EMPOWERMENT AND ENRICHMENT IMPACTS OF INFORMATION TECHNOLOGY ON OFFICE WORK AND ON OFFICE WORKERS IN ESB

Peter C. Lynch B.A. (Hons.)

Degree of Master of Arts

National College of Industrial Relations

Supervisor: Brendan Devine

Submitted to the National Council for Educational Awards in fulfilment of the requirements of the Degree of Master of Arts,

May 1996.

Declaration

I declare that this Thesis represents my own work; that no portion of it has been submitted previously in support of an application for any other Degree or qualification of this or any other institution of learning; that it has not been published previously; and that the views expressed and the conclusions reached are personal and that I accept full responsibility for them.

Peter C. Lynch

Peter C. Lynch

EMPOWERMENT AND ENRICHMENT
IMPACTS OF INFORMATION TECHNOLOGY
ON OFFICE WORK
AND ON OFFICE WORKERS IN ESB

Peter C. Lynch

ABSTRACT

Empowerment has been put forward by industrial psychologists as a beneficial goal for both business and employee alike. The *enrichment* of life at work has been propounded by some as a means to improve morale, productivity and quality of working life.

The study examines the extent to which information technology (I T) might facilitate the empowerment of office workers and the enrichment of life at work for these workers. Particular reference is made to the staff of ESB, the Irish electricity utility, which is undergoing radical organisational change.

The study relates aspects of information technology and office work to their cultural, corporate and environmental context in a synthetic way.
A survey was carried out among staff at the company using specifically-designed written instruments in the form of questionnaires. This survey concludes that:

- bodily discomfort is reported by a proportion of Respondents who use computer terminals;
- there is some frustration at the inadequacy of certain software products;
- electronic mail is generally perceived in a favourable light, for example in facilitating communications - people feel they would be less well-informed without E-mail;
- word processing products are perceived as useful, while database products are less widely used;
- Respondents do not use more exotic forms of I T such as videoconferencing;
- most people feel they could not do their job as well without a computer;
- I T is seen as enhancing productivity and reducing tedium;
- there was improvement in the quality of life at work and in the job satisfaction of many Respondents, though not all.

Finally, some recommendations are offered which may enhance the empowering and enriching ability of I T.

Dedication

To my parents, Charles and Moira.

ACKNOWLEDGEMENTS

I owe special thanks to the following persons:

my Supervisor, Brendan Devine, for the advice and moral support which he gave so readily;

Claire Lynch, Andrea Lynch and Mark Lynch;

Jim, Linda, Ruth, Susan and Miriam of ESB Library and Information Services;

Tom Maher, Pat Joye and Jim Duignan of ESB;

those ESB staff who kindly responded to the survey;

the staff of the National College of Industrial Relations, among whom Fr. John Brady, S.J.; Mary Buckley and Emma Fry in the Library; Kevin Tyrrell of the Computer Laboratory; Tony Morgan; and Harry Gough deserve special mention;

fellow student, John Connolly.

Acknowledgement is made to Faber & Faber Publishers Ltd., London for kind permission to reproduce "Dolor" by Theodore Roethke.

CONTENTS

CONTENTS - *continued*

CONTENTS - *continued*

CONTENTS - *continued*

LIST OF TABLES

LIST OF TABLES - *continued*

LIST OF TABLES - *continued*

Page

Involvement in design of software products (continued):

LIST OF TABLES - *continued*

LIST OF ILLUSTRATIONS

DOLOR

I have known the inexorable sadness of pencils,
Neat in their boxes, dolor of pad and paperweight,
All the misery of manilla folders and mucilage,
Desolation in immaculate public places,
Lonely reception rooms, lavatory, switchboard,
The unalterable pathos of basin and pitcher,
Ritual of multigraph, paper-clip, comma,
Endless duplication of lives and objects.
And I have seen dust from the walls of institutions,
Finer than flour, alive, more dangerous than silica,
Sift, almost invisible, through long afternoons of tedium,
Dropping a fine film on nails and delicate eyebrows,
Glazing the pale hair, the duplicate grey standard faces.

- Theodore Roethke

INTRODUCTION

INTRODUCTION

The Theoretical Approach

This researcher's interest in this area stems from:

- a short essay on the subject of Empowerment and Enrichment which he submitted to ESB, when the company explored a "Quality of Working Life" initiative some time ago;
- his efforts in coming to grips with information technology (" I T " as it is generally known).

Over time, a viewpoint emerged. The initial hypothesis could be stated thus:

that information technology can empower the individual worker in an office and enrich her/his experience of office work.

Computers are becoming ubiquitous. The total world-wide installation of personal computers in 1993 was estimated at 200 million **[Smith 1994]**. In Ireland alone, thousands of businesses use information systems ranging from mainframes down to single PCs (personal computers). To survey this scale of activity would have been overwhelming.

It was decided to refine the original hypothesis so it would read:

that I T has empowered those ESB workers who do office work, enriching their work experience in the process.

For the purposes of the study, the term "office" signifies the modern indoor workspace where managerial, clerical and administrative work is carried out. Technological advances in laptop computers (see Glossary) and mobile telephony are expanding the *reach* of the office, ensuring a communications inflow from colleagues who are "away from the office".

It was decided to examine sub-hypotheses as they emerged in the context of ESB offices. These "Concepts" are outlined in the chapter on methodology as a "Theoretical Framework".

A purpose-designed research instrument was intended to uncover attitudes among individual ESB employees.

Ideas from other writers, say, in the field of human factors research, for example, would guide the choice of questions to be asked. It was further realised that the experience of each individual in using the capabilities of information systems and software could be an influencing factor.

The organisational structure surrounding the individual might be significant, too.

A range of subsidiary issues including knowledge work, information work, job design, and motivation also surfaced in the literature. Though the uses of information technology and information systems differ from organisation to organisation, an initial reading of the literature showed that common threads ran throughout.

CHAPTER 1

OVERVIEW

AND

EVOLUTION OF THE OFFICE ETHIC

OVERVIEW AND EVOLUTION OF THE OFFICE ETHIC

OVERVIEW

Change and learning

Many issues sprang to mind as the study got under way. When reviewing the literature, the material selected was considered with these issues in mind.

It was hoped to discover how I T has changed office work by empowering users to perform tasks in ways that are identifiable, sustainable, controlled by the user and by enriching their experience of work.

In order to control an information system, we need to learn about it. The learning process and learning curve involved in I T would be examined. The continuous learning implied by the rapid pace of I T change might cause problems for users; system upgrades and enhancements might prove troublesome. Perhaps some users welcomed the challenge of systems changing.

Accessibility / Usability

At the outset it was hypothesised that old-time information systems were limited in *accessibility*. They were restricted to a programming "class". These privileged users, few in number, controlled the systems. Inputting clerical data was generally "at one remove": paper forms, for example were completed by clerical staff before being "punched" into the computer by other clerical employees. "Batch processing" was flourishing. Now, **graphical user interfaces (GUIs** - see Glossary) and faster response from computer systems appear to make systems more accessible. Still, users might not be receiving the level of *access* they sought. The extent of *involvement* users seek in specifying; designing; and modifying systems might be uncovered.

Usability becomes an issue once access to a system is obtained. The degree to which users experience a smooth path through their applications could be identified.

Transportability / Portability / Transparency

It is open to question whether or not users can move between applications and tasks across different " platforms" *seamlessly.* For example, when a user switches from using Word for Windows on a PC to using All-in-l running on another system, s/he may be aware of a disconcerting "join" between the two systems.

Users might comment on the benefits or otherwise of carrying portable computers around or being reachable by telephone anywhere .

Users may prefer the reassurance provided by systems which are "transparent" to them: the operation of these systems should be clear to users.

Organisational and human resources issues

Organisational structures are being altered, imperceptibly or sometimes radically. Phrases like *team building* are popular in management literature.

Corporate cultural change issues are becoming important in business. Technology issues can be addressed as part of that process.

Information technology may affect our perception of human resources issues, motivation, productivity and effectiveness at managerial and employee levels. I T might have rendered traditional job descriptions less relevant, while impacting on the scope and responsibilities of office work.

Empowerment and enrichment

Empowerment is intended to benefit the company, as well as the individual worker and her/his group of fellow workers. It is possible that I T empowers or disempowers people, thereby affecting this process.

For the purposes of this study, enrichment was felt to encompass wider issues than simply that of *job enrichment*, (which is an initiative adopted by some companies).

EVOLUTION OF THE OFFICE ETHIC

Beginnings

It begins with the sound of running water. Across the world, ice is melting. A winter millennia-long is ending.................................

Writers on human history find a synthetic approach is attractive. In attempting to link various strands of an issue - let us say, technology - they *synthesise* an explanation of how the issue developed. Signs of such an approach will become evident throughout this study. The following speculations on the development of the office have been inspired by historical writings of **Burke [1978]**; **Smith [1960]**; **Boardman *et al* [1993]**; **Geyl [1955]**; **Doswell [1983]**; **Habakkuk and Postan [1965]**; and **Postan *et al* [1963]**.

Burke [1978] proposes that about twelve thousand years ago, the world's climate grew warmer and drier: glaciers began to retreat. The resulting movement of peoples caused demographic changes that were to have far-reaching consequences. The Nile valley especially became a seat of the new practice of Agriculture. The plough brought crop surplus. Surplus implied population growth and a fixing of formerly-nomadic peoples in one place. An invention we call Civilisation grew up around agricultural communities, bringing with it the need for administrators. These administrators used the newly-developed art of writing to record grain statistics or taxes, to give but two examples. The need to support artisans, bakers and a myriad of service workers in the new towns and cities called forth Taxation - which itself needed recording. Tax collection required the creation of Accounting. This, together with the need for agricultural prediction and religio-cultural beliefs of the city-states - epitomised by Astronomy - encouraged the growth of Mathematics, yet another intellectual skill. The cerebral bandwagon was rolling.
However, Toynbee held that great civilisations came into being *not* through advantages of soil, climate or situation, but through *overcoming obstacles*; the process is brought about by

creative *individuals* or creative *minorities*. Civilisations grow, by dominating their environment. Finally they break down: they collapse. (Geyl 1995: 113-114).

