helsinki

In proceedings of the 6th European Conference on Information Systems in Aix-en-Provence; June 1998

Paper: 5 pages

**Developing Managerial Competencies in the Strategic Application of Information Technology:
the Executive Learning Ladder**

(1997) Co-authored with Professor Clive Holtham

A precursor study for the paper read at Helsinki

In proceedings of the 1st Knowledge & Innovation Conference at CUBS; Dec 1997

Paper: 10 pages

On Applied Knowledge Management

(1997) Co-authored with Anne Leeming

An agenda-setting paper to promote panel discussion. Drivers and definitions for knowledge management are identified and its application in an organisational context is described. Collaborative technologies such as GroupWare are discussed and managerial issues highlighted.

In proceedings of the 5th European Conference on Information Systems in Cork, Eire; June 1997; ISBN: 1 86076 954 3

Paper: 3 pages

§ On Roles and Competencies for Information Management

(1996) Co-authored with Professor Clive Holtham

An interim report on the development of a theoretical model for by means of collaborative action research with senior business executives engaged in a range of sectors, industries and disciplines.

Definitions and skill sets for six information management roles, and the relationships between them, were elaborated with subject experts at a workshop entailing a series of exercises. The analysed data reinforced the model and encouraged further research into the relationships.

For the ASLIB Information Resources Management Network, London

Survey & report: 20 pages

Future frameworks for Open Client-Server Technologies

(1995) Co-authored with Professor Clive Holtham

This report examines the impact on business of new client-server technologies. Desk research surfaced eight hypotheses and led to a theoretical model that was articulated in the form of a 'transitional object'. These were evaluated in structured interviews with top executives in 40 companies fabricating or exploiting these technologies.

Analysis and synthesis of the survey data indicated that client-server was dissolving the proprietary lock-in of IT vendors and blurring the boundaries between entire industries. The report concludes that these trends will lead to the emergence of 'value networks' in which time, distance and size differences will be irrelevant to the relationships between counterparties.

In proceedings of IEE 1st International Conference on Client-Server Technologies; Brussels Oct 1995 [London; Institution of Electrical Engineers]. ISSN: 0963-3308

Sponsored by: Digital Equipment Company

First published by City University Business School

Report: 56 pages

12.4 Supplementary research influencing the study

The National Information Systems Skills Framework

(1998) IT National Training Organisation; London

co-author of online collaborative authoring tools plus portfolio of publications

[note: this framework was adopted by the government in April 2000 and renamed the Skills Framework for the Information Age. See www.sfia.org.uk]

Staff Shortages: Futures and Options

(1998) Wentworth Research/Gartner Group; Egham. 60pp

Mastering information management for strategic business advantage

A Capability Maturity Model for information management in 5 diagrammatic steps

Maximise the Potential: Profit from Information and Communication Technologies

(1997) The Information Society Initiative, DTI, March; URN 97/601. 20pp

Planning and implementing an electronic newspaper at Eleftherotypia, Athens

Process Modelling; Re-engineering Methodology; Evaluation of Process Improvement and Risk Assessment

(1996) 'BEPEL' project, ESPRIT # 20286; European Commission, Brussels. 28pp

Profit by Improving your Message Flows

(1996) Department of Trade and Industry, July; URN 96/764. 30pp

Business Process Reengineering: Part of the Managerial Toolset

(1995) Co-authored with Professor Alistair Sutcliffe (CUBS; London). 36pp

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BPR Sources and Resources

In "Business Process Re-engineering: Myth & Reality" (1994) ed. Colin Coulson-Thomas [London; Kogan Page] pp226-250. ISBN 0 7494 1442 1

The Needs of Small IT Firms

Co-authored with Anne Leeming

In proceedings of 3^d International Conference on High Technology: Manchester Business School. 28pp. Summary published (1995) Business Growth & Profitability Vol 1 No 3, Sept, ISSN: 1355-6347

Executive Information Requirements

(1992) Co-authored with Ian Meicklejohn (Business Intelligence; London). 112pp

BPR at Western Provident Association (1994).