In the first stone cities of Egypt, Mesopotamia and Sumeria, scribes were at work. These civilisations of the Golden Crescent realised that to prosper it was necessary to simultaneously control and organise.

We might consider this the dawn of the *First Age of Administration.*

A deep-felt need to centralise administrative control has long been pursued by administrators. The Pharaohs adopted bureaucracy as a "mode of administration", points out **Child** [1977: 207]. Child speaks of the paradox of organisation: without it, democracy and progress cannot readily be given effect; yet with organisation, barriers to democratic expression and to change may arise.

Over the succeeding centuries, Greece and Rome pushed the administrative arts as far as the limited technology of the time permitted. In China, isolated as though in another world, a bureaucracy flourished, with a science of printing hundreds of years ahead of her more Westerly counterparts. Ancient Empires exploited their political power to dominate their lands. The isolation of the Chinese Empire meant its achievements went largely unrecognised in the Western world, so we tend to see the Old World order created by Roman, Greek and Phoenician as the legitimate origin of Western-style administration.

At the helm of this Old World order stretching from Constantinople to the North Sea and down to the North African rim, flourished an administrative class. Trade was financed through Coinage, recorded by Accountancy. Partly from a desire to record the events of great empires and the legitimacy of kingly rulers, grew the creation of written History. Numbers and Words: two inventions that have formed our conception of how things should run smoothly. Graphical representation, whether on papyrus, parchment, slate or paper seems essential to a human need to represent the universe in a symbolic form.

Throughout upheaval in the Roman Empire and its successors, the art of administration continued, being found largely *indoors*, while being based upon *graphic representation* or upon human *speech* to communicate. Since the Middle Eastern city-states, scribes had worked out-of-doors - supervising tax gathering, construction projects - while being employed inside buildings as the need arose. Perhaps it was the colder climes of the Northern European Roman territories or the unrelenting heat of the Mediterranean sun that encouraged scribes and clerks to shelter inside. Whatever the cause, by early medieval times, an idea of clerkish life is firmly rooted in toil within four walls. The effect of this has carried over into the present.

Communicating thought

Writing used symbols, according to the particular culture that created them, first to record thoughts - employing tools that were cheap, could easily be manufactured - then to transmit these thoughts to others. Without the leap of imagination that gave rise to the electromagnetic media, it was not possible for our ancestors to envisage any way to communicate speech - other than face-to-face. It is a fascinating thought that modern institutions have spent decades aiming to supplement the shortcomings of the sound-only telephone with the pictures provide by videophone. Seemingly there is no substitute for personal contact - or the appearance of it. Real-time real people and static symbols were all that our forbears could employ in communicating. Communication in the past had been both *slow* and *static*: hand-delivered letters, carved or painted images in public places. Such images do not keep up with changing circumstances, taking so long to reach their destination that they must have been the despair of old-time clerks.

Other constraints on administration lay in the human element. The class structure of society; the lack of widespread literacy; and educational systems hide-bound by convention trammelled the growth of administrative science. Even if the will had existed to change these, a lack of resources in the pre-industrial state would have slowed the vehicle of change. This was still the case as we entered a *Second Age of Administration*, as we choose to call it, in the Middle Ages.

The role of the Church

The Church inherited part of the mantle of a collapsed Roman Empire in passing on administrative practices. Postan *et al* even go so far as to say the Church "copied" its organisation from that of the Roman Empire [1963: 5]. To Burke, the Church was the first multinational corporation, containing as it did a willing, capable administrative machinery and a communication system that spanned Europe. Its successes were astounding for the time. Cathedrals, such as that at Chartres, were among the largest buildings constructed in the medieval world.

Writing, which had become essential to administration, gives rise to a further requirement: people who can read it. To be of any value, a written record has to be readable. Inheriting the traditions of Rome, the Church possessed within its ranks a class of men who could read and write. Monks became the scribes of a new age, forming an elite corps of administrators. The Church solidified a notion of bureaucracy, which was to remain unchanged for centuries. The term *cleric* gives us *clerk*: the phrase "cellular office" reminds us of the monk's cell. Working within their cells, these men continued the tradition of indoor clerical activity, which remains the norm.

In the later Middle Ages, ideas from the Arab world and further afield from Asia altered conceptions of science and mathematics. Consider the arrival of Arabic numerals (the digits 0 to 9). The Church, instead of embracing such a potentially useful innovation, at first condemned these infidel "ciphers", according to **Lancelot Hogben** ["*Mathematics for the million*", 1967: 245-246]. But it was a futile gesture - since business could thrive better adding *5* and *4* to get *9*, rather than *V* and *IV* to get *IX*. By the twentieth century, computer programmers were using just two of these digits, *0* and *1*, forming a binary system to speed up the processing inside a computer.

Power and administration

Parallel to the sophisticated structure of that spiritual organisation, the Church, the Second Age of Administration saw a growth in another layer of control - the temporal powers - and in wordly affairs - as evidenced by the merchants.

Rulers of states had realised the advantages of effective administration early on, as we have seen. The state throughout history used it to acquire more territory and wealth - in short to promote the better governance of its lands. Constant crusade and conflict in the Middle Ages produced innovation after innovation: horse-mounted armies, navigational aids. A spread of European trade and colonisation in the succeeding centuries, first Hanseatic, later Italian, English, Dutch, French, Spanish, reshaped the boundaries of earthly power. Not the Mongol nor the Moor, but the aggressive European, coming not in hordes, but in small shiploads, moulded the modern world's current reliance on the office as a seat of power.

Postan *et al* record a revolution in the organisation of medieval society [: 555]. The West came into contact with the East. Merchant and burgher took their place beside warrior and noble. Greek, Roman and Christian thought of the Ancient World became available. Greek and Roman ethics were reconsidered in the light of fair reward for labour given and in terms of social status [Postan *et al*: 562-564].

The medieval church clerics formed a clerical "profession", which should not engage in menial and manual things - so surpassing all other professions. [Postan *et al*: 574]. This view idealised Man as set apart from the world, among the non-producers. But while wealthy clerics did not need to work, poorer clerics did. No member of clergy could be a merchant: this was a mistrusted profession. Postan *et al* [: 575] later seem to imply that theological theory could *not* halt world trends towards what we might term materialism.

The rising business community needed to administer itself. Renaissance commercial enterprises developed accounting innovations such as double-entry book-keeping; financial concepts like the letter of credit; plus better paper-based communication methods to convey the information required by expanding commerce. Book-keeping attained new heights of efficiency [Postan *et al* 1963: 74]. Werner Sombart believed that the introduction of double-entry book-keeping marked the beginning of capitalist enterprise and the triumph of the profit motive as the guiding principle of economic activity [Postan *et al* 1963: 94]. The advent of modern information systems can be dated to the invention of double-entry book-keeping, believe **Ein-Dor and Jones**.

Postan *et al* relate how "the steady progress of business management" [: 73] favoured the rise of Italian companies with foreign branches. Italian merchants - who had longed ceased to be illiterate [: 68] - learned to do business by correspondence rather than by personal contact. Growing paperwork tied them more to the counting house, an equivalent of today's business office [: 73]. Merchants could conduct their business from their *deschi* (tables in the counting house - hence our word desk) without ever leaving the premises [: 74].

These medieval merchants acquired their basic education at school, but gained their "professional knowledge" in the counting-house by apprenticeship [Postan *et al* 1963: 89-90]. This model has survived. Today the education at secondary or tertiary level acquired by manager and employee is honed through exposure to the realities of company life.

After the Industrial Revolution, mass-produced steel nib pens and cheaper paper, together with wider literacy to read larger numbers of printed books, encouraged a gradual improvement in the tools of administration.

A *Third Age of Administration* had come upon us.

Administration has always needed a concrete expression in the form of massive edifices, represented by purpose-built office buildings erected from the second half of the nineteenth century onwards. Even today's emerging Asian economies have adopted the Western model of basing much office work in monolithic structures located in defined business districts.

Britain, the United States and sundry European powers came to dominate the industrial and commercial worlds - they controlled the means of Western bureaucratic production. Twentieth century management theory stemmed from those countries.

In 1900, it was possible for the British system of administration to dictate what Chinese bureaucrats should do, though China's system of administration had formed thousands of years earlier.

Habakkuk and Postan [1966: 900-906] theorise that Chinese attitudes of superiority towards the West and a fundamental conservatism prevented a modernisation of institutions and industry such as the West experienced. Perhaps we might speculate that in medieval times a similar event happened: China's aloofness prevented her influencing Western administrative methods.

Japan took a different path. She used her social "orderliness" to build up her large businesses in the early twentieth century [Habakkuk and Postan 1966]. Now, decades later, these corporations - Mitsui, Mitsubishi, Nissan - are becoming role models for Western industrial management practices.

On our own island, the administrative systems were not so much developed as *inherited*. The formative years of ESB were influenced by overseas example, including contemporary British and American thinking (the special issue of **Administration**, Autumn,**1957**, devoted to the Electricity Supply Board, reveals these influences).

Summing up

To conclude, it is clear that the *technology* of work has continued to advance. Today we are less constrained by the *technology*, which is one part of the administrative "equation": we tend to give more attention to another part of that equation, the *human* dimension.

Administration began as the "left arm" of ancient rulers, just as military might was at their right. It matured as the instrument of earth-bound states, while safeguarding more heavenly traditions. In recent times, technology has created sophisticated tools of administration, available to any office that needs them.

Jonathan Raban considered the clerk; computer operator; secretary; system analyst and office manager to hold the "staple" jobs of the modern city, the "most necessary raw material" of which has been paper. The typewriter and telephone were the "most urban tools" [Doswell 1983: v].

Now we stand on the cusp of a *Fourth Age of Administration*: an age of "virtual administration", in which the mediating force may be electronic.

CHAPTER 2

DEVELOPMENT OF SCIENTIFIC APPROACHES TO ORGANISATIONS AND PERSONNEL

DEVELOPMENT OF SCIENTIFIC APPROACHES TO ORGANISATIONS AND PERSONNEL

Organisational issues

Taylorism: gone but not forgotten

Because most office work is conducted under the umbrella of a particular organisation (whether a two-person "back-office" or a corporate monolith), it is fitting to consider aspects of organisational theory. It is an accepted truism that organisations have to be managed. Management theories provide a framework for examining how organisations are managed.

Some views of management in organisations could be called "Taylorist" [**Argyris** 1964]. *Taylorism*, as the term is used by **Woods [1982]**, describes a movement which followed precepts laid down by F. W. Taylor who, in the Nineteen Twenties and Nineteen Thirties, developed theories under the generic heading of "scientific management".

Taylor was at the forefront of investigators studying industrial plants, with a bias towards improving productivity.

Habakkuk and Postan [1965: 548-550] view Taylor's scientific management as a "natural sequel" to the process of mechanisation which was central to the Industrial Revolution. They describe a process whereby, *first*, machines and power replace human skills and strength, *then* the machine operative becomes an "automaton to match and keep pace with his equipment". Writing in 1965, they declared that the *third* stage had come: namely, ***Automation***, "the replacement of man by machines that think as well as do" [: 549].

(The term *automation*, meaning mechanisation of operation, has been in use only since 1947 - **Reichardt**: 140.)

The typists depicted by **O'Broin and Farren** [1978] *have* proved replaceable; or rather, office work in larger Irish businesses has altered, making production typists in typing pools - as described by **Maldé** [1980] - much less significant.

Argyris [1964] indicated that most organisations in the Nineteen Sixties had structures that were designed to follow "scientific management" principles: in other words, some assumptions had been made about the best way to design work. He refers to his earlier book *Personality and Organizations* [1957], in which he hypothesised that such scientific management assumptions could create organisations which had unintended consequences. Additionally, since individuals needs for psychological success and self-esteem were not met by the work situations within these organisations, people modified the situations, and hence modified the organisations, to meet their needs [Argyris 1964 republished 1990: 35-36].

Organisations possess culture

Rosemary Harrison's view is that when we refer to the *culture* of an organisation, we mean in general the set of norms, ideas, beliefs about " how things ought to be done " in the organisation or in a part of it; *climate* means the same thing.

The culture of the organisation is critical to the achievement of its goals. A "strong" culture means employees believe in the company's products, customers and processes.

In the words of Marvin Bower of McKinsey & Company, corporate culture is "*the way we do things around here*" **[Sveiby and Lloyd** 1987: 58**]**.

Argyris [1964] describes the work of other writers who partly attributed different styles of management to cultural influences, such as nationality - by comparing German executives with their American counterparts, for example [: 16].

Different cultural values of the managerial class may influence the organisation generally [: 16].

Handy [*Gods of management*, **1985b]** speaks of the first essential of organisational efficiency as being "cultural purity". He outlines a number of models of organisations and their members having varying characteristics, similar to the stereotypes of ancient Greek gods. Hence an "Athenian" individual uses persuasion and logical reasoning; but this approach will only be successful in an "Apollonian" organisation (which values techniques and rule-books) if it is introduced in the correct manner. Handy, of course, admits no member of the organisation actually matches these stereotypes fully; everyone is culturally impure; the mix of human and organisational characteristics vary from person to person and organisation to organisation. Therefore it is not possible to derive an universal panacea for job satisfaction or heightened motivation.

ESB Organisational Culture

Sveiby and Lloyd state that every successful company has its own culture. They instance IBM (before its recent troubles) and Hewlett-Packard (HP). This latter company has a celebrated human-centred ethos colloquially known as *the HP way.* We would expect ESB's use of I T to reflect its own corporate culture, its historical development.

Consulting a variety of documents, we discover ESB has experienced cultural shifts over the years.

A formal history of the organisation [**Manning and McDowell**, 1985] emphasises how ESB has *reacted* to numerous events that challenged it: economic crisis; industrial relations conflict; and energy industry crises. When describing ESB's reaction to change, Manning and McDowell provide proof that ESB culture, as expressed in its self-management, is neither homogenous nor unchanging.

Before the late Nineteen Sixties, ESB had reorganised its internal structure "as the size of the organisation outgrew existing management structures" [Manning and McDowell : 240].

During the Nineteen Seventies, ESB called in management consultancy firm McKinsey and Company. A major restructuring of the utility resulted. Manning and McDowell feel ESB had entered an era of greater freedom in decision-making, so management decisions would have greater impact. McKinsey's recommendations, which ESB adopted "without compromise" [Manning and McDowell: 24] meant policy making would be separated from decision making.

That ESB *plans* many things at a detailed level is evident from reading **Roche** [*Planning in the ESB*, 1978] or any of the firm's Annual Reports.

Sometimes events - the strikes of the Nineteen Sixties being examples - encouraged Government intervention in the form of Official Inquiries. More recently, a strike in 1991 prompted an internal review of industrial relations and employee attitudes, overseen by Peter Cassells.

Excellence as a cultural norm

At other times, global fashions in management encourage Board-level change programmes. For example, a ***Report on the organisation, structure, roles and relationships*** of ESB (popularly known as the Miller / Barry Report) was published in 1984. The phenomenon of seeking "excellence", promulgated by **Tom Peters and Robert Waterman** in their book *In search of excellence* [1982], underpinned many changes contained in that Report.

Members of the Board of ESB read the gospel of excellence preached by Peters and Waterman, who held that a company which has a distinctive culture proclaimed its *uniqueness* and *superiority*. The clearly-defined values in "excellent" companies are obvious to their employees, who must "buy into these norms or get out" [1982: 77]. People accept a certain loss of latitude or freedom of action in working for excellent companies. The risk that corporate authority will dominate the personal ethics of a company's managers or employees is lessened by the fact that an excellent company is *close to its customers*: the resulting "openness" of the company towards customers injects balance into the company.

The ESB Officers Association (ESBOA), a white-collar Union mainly representing ESB clerical and administrative staff, opposed the Miller / Barry proposals of 1984. These proposals were intended as a radical overhaul of ESB's organisational structure and culture.

The ESBOA believed that the proposed restructuring was related to the philosophies which Peters and Waterman had espoused. These writers saw corporate excellence as stemming from key factors: that firms should institute better-defined control while allowing flexibility ("simultaneous loose-tight structures"); that firms should focus on the activities they could excel at ("sticking to the knitting"); and so on. Such ideas swept the Western business world.

Begg and McSweeney [1984], in putting forward the ESBOA's case, provided a spirited defence of the existing ESB District and Head Office structures. Nevertheless, the restructuring went ahead.

Thomas [1985] has studied excellence as a cultural ideal. Organisational culture is defined by Schein - quoted by Thomas - as "the pattern of basic assumptions, invented, discovered or developed" by the group in response to internal adaptation and internal integration. This culture is passed on to group members as "the correct way to perceive, think and feel" in relation to problems. [:24]. Culture can be "elusive" to define, yet it can be learned. It can also become out of date and act as a "brake on change" [Thomas: 24].

In practice, because of human differences - our membership of a wider society and so on - organisations do not display a single culture.

Management's prime role is in shaping corporate culture [Pettigrew, quoted in Peters and Waterman: 104]. The business leader creates not just rational, tangible aspects of the organisation, but also ideologies, rituals, language, myths. Culture unifies the social dimensions of the organisation.

Research by **Glisson and Durick** [1988] found two "organisation characteristics", namely *leadership* and *the age of the organisation*, to be the best predictors of commitment among employees.

In various companies, a corporate *mission statement* has been formulated, as a tool focusing the goals and ambitions of the enterprise. ESB's version, a **Vision Statement**, has excellence embedded as a keystone concept: it aims to become a "world class company".

Information technology has been used inside ESB in the search for excellence. Computers have aided in communicating the company's vision of excellence to employees, through the medium of E-mail and audio-visual presentations created by software. Naturally, I T tools themselves are intended to produce higher-quality work; ensure timely production of information; and so forth.

Success in the Nineteen Nineties will be based on excellence: managers will be more aware that the most effective way to increase productivity is to recognise excellence [**Cairns and Wilson**: 140].

A case study of ESB culture

A former ESB manager, **Des Gilhawley** [1989] has analysed what he terms *the corporate executive culture of ESB*.

He finds a difference between the Japanese model of implementing decisions and that employed in ESB. The Japanese process involves slow processing of the decision but rapid implementation. ESB generally decides relatively quickly what needs to be done, but the subsequent implementation of that decision is slow and inadequate [: 15]. He warns that the executive activity is not fully capable of being formalised in a system. Progress towards computer-based systems at the operational level - mainly administrative - has been faster than that at the executive level. As an example, Gilhawley states that a good maintenance management system was developed - but actual implementation progressed slowly, possibly due to a cultural resistance to accepting formalisation of this method of working. Apparently, developing a system is easier than changing ESB culture to accommodate the system.

Organisations: a layered structure

Writers have divided the power to change and implement decisions within organisation into layers or echelons [**Haas**; **Kanter 1977**; **Kossen**; **Pfeffer** and others]. It is possible to synthesise some of their concepts.

Roughly speaking, organisations such as ESB follow a corporate model consisting of layers, or echelons. Overseeing the strategic running of the organisation we find what could be termed a primary layer, at board or chief executive level. This layer draws the outline or ground rules for business strategy, which will shape the tactics used by the other layers.

Below the higher executive level lies a secondary layer. (The word "below" suggests itself: we still tend to think hierarchically, even in democratic organisations). This echelon plans how the enterprises' **resources** will be allocated to achieve the strategy proposed by the top layer. This entails activities such as spending; investing; recruiting staff. These are the **enabling** actions which will facilitate the strategic ends pursued by the corporation.