Teaching case study + exhibits

Business Transformation (1993).

Seven original, contemporary in-depth case studies for a proposed book entitled 'Infolution', sponsored by Andersen Consulting

12.5 On Roles and Competences for Information Management

This 20-page paper was published in 1996 and is appended here as a practical illustration of the author's application of research methods and techniques and the communication of findings to academic or business audiences.

on Roles and Competencies for Information Management

**an interim report
on the development of a theoretical model by means of
collaborative action research with senior business executives
engaged in a range of sectors, industries and disciplines**

Professor Clive Holtham and Nigel Courtney

First published in July 1996

Purpose:

This project has been designed to test theoretical research by Professor Clive Holtham over the last six years. The process involves a series of facilitated meetings with practising senior business managers

‘to share, discuss and refine on-going research into roles and competencies for effective information management’

An introduction is followed by a facilitated debate focused by means of four exercises. A ‘technographer’ assists in collecting and processing the data that results.

This report provides the context for the theoretical model by offering an account of the proceedings with members of the Aslib Information Resources Management Network on the 9th July 1996. Participants included:

Jean Balcombe	Monica Blake	Jane Button
Lynn Coleman	Rose Dixon	Carol Gorman
Diana Grimwood-Jones	Liz MacLauchlan	Kevin Miles
Susan Montgomery	Graham Robertson	John Walford
Mark Watson	Linda Whitby	

The report also includes evidence from previous meetings with, inter alia, participants in the ERSC ‘Business Facilitation System’ project and with executive members of the IT Skills Forum.

The Researchers:

Facilitator Professor Clive Holtham
Bull Information Systems Professor of Information Management
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Note: Nigel Courtney designed the workshop, collected and analysed the outputs and is the principal author of this report

Contents of this interim report:

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1.2	Releasing the strategic value of Information	5
1.3	Six roles for Information Management	6
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4	CONCLUSIONS	20

1 Introduction and Background

1.1 The need for a new model for IT in Business

During what has been termed the first era of computing (Tapscott & Caston et al) the focus was on data processing on ‘mainframe’ computers tended by white-coated high priests using arcane language. This stilted supply chain has been blamed for the lack of business benefits from massive corporate investment in IT during the 1980s (Morgan Stanley).

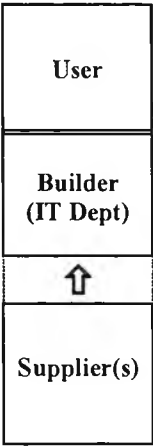


figure 1: A historical perspective on IT user/vendor relationships © Clive Holtham (1992)

Other more mature industries can offer a useful model for more effective relationships between users and suppliers. For example, after a series of cathedral collapses in the Middle Ages, the building industry evolved two additional and specialist roles, namely Architect and Developer.

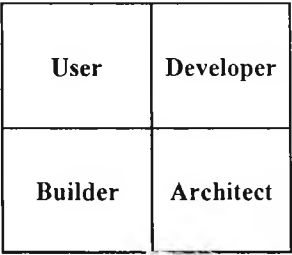


figure 2: Roles and relationships within the construction industry © Clive Holtham (1992)

If applied to IT in the general business context this can be represented as:

Business User	Business Sponsor
IT Builder	IT Architect

figure 3: Generic roles for IT in Business

© Clive Holtham (1992)