The tertiary layer is a front-line theatre of operations, to use a military term. This is the arena where technology is aiding the organisation in remaining *competitive* (competing with rival businesses) yet *co-operative* (co-operating internally or externally where advantage can be secured).

Building a learning organisation

Modern organisations are coming to recognise that the process of **organisational learning** as advocated by theorists is valid. The company becomes a *learning organisation*. Garvin [1993] claims that before people and companies can improve they must first learn. He propounds "three Ms".

Firstly, *meaning:* he defines a learning organisation as one that is skilled at five activities:

- problem solving;
- experimenting with new approaches;
- learning from past experience;
- learning from the best practice of others;
- transferring knowledge rapidly throughout the organisation.

Secondly, *management*: clearer guidelines on learning are needed within the organisation.

Thirdly, *measurement*: better tools for assessing an organisation's *rate* and *level* of learning are prerequisites.

Comparison is one mode of measurement. For example, McKinsey and Company has compared ESB's workings with those *best practices* of foreign utilities and corporations which had proved successful [***Reshaping ESB to meet the challenges of the 1990s,*** McKinsey and Company 1992].

A model of learning in the organisation

Harrison [1992] derived a model of learning from two main theoretical standpoints. Firstly, she looked to *Kolb*, who says that learning can be viewed as a circular and perpetual process, whose key stages are *experience*; *observation* of / *reflection* on that experience; *analysis* of the key learning points arising from it; and consequent *planning / trying out* of new / changed behaviour.

It can an "almost instinctive process", with increasingly successful outcomes; but at times, mistakes are made at one or more stages of the cycle, so that skills, knowledge or attitudes acquired do *not* lead to improvement in those instances [Harrison: 150].

An employee can develop a strategy for dealing with unexpected events, such as being called into a sudden meeting for which s/he is not prepared. In such circumstances, the employee will be using five steps identified by Kolb for problem-solving:

- observation / reflection
- analysis
- creativity
- decision-making / experimentation
- evaluation.

The second major theory cited by Harrison is the stimulus-response theory.

According to this, for learning to occur, there must be a basic need to make the individual want to learn, and acting as the constant spur to that activity. In other words, there must be a drive, or motivation, to learn.

Stimulus is a message that makes an impact on our senses because it relates to one or more of our primary or secondary drives. For learning to occur, people must be stimulated by the methods used.

Appropriate *responses* - skills, knowledge and attitudes - of the learner to the learning situation will lead to improved performance and/or development of potential.

The learning of organisation members contributes to the process of organisational learning.

Managing the organisation as a continuous learning system

Harrison makes some recommendations arising from her analysis.

"Everyday experience" should be carefully examined - because it impinges on the learning process and learning opportunities within the workplace. Some effects of daily experiences will be positive; others will be negative - as people acquire attitudes that conflict with work objectives. People may develop gaps in their knowledge or skillbase.

The organisation should be managed as a "continuous learning system". Managers have a role in finding ways to use workplace as a primary source of learning positively. Coaching, counselling and guidance will become vital, to help people benefit from their workplace experience.

There must be a conscious decision to develop an organisational environment that promotes and sustains desired kinds of organisational learning: *this goal must be pursued as much as profit and productivity.*

In summary, the organisation can be a powerful learning system. The integration of learning with work is a cost-effective learning strategy. Continuous development in the workplace benefits the whole organisation; this development is a fundamental management responsibility.

The inter-relation of organisational and personnel issues

Hawthorne, an earlier examination of worker motivation

The twentieth century has seen methodical attempts to analyse personnel issues in the context of the organisation of the work itself.

Despite the criticisms that have been levelled at the Hawthorne studies of the Nineteen Thirties, the renewed emphasis placed by the studies (and the earlier Human Factor group in the United Kingdom) on the human element marked a shift from the strictly Taylorist vogue. The effect of the experimental situation on the workers being studied - the celebrated "Hawthorne Effect" - was regarded as a lesson for management; workers should be treated as responsible human beings [**John H. Smith** 1987: 112].

The Hawthorne experience revealed that productivity could only be improved when the social needs of workers were met. Consequently, supervisors required wider interpersonal skills to relate to their subordinates [**Newell** 1995: 28].

The importance of the individual

Western thought has focused on the individual and her/his relation with the group they belong to. Social theory and management science are interacting to examine how at work or outside of it, we have needs that are, or are not, met to varying degrees.

Abraham Maslow and his fellow thinkers identified our "hierarchy of needs". These needs change only in complexion and relative importance as society develops. Better-off individuals have deeper needs for fulfilment than financial reward. They seek "enrichment" and job satisfaction, even if this is not always clearly stated.

Argyris [1964] employs elements of Maslow's model of human psychology, which postulated that:

- certain lower psychological needs are primary - food, sex being examples;
- next in order of priority comes a need for security;

- finally, comes a need for *"self-actualisation"* which involves the "full expression of the individual's present potential" and the "striving to expand" this.

Should the first two categories of need be fulfilled by society, the person will focus on the third category, "*self-actualisation*" - we might today call it "self-fulfilment". Argyris feels that individuals will tend to experience *frustration* because their "self-actualisation" is blocked [Argyris 1964: 32, 44].

Job satisfaction

Frederick Herzberg and his co-writers contrasted *motivators* and *hygiene factors* associated with the job [**Herzberg, Mausner and Bloch Snyderman**; **Herzberg 1968a**: 74]. Motivators, which are the "satisfier" factors, comprise recognition, achievement, responsibility, among others. Major hygiene factors (the "dissatisfier" factors) included company policy and administration; supervision; salary; interpersonal relations; and working conditions. The opposite of job satisfaction is *not job dissatisfaction*, rather it is having *no job satisfaction*. Dissatisfaction with a job is caused by hygiene factors extrinsic to the work.

Among factors influencing job satisfaction adversely, **Feldman and Arnold** [1983: 219] identify low pay and boring work. Thirdly, they cite feelings of inequity: even if pay and the job appear satisfactory to a manager, employees may react negatively if their expectations from a job are not matched by the outcome from the job.

Feldman and Arnold state that satisfaction is not closely related to performance. Therefore high performance does not equate with increased productivity. Job satisfaction emanates from job performance to a greater extent than job satisfaction can lead to improved performance.

If the most talented individuals in an organisation are dissatisfied, then something is wrong with the organisation. Conversely, if poor performers are unhappy over pay, the two writers regard this as a sign of organisational effectiveness: better performers are being rewarded.

Kohn [1993: 53] feels that incentive schemes do not work. Forcing people to compete for rewards, recognition or ranking does not motivate, but instead destroys co-operation and therefore "organisational excellence".

Varying motivational needs

We might bear in mind that not all individuals seek high responsibility, for example, as portrayed in a pamphlet entitled ***Coping ... with your job***. An anecdote relates how an employee turns down a promotion because he has reached a plateau in his working life which he finds comfortable.

It appears from the available literature [Herzberg, Mausner and Bloch Snyderman; and others] that job satisfaction *rises* with age. Some of this expressed level of satisfaction could be due to a comfort factor: the employee, having spent years in reaching her/his present position, comes to accept her/his life situation. That person reports feelings of "satisfaction" to social researchers, because contemplating the prospect of change is too uncomfortable.

Flippo writes of the *work ethic*, a term implying that work is imbued with a spiritual dimension and is buttressed by "behavioral norms". These norms include honesty, punctuality and diligence. Writing in 1980, he is of the opinion that the work ethic is declining in favour of a more existential view of life. Workers were becoming self-actualising; quality of life was emphasised, and diversity was preferred to conformity.

Personnel programs attempted to redesign jobs, so providing more challenging jobs which met the requirements of the human psyche; and to pay employees for the skills they possessed, rather than those which the job required. Additionally, workers could have more say in determining work schedules [: 12-15].

In his study of staff in ESB power stations, **Hurley [1982]** accepted that motivation was not a single concept but was made up of a fairly large number of components. He felt that theories of work motivation had been successfully validated against productivity. His study concluded, *inter alia*, that between the fourteen power plants examined there were large differences in productivity and in absenteeism. He also concluded that, like many organisations, ESB's organisation did not facilitate the goals of workers as much as many of these workers would like: consequently, worker frustration was produced.

He accepted that some measures *did* exist within ESB aimed at fulfilling some needs, such as

- **social support** (friendships at work, for example);
- the need for **knowledge** of the work they do, the technology they use;
- the need for **control** (such as influence over decision-making);
- and **job enlargement** (increasing the scope of the job).

But he found that such measures were inadequate, as well as being distant - for these measures were based in Dublin, at ESB's Head Office.

Evelyn Blennerhassett found that Irish Civil Service executive officers identified the work itself as significant for job satisfaction and motivation - unfortunately, these officers felt their own jobs rated low against these factors (she is also quoted by **Gunnigle and Flood** 1990: 108, who interpret her findings as raising "serious questions" about the design of Civil Service jobs).

In a survey among ESB's IT Services staff, respondents were asked to indicate on a "list of items which may offer job satisfaction" how satisfied they were with each item [***ITS - survey of staff opinion December 1993***]. Thirty-two per cent of respondents reported being "very satisfied" with the item "Interesting work"; a further 57 % were "fairly satisfied". Twelve per cent were very satisfied with the item "Feeling involved" - 55 % were fairly satisfied. Yet the item "Recognition of effort" produced a 33 % "fairly dissatisfied" against a 44 % "fairly satisfied" response. Overall, 78 % of respondents were either "very" or "fairly" satisfied with their present job, as opposed to 21 % who were either "fairly" or "very" dissatisfied.

In his study completed in 1989, **Brendan Devine** looked at two Irish industrial plants.

A theoretical model postulated by him examined whether Herzberg's hygiene factors and intrinsic motivators could measure levels of job satisfaction in Irish industry. His findings accorded well with the theoretical model.