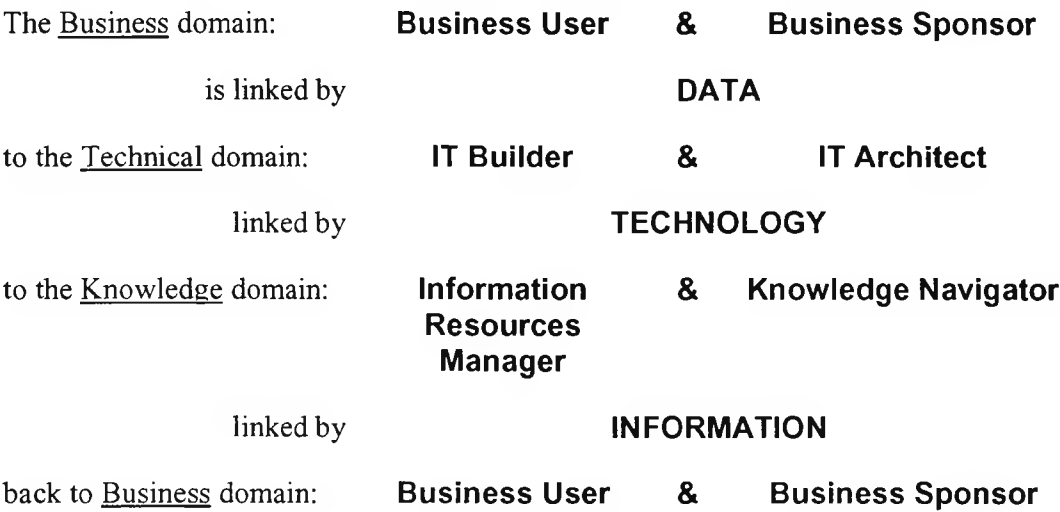
1.2 Releasing the strategic value of Information

The convergence of information and communications technologies has increased the need for an industry model of this type. However, the accompanying improvements in the price/performance ratio have led to the pervasiveness of IT in most forms of business. Competitive advantage now depends on the strategic use of new technologies.

To make this possible business managers and IT professionals have had to reduce the gulf in understanding caused by the traditional relationship. This shift is characterised by the explicit or tacit adoption of the Developer and IT Architect roles.

In practice this has meant distinguishing between the ‘I’ and the ‘T’ in IT. Information can then be protected and exploited as a business asset - and even (as by Skandia Bank) valued on the balance sheet. But this has given rise to the need to integrate into the business process two further roles concerned with Information and Knowledge - the Information Resources Manager and the Knowledge Navigator.

1.3 Six roles for Information Management



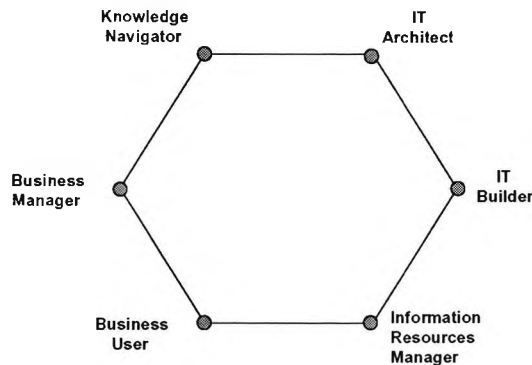
Our research has identified these roles by empirical observation and case studies in best practice organisations in the UK, the US and many parts of mainland Europe. Preliminary findings have been reviewed at workshops with managers in the public sector and in a wide variety of lines and sizes of business in the private sector. The working definitions flowing from these debates can be summarised as follows:

- 1 Business User ['BUS']**
"any stakeholder whose organisational effectiveness may be innovated by the use of information and communications technologies"
- 2 Business Sponsor ['BS']:**
"a business focused, IT-aware fund holder to lead the organisation through change"
- 3 IT Builder ['BUI']:**
"a provider of technical solutions to meet business requirements"
- 4 IT Architect ['AR']:**
"evaluator / interpreter of options and master of the art of the possible"
- 5 Information Resources Manager ['IRM']:**
"steward, assembler and disseminator of business information assets"
- 6 Knowledge Navigator ['KN']:**
"distiller of the key informational needs of the business to catalyse added value"

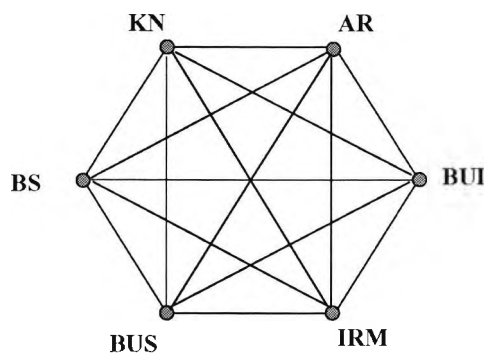
1.4 Relationships between the six Information Management roles

These six Information Management roles comprise a core competency needed by any organisation to flourish in today's business environment. However, it is not expected that the role names will be used for functional job titles or posts.