Early theory on job satisfaction suggested a fairly straightforward relationship between needs and satisfaction. Later theories emphasised how the characteristics of either the worker or the organisation played a part [Glisson and Durick: 62]. Latterly, the organisational or situational context of the work is identified as a major source of variation in work attitude. Rousseau [quoted in Glisson and Durick] holds that both the technical and social components of a system determine the characteristics of jobs.

The socio-technical approach as a possible framework

One view of the modern office regards it as a socio-technical system, meaning it is a complex set of interrelationships between people as well as equipment, information and document flows [**Mason** 1980: 144].

Mason asserts we have concentrated too much on equipment, not enough on people's interrelationships.

Enid Mumford [1983] states that, as with Taylorism, socio-technical designs appeared first in manufacturing industry.

Emerging from work carried out at the Tavistock Institute at the end of the Nineteen Fifties, socio-technical principles differed greatly from Taylorist principles. In describing these principles, she cites Eric Trist, a leading socio-technical designer [Mumford: 77-78; also Emery 1993].

The basic design unit of the socio-technical approach is the overall work system, which comprises a number of logically-integrated tasks or unit operations rather than single tasks or operations which form the system.

The work group, not the individual job holder becomes the primary social unit.

Since the work group is the primary social unit, jobs are multi-skilled.

The discretionary part (that is the part which the worker can vary to an extent) of work roles is emphasised more than the prescribed part (which is defined for the worker).

People are treated as *complementary to* machines, not as *extensions of* or *subservient to* machines.

The organisation of work is aimed at increasing rather than decreasing job variety.

The internal regulation of the system is by the work group itself.

While the basic principles remain in use at Tavistock, Mumford accepts they have subsequently "evolved".

Her own personal approach emphasised greater participation by users in the system's design [: 78-82]. Tools used include "exercises"; video and other communications media - such as film [: 78, 83]; and a "framework of questions" pertaining to the system's development. Participation involves users in analysing their own job satisfaction and efficiency requirements, perhaps more accurately than outsiders might. Through gaining deeper control over "their own future work situations", users feel they have a "stake" in the system.

Another off-shoot of such a process of user involvement is that the design process becomes a learning experience, making users "increasingly competent in the management of change" in their environment [: 82]. This seems especially pertinent in the change-focused atmosphere of today's ESB.

In another instance, Mason [1980: 145-6] adopted a socio-technical stance in analysing the work of typists in the word processing environment, as they faced the challenge of new technology.

Organisation layers from a socio-technical viewpoint

Butera and Bartezzaghi [1983: 109-112] provide a model of the layers of an organisation in the light of socio-technical design.

Figure 1: Model of organisation layers

Formal organisation
Technical organisation
Professional institutions
Perceived organisation
Informal organisation
***De facto* organisation**

{Derived from Butera and Bartezzaghi [1983] Page 109}

The **formal organisation** is that system of written rules [: 109] regulating the office workers' actions. The **informal organisation** is the unplanned, unrecognised organisation whose goals, norms, and so on differ from the formal organisation. While the formal and informal organisation have been studied most, given their predominance in the manufacturing sector (a primary focus of socio-technical research until the Nineteen Seventies), Butera and Bartezzaghi feel the other four layers are more important in white collar office work.

The technical organisation

The technical organisation covers the *rules and procedures* for running *technical* systems, such as computerised information systems. The design of this organisational structure is tied to the other aspects of the organisational layers, including

- rules for accessing the information systems;
- formats for display of information;
- job roles and job skills.

Professional institutions

When Butera and Bartezzaghi wrote, computing specialists were part of a wider community, which lacked the status of a formalised professional institution [: 110], but influenced those specialists in setting goals and standards. A trend was noticeable towards using advanced technology, rather than sticking to well-proven, less "exciting" technology to meet user requirements. However, we observe, today the I T professional has become more formally recognised: s/he is more likely to be at the forefront of promoting new applications, under pressure from user demands.

Perceived organisation

Different viewpoints are taken towards office rules and regulations [Butera and Bartezzaghi: 111-112].

Managers may have *authoritarian* or more open methods of using control. *Clerks* may *welcome* or *avoid* the formality of rules. Technology can change job roles and the way people view office work. Butera and Bartezzaghi believe the "subjective, qualitative" viewpoint of workers needs to be considered in developing office information systems [: 111].

The *de facto* organisation

This is the **actual** set of rules and "modes of action" [: 111] which get the work done, despite being poorly-understood and defined in the formal organisational design. Our two writers give an example: a *secretary's* personal method of *filing*, if it is not expressed *formally*, can be unusable by a *manager*.

Looking more closely at filing, we find that **Bailey [1985**: 200] feels this activity is essential if most businesses are to work efficiently; further, that documentation is the backbone of most business undertakings. Evidently, even basic activities are fundamental to the functioning of the organisation.

Work Study and job design

"Some of the work performed by everybody is unnecessary" [**Rae** 1965: 15].

Alternative methods of studying the workplace include that advocated by Rae. Feeling that improvements made by rule of thumb, bright ideas or hunches were no longer enough, he advocated **Work Study**, which could be defined as the investigation of the work done in an organisation, so as to best utilise personnel, machines and material. It involved finding the best way to do the job and measuring the time the job should take. The constituent parts of a job were studied.

Cooper and others focus on the processes known as *job design* and *job redesign*.

Job design, as its name suggests, involves constructing a framework (the job) within which the task is carried out.

To paraphrase Cooper, job design can specify the means "to enable the worker to experience challenge and meaning" in her/his work, and so enhance her/his satisfaction.

Increases in one job characteristic, such as the *ability to operate independently*, can induce increased motivation, even when other job characteristics remain the same [: 61].

But increased *job variety*, for example, may serve merely to make a job more tolerable, rather than making it positively motivating.

Skill discretion (implying the worker may make a choice concerning the skills to be used) is the characteristic most likely to produce feelings of achievement [Cooper].

The past decade has seen an increased emphasis on quality, service and competitiveness. One result has been the redesign of work, an initiative which restructures work systems so as to increase motivation, commitment and performance [Gunnigle and Flood: 107].

The process of *Work Redesign* as described by **Hackman and Oldham** [1980: 91] may lead to improvement in the **quantity** of work (compared to that produced before the redesign process was undertaken), as well as the **quality** of work. These two writers provide a number of key reasons for this improvement.

Firstly, a traditionally-designed job may have demotivating effects. People doing boring jobs often "find" behaviours which *reduce* the amount of work they *actually* do: removing these behaviours helps productivity, even if no greater quantity of work is produced.

Secondly, redesign of work may *uncover inefficiencies*, say in *time* use, which can be removed. Even well-designed jobs may involve adding layers of control (staff, quality control, supervision) to enable the whole work system to function smoothly.

Thirdly, when jobs within a system are redesigned, it is often possible to *refine* and *simplify* the *overall* work system.

Hackman and Oldham stressed a view that motivation was influenced by the nature of the job itself and the characteristics of the individual worker. The worker displayed a varying "Growth Needs Strength" (GNS) - the extent to which the worker experienced psychological "growth" would vary from person to person. There were five "core dimensions" to a job which would most affect workers who displayed a high GNS:

- *skill variety* - measures the variety of skills needed for a job;
- *task identity* - the degree to which a job requires completion of a single identifiable piece of work;
- *task significance* - the impact of the task on other work or other people, inside or outside the organisation in question;
- *autonomy* - the discretion and freedom allowed to the worker in doing the job;
- *feedback* - the level of information, relating to performance and so on, received by the worker.

The concepts underlying the *Job Diagnostic Survey* (JDS) developed by Hackman and Oldham have been used by some writers to measure these aspects ("characteristics"): for example, **Medcof** will be referred to later. For their part, Glisson and Durick found that two job characteristics, namely *skill variety* and *role ambiguity*, were the best predictors of job satisfaction.

Motivating jobs are those which reflect high values of some or all of the characteristics identified by Hackman and Oldham - provided the worker is capable of being motivated.

In looking at job design in the context of I T within the office, we shall examine the model proposed by **Bjørn-Andersen [1983]**. He identifies *four* main factors that influence job design: job content; work autonomy; ergonomics (see Glossary); and psychological aspects.

Job content

Offices have seen growing specialisation, claims Bjørn-Andersen. Clerks capable of handling a variety of tasks have gradually disappeared, because office work was growing in complexity while managers and those concerned with organisation design / job design were attempting to reduce educational requirements for office jobs.

Since Bjørn-Andersen advanced this view, it has been possible to detect an *upward* shift, not a reduction, in educational requirements for office workers. In fact, within ESB, as in Ireland generally, it is clear that educational standards displayed by office employees are high. Traditionally, public service clerical jobs have been represented as being open to those students who were academically successful. What the spread of the electronic office and the call for a flexible workforce **will** encourage is a wider skillset for each employee - not a more narrowly-defined one such as Bjørn-Andersen initially expected.

Over-specialised jobs could be boring, warns Bjørn-Andersen. (It does seem that increased specialisation is encouraged by technology-based jobs.)

Designing "robust" systems (which resist erroneous input and operation; which are more fool-proof) might be insulting to clerks' intelligence, and ill-prepare them for system breakdowns. It could even make them resistant to change.

Rule-based decision-making (which is based on standard rules) could reinforce bureaucracy, advises Bjørn-Andersen. He counsels a system where instead of making computer decisions inviolable, staff should be have computer systems which keep track of activities, and which are adaptable.

Work autonomy

Computer-based work allows for greater supervision of employees, feels Bjørn-Andersen.

Monitoring employees too closely can result in the diverting of staff energy into beating the system; and in employees only meeting those objectives which are being monitored, ignoring service to colleagues for example.

Child [1977: 130-131] declares that one method of control lay in close supervision of activities. But this incurs cost disadvantages, together with a "loss of employee motivation and attenuation of organizational hierarchy", consequently affecting communication.