One method for examining the relationships between the six roles is to place them around a hexagon:



It can then be seen that there are 15 possible 'pairings' between roles. We are investigating which of these have the greatest utility:

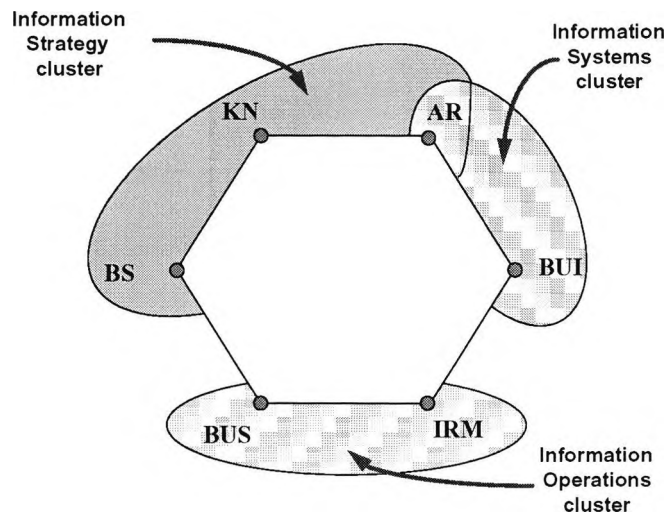


In practice we observe two phenomena:

1. each role requires a degree of proficiency in up to 10 skills - some by training, some as a function of natural aptitude and experience. Complementary teams compensate when an individual does not yet possess the full range of skills associated with a role. These teams may include members from beyond the organisation's boundaries; for example, to introduce IT Builder skills.
2. an individual is likely to perform several of the roles during a typical working day. But relatively few people need to exercise all six roles (examples would include general managers and business consultants). We observe that most people

generally operate in 'role clusters' - embracing two or perhaps three roles - according to the needs of their function or post.

To date we have identified three:



- senior business managers and IS directors tend to apportion their time between the roles in the Information Strategy cluster
- IS/IT managers and professionals similarly in the Information Systems cluster
- and middle managers and training professionals - and, we assume, the majority of 'knowledge workers' - in the Information Operations cluster

One purpose of this interactive session with the Aslib IRM network was to see if professionals concerned with 'added-value information' occupied any of these role clusters or would reveal a fourth, as yet unidentified, cluster.

1.5 The skills required for Information Management

Our research, utilising standard competency models, with practising senior business managers has elicited that the six roles require the following skill-sets:

Role:	"Knowledge Navigator"
alternative titles	Catalyst; Coach; Distiller; Seer; Scout; Harvester
Required Skills: {roleholders should possess high levels of ability to:}	• understand the enterprise-wide business processes • know and communicate the Sponsor's information vision • identify the high-level information needs of the business • institutionalise information sharing to create knowledge • engender a collaborative, networking business culture • envisage, create and update an 'information infrastructure' • excel with analytical methods and techniques • manage ambiguity - esp. when information is fragmentary • correlate information to fuel competitiveness • search for & innovate best practice in knowledge mgmt

Role:	"Information Resources Manager"
alternative titles	IR Steward; IR Custodian; Information Asset Manager
Required Skills: {roleholders should possess high levels of ability to:}	• appreciate the objectives of business unit customers • provide an operational service, cross-functionally • deal with detailed tasks, with enthusiasm and accuracy • be the 'eyes and ears' of the business • use analytical tools, especially IT processing tools • use electronic archive and communications technologies • use presentational technologies, as appropriate • understand the principles of information value (eg: age, relevance, quality, copyright, relatedness, ISBN) • search, fact-find, summarise, disseminate information • interpret customer requirements by effective listening

Role:	"Business Sponsor"
alternative titles	Project Owner; Business Process Owner; 'Le Responsable'
Required Skills: {roleholders should possess high levels of ability to:}	• develop the strategic business vision • persistently maintain the agreed business focus • understand the strategic capabilities of IT • uphold Information as a business resource and asset • manage change effectively • harvest business benefits from IT investment • communicate the vision to stakeholders • secure 'buy-in' for new ideas • motivate by personal example • exercise leadership and acquire credibility • sustain a culture of success

Role:	"Business User"
alternative titles	to be developed
Required Skills: {roleholders should possess high levels of ability to:}	• to be developed • • • • • • • • •

Role:	"IT Architect"
alternative titles	IS Architect; Business Architect; Solutions Architect
Required Skills: {roleholders should possess high levels of ability to:}	• know the business culture & the 'stakeholder map' • understand 'IT today' and 'the art of the possible' • be creative and generate & evaluate options • assume responsibility and accountability • identify and resolve the key details • project manage issues to fruition • resolve/balance conflicting forces • engender trust through good 'people judgement' • act as interpreter between business domains • maintain continuous dialogue with stakeholders • through integrity, earn acceptance as an 'honest broker'

Role:	"IT Builder"
alternative titles	to be developed
Required Skills: {roleholders should possess high levels of ability to:}	• to be developed • • • • • • • •

2 Proceedings

After introducing this Information Management model, Professor Holtham invited the fourteen Aslib IRM Network delegates to participate in the research by tackling four exercises. Each delegate was allocated one of the IM roles by arbitrary distribution:

Job title of delegate:	IM role allocated:
Head of the Information Service	KN Knowledge Navigator
Information Consultant	IRM Information Resources Manager
Head of Central Information	BS Business Sponsor
Office Manager	BUS Business User
Research Manager	AR IT Architect
Senior Consultant	BUI IT Builder
Information Management Co-ordinator	KN Knowledge Navigator
Information Co-ordinator	IRM Information Resources Manager
Head of Information	BS Business Sponsor
Consultant	BUS Business User
Head of Library & Information Services	AR IT Architect
Project Researcher	BUI IT Builder
Information Audit Manager	KN Knowledge Navigator
Consultant	IRM Information Resources Manager

For exercise (1) delegates allocated the same Role were invited to form into 6 teams to review their given role definition. The results were then discussed in open forum to facilitate a shared understanding of the six roles.

For exercise (2) delegates were asked to form into 'pairings' to review the relationships between their roles. The size of the group allowed seven of the 14 possible pairings to be examined:

KN-IRM; BS-BUS; AR-BUI; KN-BS; IRM-BUS; AR-BS; KN-AR

For exercise (3) adjacent pairings were invited to team up to discuss the role clusters observed during the research and to consider how one of them - namely the BS / KN / AR cluster - could be made to operate more effectively.

For exercise (4) the 14 delegates were asked to identify the roles they normally undertook in their jobs and apportion their time spent performing the selected roles.

In each case an OHP was used to record the consensus view of the group.

3 Findings

3.1 Exercise 1: Review of each Role

After a period for individual study the delegates discussed their findings in open forum. The consensus views were:

“Knowledge Navigator”:

definition: "distiller of the key informational needs of the business to catalyse added value"

improvements suggested by the group:

- characteristics a strategic role:
 - :
 - alignment of all knowledge assets with business strategy
 - co-ordination of information, IT and HR
 - steering the transformation process
- keywords: the role-name should be “Knowledge Alchemist”

“Information Resources Manager”:

definition: "steward, assembler and disseminator of business information assets"

improvements suggested by the group:

- characteristics an operational role:
 - :
 - identifying, specifying, monitoring, reviewing, improving
 - analysis and design
 - ensuring two-way communications with users and suppliers
- keywords: the role definition should include “co-ordinator” (as in ‘linking’)