Traditional office work, while not permitting much influence on the planning of work, **did** allow scope for choosing the sequence of tasks, or perhaps the methods to be used [Bjørn-Andersen]. Computer-based systems present a danger that deviation from the norm is more restricted, that autonomy is reduced. Bjørn-Andersen advocates systems design which provides better information, without reducing users to "puppets" [: 133].

Ergonomics

This third aspect is not discussed in detail by Bjørn-Andersen.

However in the same volume we can read the views of **Armbruster** [1983]. His ideas, together with concepts derived from **Preece** ***et al*** [1994]; **Olphert** [1989] and others indicate the pivotal role played by ergonomics. The U.S. counterpart of ergonomics, "human factors engineering" (Preece *et al* 1994: 714), is sometimes encountered in the literature.

Ergonomics, or human factors, originated as a multi-disciplinary field. Its purpose is to *define* and *design* "tools" and "artefacts" for work and non-work environments "to suit the capacities and capabilities of users" [Preece *et al*: 40].

The practitioners of ergonomics are "ergonomists". They endeavour during the design process, to maximise the safety, efficiency, and reliability of performance experienced by the operator of a computer system (for the sake of example) and to make a task easier, more comfortable or more satisfying [after Preece *et al*: 40].

The role of ergonomics has been thrown into sharper focus by health and safety issues arising from information technology.

A technology that can leave users feeling in pain at the end of a working day must be open to question. Indisputably, the unpleasantness of the Dickensian clerks' life was no match for the risks of life in a cotton mill. Yet unpleasant aspects of office life existed, and still do. Public recognition that office automation represents a hazard to the human body has been slow in coming.

But cases are reaching U.S. and British courts relating to **Repetitive Strain Injury (RSI)**, allegedly brought on by computer terminal use. Older technology had fewer hazards. Typists were forced by the nature of typewriters to take breaks occasionally to insert paper, adjust tabs, change ribbons [**Flynn** 1995]. One theory put forward today argues that computer terminal users seem wedded to the screen, tapping at the keyboard for hours.

The relatively small number of computer users in the past were more worried about the inefficiencies of the teleprinter type terminal, including paper jams, as their systems did not have screens.

Just as excessive noise remains a problem in production industry, and is merely alleviated by ear defenders, though not eliminated, so too have the measures taken to improve office ergonomics seemed partial, not "holistic".

Preece *et al*, in common with ergonomists, represent a concern shared by designers to lessen the negative impact of computers.

At one time systems designers paid little attention to the "human element", to the fact that people are highly variable in their emotions, motivations, errors and successes [Preece *et al*: 55]. Ergonomics today is concerned with primary and secondary levels, of user impact from badly designed keyboards, office seating, poor posture, heating, ventilation, lighting. Primary levels might cover the "physical" impact of computing.

VDUs: health and safety issues come to the fore

In the Nineteen Eighties, ESB policy on VDU safety appeared to be driven to an extent by union pressure. Much of this came from the ESB Officers Association (ESBOA), a white-collar union representing the majority of administrative and clerical staff.

No doubt encouraged by Irish Congress of Trade Unions documents [sources: **ICTU Annual Report** 1984; ***Health and safety aspects of VDUs:*** **Guidelines for negotiators,** ICTU 1985] and by Department of Labour guidelines, the ESBOA initially shared some of the unions' traditional reservations about VDUs. (Doswell lists the criteria for ergonomic workstations published by the U.K. union, APEX, as do **Bruce Christie and M. Polly Kaiser** [1985: 50] .)

In the **ESBOA Annual Report 1988** we find mention of a proposed ESBOA health policy to be devised, covering, *inter alia*, health and safety aspects of new technology [: 15].

Details are given of the agreement reached with ESB regarding arrangements for **sight testing** for VDU operators, to be paid for by the company [: 16].

These arrangements were:

- that all staff who would be using VDUs regularly should have an sight test as soon as they took up such duties - staff already regularly using VDUs would qualify for the test immediately;
- the sight test would be carried out by qualified ophthalmic opticians and would include a *muscle balance* test (eye muscle balance had been put forward as a potential source of problems for VDU operators).

Ocular issues

The human eye and its relation to VDU operator discomfort has been a problematic field. Alleged risks of temporary, even permanent eye damage, due to VDU operation, has long been a source of debate. **Rosenthal** [1979] is one example: this ophthalmic optician felt a true case of ocular discomfort caused by VDU work was *rare* - or would be, provided that a properly-designed VDU was used in good working conditions. He stated that eyes are "probably" the most common single cause of **headaches**: such headaches would be *avoidable* by ensuring "the eyes work{ed} in comfort" [: 142]. Expert opinion remained divided throughout the Nineteen Eighties. Union negotiators had difficulty in proving that eye problems, in the form of "tics", dryness or burning sensations or conjunctivitis were of a lasting nature, or were derived from VDU use [**Craig**]. Even the U.K. Health and Safety Executive had seemed sceptical; however, it established guidelines covering the safe operation of VDU. The relevant Irish agencies have done likewise.

Research continues into the ocular effect of screen displays and into ways of combatting eye fatigue.

For example, **Rogowitz** [1992] relates how an understanding of the human vision system has helped modern designers of electronic displays. Balancing colour, luminance and flicker is important for the optimal use of displays.

Safety Notes No. 223 July 1994, produced by ESB's Distribution Department, mentions Japanese research indicating that computer workers blinked seven times a minute while looking at their VDU screens compared with ten blinks a minute when reading. Computer workers also kept "their eyes open wider", meaning "moisture evaporated more quickly". "Since blinking keeps eyes moist", "reducing" eye strain, the suggestion is that users of screens should *close their eyes periodically* (this would spread a tear film while resting the eyes) and *blink more often*.

The size of the VDU screen has some effect on its usability and "readability". Standard monitors, such as the 14-inch monitor, are becoming outmoded by modern computer applications [**Birkbeck**]: for maximum effect, the Windows GUI (see Glossary) benefits from a bigger screen. Yet monitors in the 14-inch to 15-inch range appear to be the norm throughout ESB; only a small number of larger screens were encountered during our study.

Computer technology itself may contribute to resolving some issues concerning displays. For instance, **Vutest** is a software product that purports to test the vision of VDU operators *as they sit at their own workstation*, to ensure compliance with Government screen equipment regulations [**The only way**......Personnel Management October 1993: 65]. The procedure takes a matter of minutes.

RSI and WRULD: acronyms for injury

Craig [1991: 50-53]; **Glenfield** 1995; **McAleese**; and other sources describe how there have been legal cases relating to Repetitive Strain Injury (RSI) and other work-related upper limb disorders (**WRULDs**). Incorrect usage has been cited in many of these cases as a cause of the WRULD. *Tenosynovitis*, a condition linked to VDU use, has also been the subject of litigation. *Tendinitis* and *carpal tunnel syndrome* are other conditions which allegedly can be induced or aggravated by keyboard operation.

The connection between what are known as *musculo-skeletal disorders* and operation of visual display units is a controversial one, disputed by certain authorities.

Stephanie Brown, a New York professor of piano (quoted in **Boyling** 1994), has offered advice on avoiding hand injury through keyboard use. The user should let the wrists float, and allow the elbows to hang free. S/he should not squeeze the mouse. A mouse is a small hand-operated device which the computer user moves across the desk: clicking buttons mounted on its surface activates icons or menus on the screen. As an alternative way of controlling the computer, it usually supplements, not replaces, the keyboard, which is still essential for text and number input.

Users ought to rest the hands when not keying; exercises and massage during rest breaks from the computer screen are also detailed by Brown.

Shanahan [1995] considers that WRULDs have become more prevalent in the research literature because of the growth of computer screens and keyboards. She warns that incorrect use of *the mouse* by novices can lead to fatigue in the muscles of the neck and shoulders, as well as persistent, chronic conditions.

An environmental factor: lighting

"....... *in many instances the lighting systems in the building are the same ones that existed before PCs entered the scene. It's simply been assumed that the lighting systems that served workers at typewriters and adding machines are appropriate for those working with computers.*"

[Karl Johnson, quoted in **Lamarre** 1995: 23]

We believe it is difficult to analyse ergonomic factors while excluding *environmental* factors. At times, the two sets of factors will inter-relate.

For instance, there can be hazards in adapting the working environment to the technology of work. **Moore [1993**: 20, 21] documents the effect light has on human biology and psychology - altering circadian rhythms, to give one example. In control rooms, such as in power stations, lighting levels have been lowered to "reduce glare and improve contrast on the increasing numbers and types of computer screens". **(Geldard** indicates how sensitive the human eye is to contrast.)

But a side effect of lowered lighting levels has surfaced: while these were adequate for *vision*, they may not be optimal for *worker alertness*.

An EPRI study quoted in Moore 1993 [: 21] suggests that while visual discrimination may be enhanced by low ambient lighting levels to provide adequate contrast to screens, there may be a substantial trade-off in maintaining optimal operator awareness. Against this, the study notes that "excessively bright lighting levels in the control room can lead to eye fatigue", and so reduce alertness.

Lamarre [1995] notes that eye strain and visual fatigue can be costly in terms of VDU operator error; additionally, lighting problems can lead to "headaches, weariness and other complications" [: 23].

Lamarre [1995] relates that "overillumination" of the office space is the most common problem. The consequent glare and reflection on screen gives rise to headaches and weariness.

Many organisations are replacing fluorescent tubes with "up lighting" (aimed towards the ceiling) to remove screen glare that can cause tiredness and eye strain [**Mansell-Lewis** 1994: 40].

U.S. research is ongoing into the theory that high levels of illumination can enhance worker performance, by stimulating the human circadian rhythm [Moore 1993].

It is to be hoped that conflicting requirements posed by lighting could be resolved someday.