“Business Sponsor”:

definition: "a business focused, IT-aware fund holder to lead the organisation through change"

improvements suggested by the group:

- characteristics a strategic role:
 - :
 - resourcing (allocating finance, acquiring skilled personnel)
 - creative, entrepreneurial promoter (minimal IT-awareness is OK)
 - interpreter of trends and risks affecting information needs
- keywords: in role definition replace “lead” with “champion”

“Business User”:

definition: "any stakeholder whose organisational effectiveness may be innovated by the use of information and communications technologies"

improvements suggested by the group:

- characteristics an operational role:
 - : recognition needed that:
 - information requirements often fuzzy (need to ‘mix & match’)
 - ‘traditional’ (non-IT) information delivery still valued & valid
 - access to organisation’s information likely to be structured
- keywords: in role definition replace “innovated” with “optimised”

“IT Architect”:

definition: "evaluator / interpreter of options and master of the art of the possible"

improvements suggested by the group:

- characteristics a strategic role:
 - :
 - bridging between user needs, best practice, technical constraints
 - ensuring dialogue / feedback between users and suppliers
 - access to organisation’s information likely to be structured
- keywords: in role definition replace “master ... etc” with “process owner”

“IT Builder”:

definition: "a provider of technical solutions to meet business requirements"

improvements suggested by the group:

- characteristics an operational role:
 - :
 - converting concept/vision into practical applications
 - responding to users’ needs, not own ideas
 - delivering viable and effective technical solutions
- keywords: in role definition add “practical and viable”

3.2 Exercise 2: Review of Relationship Pairs

Having considered in detail the role allocated to them in exercise 1, the delegates were invited to form pairings to examine areas for potential disconnection or conflict between their roles. They were then asked to propose the key steps that need to be taken to build and improve the particular relationship.

Individuals can and do carry out two or more of the six Information Management roles. This exercise assumes an organisational context in which the roles in question are being performed by separate individuals.

With 14 delegates it was possible to simulate seven of the fourteen feasible pairings:

Knowledge Navigator & Information Resources Manager

scope for	a natural synergy between these roles could be upset by:
conflict:	- lack of understanding of roles
	- shortage/poor allocation of corporate resources
for improved	- continuous communication to harmonise objectives
effectiveness:	- clarity of corporate information strategy

Business Sponsor & Business User

scope for	- tendency to be separated by language and/or position
conflict:	- BS concerned with error control; BUS with fast, practical results
for improved	- an agreed framework which respects organisational culture
effectiveness:	- shared understanding of the project management process

IT Architect & IT Builder

scope for	- fuzzy specification accompanied by time & money constraints
conflict:	- lack of a shared language
for improved	- clear vision and guidelines from the Business Sponsor
effectiveness:	- agreed 2-way communications channels

Knowledge Navigator & Business Sponsor

- scope for - clash between 'visions'
- conflict: - unclear boundaries of authority

- for improved - development of a culture of mutual trust
- effectiveness: - agreed procedure for resolving disputes

Information Resources Manager & Business User

- scope for - shortage of resources / budget
- conflict: - poor definition of information requirements

- for improved - shared understanding of feasibilities
- effectiveness: - agreement to accept Knowledge Navigator as de facto arbitrator

IT Architect & Business Sponsor

- scope for - unrealistic expectations
- conflict: - failure to stick to agreed plans

- for improved - shared understanding of budgetary constraints
- effectiveness: - determination to agree clearly on information requirements

Knowledge Navigator & IT Architect

- scope for - 'Architecture of Information' -v- 'Architecture of Technology'
- conflict: - rapid and/or frequent changes in requirements

- for improved - shared understanding of means to add value to corporate information
- effectiveness: - development of shared goals / mutual respect

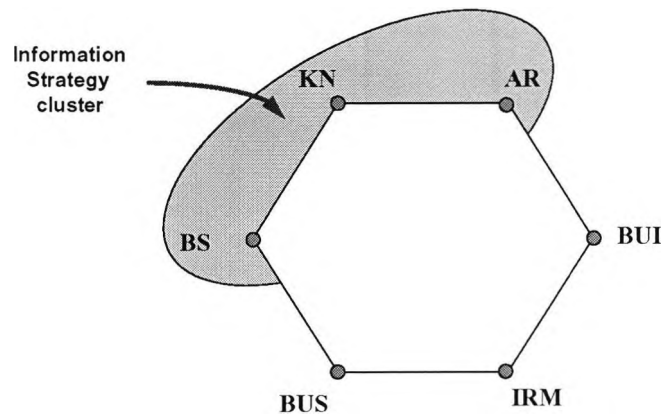
Consensus of the group in open forum:

The delegates felt that the proposed system for Information Management must fulfill two 'meta level' roles:

- the Archival role
- the Standards role

3.3 Exercise 3: Review of Role Clusters

After a discussion of the 'role clusters' encountered during the research to date (see page 8) the delegates were invited to forms into four groups to review the Information Strategy cluster. This cluster embraces the Business Sponsor, Knowledge Navigator and IT Architect roles:



Our 'action research' has revealed that a senior executive responsible for delivering business benefit from IT investment is likely to spend the majority of his/her time performing a combination of these three roles.

The delegates then shared their findings in open forum. Their principle recommendations for improving the effectiveness of this cluster appear to divide into two sets - although these need not be seen as mutually exclusive:

A) when the three roles are fulfilled by one individual:

- ensuring that Information management is 'practised as preached'
- devoting time to 'thinking and strategic planning'
- maintaining clear channels of communication with all stakeholders
- winning confidence in the system by managing expectations
- promoting the effective management of information resources

B) when the three roles are split between three or more people:

- clarifying roles and responsibilities
- promoting team-forming
- agreeing a dispute resolution procedure
- developing a feedback and review mechanism
- ensuring a mutual understanding of the values and special skills of other contributors

3.4 Exercise 4: Review of Typical Job

Delegates used a circular graph to indicate which of the six roles they customarily fulfilled in doing their job and to map how they divide their time between these roles:

Delegates indicated which of the roles they performed in doing their jobs:

Job title of delegate:	roles customarily performed:					
	KN	IRM	BUS	AR	BS	BUI
Head of the Information Service	✓	✓		✓		
Information Consultant	✓	✓	✓	✓	✓	
Head of Central Information	✓	✓	✓	✓	✓	
Office Manager	✓	✓	✓	✓		✓
Research Manager	✓	✓	✓	✓	✓	✓
Senior Consultant	✓	✓	✓			
Information Management Co-ordinator	✓	✓	✓	✓		
Information Co-ordinator	✓	✓	✓			
Head of Information	✓	✓	✓		✓	
Consultant	✓	✓	✓	✓		
Head of Library & Information Services	✓	✓	✓	✓	✓	✓
Project Researcher	✓	✓	✓		✓	
Information Audit Manager	✓	✓	✓			
Consultant	✓	✓	✓		✓	
# of selections:	14	14	13	8	7	3
% of sample:	100%	100%	92.8%	57.1%	50%	21.4%

These results show that the delegates at this interactive workshop have affirmed the existence of the three role clusters established by the research to date:

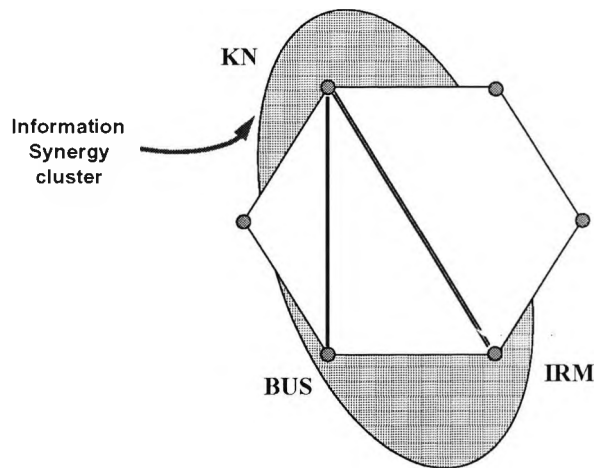
28.6% occupy the Information Strategy cluster [BS+KN+AR]
21.4% occupy the Information Systems cluster [AR+BUI]
92.8% occupy the Information Operations cluster [BUS+IRM]

But all those occupying the Information Operations cluster also perform the Knowledge Navigator role. Examination of the time actually spent performing each role could reveal the existence of a fourth role cluster embracing BUS+IRM+KN.