Another environmental factor: air conditioning

Lawson [1994] tells of expert opinion in the air-conditioning field, to the effect that U.K. building designers may have over-estimated the heat produced by modern electronic office equipment - PCs, laser printers, photocopiers to name three. Apart from over-indulgent specifications by building designers, part of the problem lies in the varying levels of use made of office machines. A survey of seventy-four U.K. companies revealed that ten per cent of managers "never touched" a PC; forty-five per cent were only "intermittent users". Typists, on the other hand. were "100 per cent users". Forty per cent of draughtsmen were regular PC users compared with seventy-eight per cent of accountants. So heat output is not what designers anticipated. Equipment contributes only ten per cent to overall office heat.

Good air quality and air circulation are necessary for alertness among office workers, who tend to be sedentary. Hence ventilation is an aspect that might repay further study.

Electromagnetic risks

During the Nineteen Eighties a stage was reached where concern over the alleged risks from electromagnetic fields (a species of radiated energy) emanating from VDUs induced a flurry of research [**Grandjean** and others]. At the time, ESB agreed that any pregnant woman regularly using VDUs who was concerned about the possible effects could transfer to other duties provide suitable alternative work was available in the location [ESBOA Annual Report 1988: 16].

While a recent report indicates that VDU radiation is not harmful to health, research on this subject is continuing.

Manufacturers of modern VDUs claim that their equipment conforms to "low emission" standards. So long as their assurances appear valid, the issue of "radiation from monitors" is likely to remain in abeyance.

Protecting users of technology through official intervention

Kossen [1994] relates anecdotally the stressful side of working for an organisation. Working for the goals of the company, to the complete detriment of one's own health or happiness, is no longer a supportable tenet. **Karasek and Theorell** desire healthy workplaces because these are more likely to be productive ones also.

The issue of workplace health is holistic, say **Raymond and Cunliffe** [1995], meaning that businesses ought to consider their workers in a wider context. Unfortunately, they contend, a trend towards **enabling** workers (allowing these employees to decide how work is done) creates a risk that the work will be accomplished in ways that *strain the body*. The writers cite upper limb disorder (WRULD), cumulative trauma disorders and RSI.

Physical strain can be lessened:

- by *redesigning the job*, to allow a variety of activities;
- by *redesigning the workstation* - some workers will in future be *measured* for their workstations, with the details stored on a smart card which will adjust their chairs to the correct height for them;
- by encouraging employees *to take responsibility* for what is happening to them.

ESB is one of those Irish organisations which incorporates employee development within their corporate personnel management strategy, aimed at facilitating business goals [Gunnigle and Flood: 155]. We would expect ESB's participatory structure to protect I T users from technology's potentially harmful effects.

Governments have created legislation to protect workers from, and instruct them on, the risks of RSI, visual fatigue and stress [**Guidance on new display screen equipment regulations launched,** *Management Services* January 1993; ***Chief Executive's Safety Committee Staff Summary Report for 1992***].

Stocker refers to the EEC Directive covering safety and health aspects of computers (issued in draft form in March 1988 and which has since come into force in the member states). Craig [1991: 145-150] also cites this Directive, which finally seemed to address criticisms levelled against VDUs.

The EC directive on work with display screen equipment requires that jobs be designed to allow for periodic breaks or changes of activity to reduce the workload at the computer display screen.

In essence, the European guidelines as implemented by governments cover human-related aspects, some of which are set below.

Safer operation of VDUs becomes a requirement.

There is an emphasis on the provision of more ergonomically correct *workstations*, *seating* and *desks*: their design and their conformance to the design parameters; and the laying out of design parameters for keyboards and computer terminals.

Lighting and glare are considered.

The onus is placed on employers to evaluate **risks** relating to *physical problems*, *eyesight* and *mental stress*, for example.

Even the *psycho-social* factors of software programming are addressed: **no** clandestine individual checks on employee actions ("tell-tale" software) may be built into the programs [Craig 1991: 150].

Assessment of VDUs

The U.K. government's Health and Safety (Display Screen Equipment) Regulations 1992 enable employees to insist on a proper assessment of VDU equipment. In Ireland, the Display Screen Regulations Act 1992 has been in force since 1 January 1993.

In the recent past, ESB has surveyed staff to check that their workstations conform to established ergonomic guidelines. If the ergonomic issues are to be seriously addressed, a concerted and on-going management programme is called for within the company, to ensure that I T users remain in conformance with regulations.

ESB users who acquire new computer equipment do not necessarily check that their use of it conforms to regulations. When this researcher began to use a computer screen, no formal, official intervention was made by another person to prevent the technology causing him harm. It appears that individual staff members are expected to utilise information (which ***is*** widely-available) to *educate* and *protect* **themselves**. This is empowering, in a sense, but relies on the individual's motivation. Since motivation varies, individual action taken to reduce risks from VDUs may also vary throughout ESB.

Tackling ergonomic and environmental problems: a case study

Mansell-Lewis [October 1994: 40] outlines how Colin Conboy, who was responsible for health and safety in Buckinghamshire County Council's education department, decided to tackle complaints concerning screen glare. Finding this was *only one of a number of complaints* by office employees, he contacted a specialist firm to conduct an assessment of all display screen equipment. Conboy believes the I T department, architects and building maintenance responsible for a workplace should co-operate to provide a harmonious, productive and comfortable environment for computer users.

As happens in ESB, workstations in the Council's offices typify the problems of introducing technology into building environments that predate computing. Cabling and office space problems had to be sorted out. Staff had tried to rearrange their desks to overcome the unsuitability of office lighting - even turning off lights, with consequent risks in winter darkness.

The article suggests measures and options for better environmental conditions.

Plants may be introduced to raise the humidity and so cut down on dust. The combination of computer equipment and inadequate air supply leads many people "to sit at the bottom of a *dust well*" - this can be "annoying" to the majority, but can cause *skin conditions* to develop among a minority.

There should be an awareness of tripping hazards presented by trailing cables.

The ozone filter in a laser printer needs to be regularly replaced - as required by law on health grounds.

The computer screen ought to be placed in the middle of the desk and be raised to a level at which users do not have to bend their necks - because head movement is important for VDU users. The screen should be *directly in front* of the user, *not to one side*, and should be *directly in line with eye level* rather than *below*. (Curiously, some previous guidelines encountered during our study have recommended that the user look *downwards upon the screen at an angle*, **not** directly ahead.)

A wrist support helps ensure the "neutral" position of the wrist while typing and resting, while providing footrests may prevent thigh strain and cramp.

The height of a *copy holder* (a form of lectern to hold documents from which data is being inputted) should be directly in line with eye level. It is noteworthy that within ESB copy holders appear to be mainly used by staff whose work involves regular typing. Other workers do not seem to be aware of the advantages of these desk-mounted aids.

The article accepts that, while an EU directive states that workers should have *separate* space for *normal* work and for *screen* work, in the real world this is not practical. (Many of the Council's I T users had sought separate desks for clerical and computer-based work.)

Human factors versus human actors

Possibly we have become too focused on the technological aspects of the workplace. Bannon (cited in Preece *et al*: 69) proposes a shift from analysing human **factors**, a term which, in viewing people as part of the "human-machine system", emphasises a "passive, depersonalized" person. Rather the emphasis should be on people as "human **actors**". This latter view concentrates on the person as an "autonomous agent" who can control her/his behaviour, acting in a *real work setting*.

This is pertinent in the context of Bjørn-Andersen's *psychological* category.

Psychological aspects

Three aspects surface in Bjørn-Andersen's model.

A sense of "self-achievement" is extremely important to any worker (Bjørn-Andersen: 133). To satisfy this requirement, jobs should hold some *challenge*, but not exceed the capabilities of the job-holder. Computer-based jobs could be boring or routine, instilling "a sense of under-achievement", or increasing *stress*.

Secondly, computer-based work can reduce social contact between colleagues. He cites how WP operators have ended up in separate rooms due to noise from the printers. ESB's WP Unit was similarly "exiled" soon after it was established in the Nineteen Eighties (an incident that will be detailed later).

Also, employees with highly-specialised jobs may have little reason to communicate with colleagues.

Thirdly, modern workers experience feelings of alienation, indicates Bjørn-Andersen. The arcane nature of computers and the boring jobs they herald at times serve to alienate workers yet further [: 134].

Alienation is a form of separation, of isolation. It arises when the worker feels "alienated from "his/her own feelings" or from other people, writes Argyris [1964], who cites Max Weber and Erich Fromm as hypothesising that feeling *powerless* and *helpless* may contribute to feelings of alienation. He notes that Friedman related alienation to a *depersonalisation* of work, so that the worker believed herself/himself to be an "interchangeable unit" in the eyes of management [Argyris 1964: 65].

Consequences of minimal social contact and a high degree of alienation are *less job satisfaction* and *lowered organisational effectiveness* [Bjørn-Andersen: 134].

Bjørn-Andersen (writing in ***Management use of new office technology*** **1984**: 117), claimed that many *managers* had been "alienated" by new office technology. They felt they were being monitored by senior management, unable to control "how" their job was changing. They no longer seemed able to express their self-identity as part of the community of work.

Shoshana Zuboff [1982] discovered that the "sensuous contact" with "paper and pencil" which the office worker had previously experienced had been replaced by feedback through symbols on a screen, generated by the system. The object of the office task had "disappeared behind the screen". We may wonder if this distancing is akin to the phenomenon of alienation; yet we also suggest that the general tendency of *traditional* office work has been to *abstract* human actions, in the form of symbols on paper.

The quality of working life

Keating [1982: 12-13] accepts that work fulfils a wider role than merely as a source of income. Work affects a person's sense of self-esteem and identity. She proposes [: 22] that in exchange for giving up their time, effort and commitment to work, workers are entitled to more than money and safe working conditions. They should be allowed an **improved quality of working life**, which will yield spin-off benefits in the shape of higher productivity and satisfaction.