Delegates then estimated the apportionment of time each spent in the relevant roles:

Job title of delegate:	%age of daily time in each role:					
	KN	IRM	BUS	AR	BS	BUI
Head of the Information Service	30	45	-	25	-	-
Information Consultant	40	40	10	-	10	-
Head of Central Information	25	25	10	10	30	-
Office Manager	10	25	45	10	-	10
Research Manager	10	45	30	5	5	5
Senior Consultant	60	15	25	-	-	-
Information Management Co-ordinator	55	15	15	15	-	-
Information Co-ordinator	45	45	10	-	-	-
Head of Information	40	40	15	-	5	-
Consultant	45	30	10	15	-	-
Head of Library & Information Services	20	30	10	15	10	15
Project Researcher	15	30	25	-	30	-
Information Audit Manager	80	15	5	-	-	-
Consultant	15	25	45	-	15	0
average of % of time spent per role:	35%	30.4%	18.2%	6.8%	7.5%	2.1%

This analysis clearly reveals the consensus: there is a role cluster combining the skills of the Knowledge Navigator, the Information Resources Manager and the Business User. This role cluster will be concerned with optimising the value of information:



4 Preliminary conclusions & proposed further research

At the conceptual level there is broad agreement with the proposed model. The principal concern is for more emphasis on dialogue and feedback to ensure that information requirements are understood and met.

Constraints on effective implementation include:

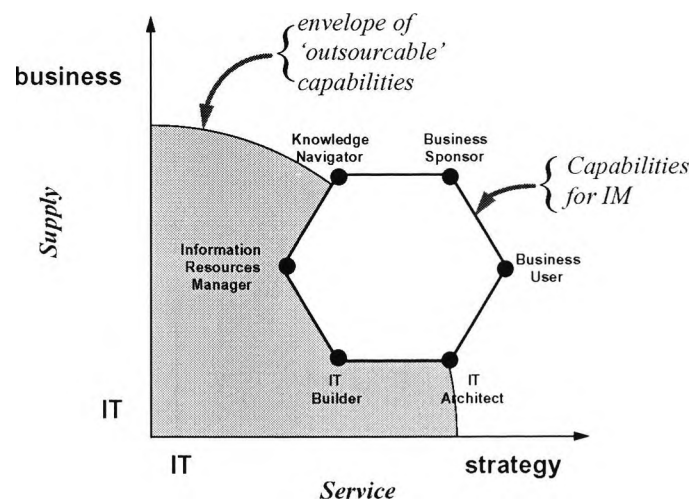
- lack of shared vision / clear guidelines
- impact on organisational culture
- need for dispute resolution procedures
- absence of a pricing model

Keys to successful application include:

- management of expectations
- high quality interpersonal communications
- fostering an atmosphere of mutual trust
- clarification of role responsibilities

The concept of 'role clusters' is clearly confirmed by the practical experience of Information Professionals - and an 'Information Synergy' cluster is seen as essential.

In view of the very rapid growth of CD and Internet-based information search capabilities it is notable that these delegates have expressed little enthusiasm for role clusters that bridge the technology and information domains. This suggests the need for further research to examine these role relationships - particularly when cost constraints and skills shortages oblige organisations to outsource the roles of Information Resources Manager and IT Builder. Current work-in-progress has produced a preliminary framework to describe this situation:



If correct, this framework suggests that the Knowledge Navigator and IT Architect roles could also be fulfilled by alliance partners. An understanding of our six IM roles will be vital to any organisation seeking to capitalise on information as a corporate asset.