A few years ago, news was circulated within ESB of an imminent "*Quality of Working Life*" initiative. Also known as *Quality of Work Life* or *QWL*, such initiatives seek to improve the quality of life experienced by people while they are *at work*. ESB's Quality of Working Life Advisory Committee sought to increase staff involvement through trust, empowerment, participation, and information sharing [**Foley and Scott** 1993: 3].

QWL initiatives can involve greater influence and involvement by employees in designing workplaces and jobs [Gunnigle and Flood: 109-110].

O'Kelly [1990] writes of the trade unions' quest for participation in decisions that relate to new technology: work methods and job design are examples of areas which early consultation can address. He looks forward to more enlightened and participative styles of management and trade union representation in future.

Involvement, in the ESB context, forms part of the corporate culture: it usually travels under the banner of "participation".

Participative structures below ESB board level include *Participation Councils*. This company-wide system of Councils meets to discuss diverse issues ranging from office accommodation to the establishment of non-smoking areas. These Councils have never metamorphosed into the "*quality circles*" prevalent in manufacturing industry especially, which consist of groups of employees and managers who meet to promote enhanced quality and organisation (described by **Robson** [1984]; Gunnigle and Flood).

A changing workplace

Transformation in work processes has been documented by **Clutterbuck** [*New patterns of work*, **1985**]; **Handy** [*The future of work*, **1985a**; *The empty raincoat*, **1994**]; and other thinkers.

About a decade ago, Clutterbuck [1985: 4-5] was writing of increasing flexibility being sought by firms; of the "delayering" of organisations; of how technology could do most of the information processing formerly the responsibility of middle management; and of a concomitant shrinking in the number of middle managers. Leaving aside the question of whether I T can replace middle management's information processing role, the reduction in the number of layers, indeed number of executive employees within organisations seems firmly entrenched in corporate strategy.

A recent **David Smith** article [1995] covered a number of issues ranging from the impact of increasing redundancy on white-collar workers to the guilt and anxiety felt by employees who survive cutting back (the "survivor syndrome"). Even organisations noted for providing jobs for life such as IBM and the UK Civil Service are shedding jobs. Smith cites Handy's *The empty raincoat* [1994], as does **Arthur** [1994].

In his book, Handy has provided a formula for management: employ *half* the workforce previously employed, but pay them *twice* as much: they will be *three* times more productive. As an equation it becomes $1/2\ X\ 2\ X\ 3 = P$. Robin Linnecar, quoted in Smith [1995] says that the trend towards job shedding will *not* be sustainable: otherwise, organisations will find that reducing headcount and working the remaining workforce harder will not be efficient. There will be a backlash from workers refusing to do certain things. *Self-employment* is another option: this exchanges the "job-for-life" with "the job-that-gives-you-life".

One example of an experiment in workplace change is that carried out by the computer company Digital Equipment Corporation, at their Stockholm facility. The experiment was based on the company's belief that there are three dimensions to the working environment: the physical dimension; the tools; and the people [**Crabbe** 1993]. The hope was that the people at the facility could help integrate these three facets better, in an "office of the future" wherein management style, technology and the physical environment would work as one. However, attitude surveys carried out after a number of years indicated that employees felt even more discontented than before the experiment began.

The I T industry itself has attempted to predict the future in order to survive.
Kate Ehrlich of Lotus, a major I T firm, feels that within a decade people will be "less tethered" to a workplace or to a device [Arthur]. She cites the company's software product Lotus 1-2-3, a combined spreadsheet, graphic and database package used in many companies including ESB. This product was adequate for the Nineteen Eighties: but today's users seek more, including connectivity with other people's computers. Ehrlich sees employees' allegiance to their firm becoming more temporary. Workers are less willing to travel to work: mobile workers are resurgent. Computers link geographically-dispersed workers, without regard to company opening hours. E-mail allows messages to be sent at any time, and read at any time. **Mantovani** too repeats Ehrlich's theme: he demonstrates that E-mail is one of a class of communicating activities that are *time-independent*.

Knowledge work and knowledge workers

I T is intimately tied to another phenomenon: the rise in importance of *knowledge work*. Much of the work of an organisation is knowledge work [**Laudon and Laudon**; **Drucker 1992**; **1993**]. Perhaps inevitably, the term "knowledge worker" has been applied to those who perform this style of work.

Mason [1980: 148] was of the opinion that some "knowledge roles" in the office, such as that of the secretary, *could not be automated*. He distinguishes between the knowledge called *expertise* - it might be typing - and *general knowledge* of, say, an organisation. A secretary is at a *nexus* through which information flows; she/he processes general knowledge about the business which others lack. Such a role is "difficult to replace by means of technology".

Reading a work manual, such as that of **Secretan** [*How to be an effective secretary* 1972], it becomes worthwhile to separate the intellectual expertise needed to do a job from the trappings of the job. Secretan advise the efficient secretary to write down everything in case anything is forgotten; to keep all "related papers" (that is, documents pertaining to the same set of activities) together in a folder [: 28]; to file everything methodically [: 29]; to break down the job into "steps" in a "logical sequence"; and to use a diary to note all important appointments.

This framework of advice can be extended to encompass most other kinds of clerical activity: similar advice is found in **Teeling and Lynch** [1985] and **Watcham** [1973].

Stibic [1982] outlines the "tools of the mind" which are needed by those doing more cerebral work.

Our point is that many of the essential office activities have remained unchanged, whether as office routine or as high-minded strategic planning. Human mental skill is still called upon to perform the tasks. The tools that can be used to regulate those tasks have altered.

Today's secretary (or indeed, other users of office automation software):

- can note information within a database or retrieve it with the aid of a document management system;
- can group her/his electronic documents in electronic folders within the system;
- can use personal organisers or diary and scheduling software to keep track of events and appointments.

Knowledge workers tend to be high users of technology; issues of I T will interest them deeply. These workers have a particular approach to work, as explored by Drucker [**1973**; **1991**; 1993].

Drucker mentions the need to concentrate when doing work [1993: 81]. Knowledge workers should ask themselves if this particular work is necessary to their main task. If the answer is "no", then it is a chore, not work; it should be dropped, or engineered into a job of its own.

He lists some prerequisites for productivity in knowledge work.

These include defining performance; determining the appropriate work flow; setting up the right team; and concentration on work and achievement. Continuous learning must be built into the job and into the organisation in order for workers to be productive in knowledge work [1993: 82-83].

Then the team need to be re-engineered to make work flow; this will involve removing the middle layers of management, according to Drucker. The concept of rank will disappear to be replace by that of assignment; the person is just doing the job for the present [1993: 84].

It is accepted that extricating knowledge workers' attitudes towards I T *from* their reactions to organisational change may not always be possible.

Professional and specialist staff

Today's knowledge-centred organisation sets great store by the skillbase which its professional and specialist staff have painstakingly acquired.

For the purposes of the present study, these classes of individuals were seen as including safety professionals; training and other personnel specialists; and chemists, to name a few.

Sveiby and Lloyd say it is hard to find and to keep good "professional" staff [: 60].

These specialist staff are difficult to integrate into the organisation: their personal style of work may make them unwilling to accept new rules. Yet any organisation which is based on exploiting its "know-how" - and ESB is no exception - must learn to accommodate the needs of professional staff, not to mention the "gifted mavericks" [: 61] that are occasionally encountered in corporate life.

Sometimes professionals work in what Sveiby and Lloyd label "pro-teams", groups of workers who have different working conditions and language to the rest of the company [: 179]. They give the example of a research division or corporate finance team. We could suggest that the software designers found in ESB's I T function (I T Services) also fill this mould - their patterns of working, the complex abstractions of their material are alien to other employees of the company. I T professionals, such as programmers, who responded to our questionnaire were listed as Professional / Specialist in the survey results.

It is tempting to speculate that some of the difficulties users experience with software originate in the isolation of the software designers; end users may have a vested interest in becoming involved in software design.

Managerial work

One of the bugbears of artificial intelligence and expert systems, that attempt to replicate human expert knowledge, is summed up thus: much of that knowledge is intuitive, internalised within the person, so is not readily quantifiable. Work as performed by managers reveals this trait.

In "*The nature of managerial work*", **Mintzberg** [1973] speaks of the difficulty "management scientists" had in analysing managerial work which depended on the manager's "undocumented knowledge". Mintzberg's book describes his own findings, which deserve mention.

Managers seemed averse to leaving their offices unless there was a specific reason to do so. They were not prone to taking informal tours of the workplace. In relation to Mintzberg's finding, mention may be made of a modern term, **MBWA - Management by Walking About** (or Around) which describes a more recent hands-on approach to management. Whether practised by Feargal Quinn or by line managers in ESB, its intent is to see what is happening on the ground. Management information systems are superior to the slow correspondence practised by the Italian merchants: their speed and "reach" mean they can *supplement* direct contact with employee and customer, but they cannot *replace* this.

Managers demonstrated a strong preference for "verbal media of communication" [Mintzberg: 44].

They seemed to *dislike mail*, or to use this primarily for formal and for lengthy correspondence. They used *informal* means of communications: telephone calls, informal (unscheduled) meeting are examples. Managers *did* use the instrument of *formal meetings* when required.

The manager did not leave a telephone conversation or a meeting in order to "get back to work" - these contacts "are the manager's work", according to Mintzberg's model.

Mintzberg sees *ten* roles for managers, among which are: *leader* - of subordinates; *liaison*; a *monitor* of information and a "*discriminator*" of this information (presumably Mintzberg means sifting it and such like).

A manager "acts in a 'programmed' way", something "like a computer" [: 141-143], scanning for new information, assessing its importance. Mintzberg feels some of the manager's work could be programmed, "automated" to be done by a subordinate (analyst) or a "man-machine system", "a computer". We should recall this was written in the Nineteen Seventies.

One potential modern parallel to Mintzberg's suggestion is the current development of *intelligent agents*. These software programs can scan large databases of information on behalf of their "master" - the user - once they have been programmed with keywords for which to search. On another level, *knowledge-based systems* (to be described later) may some day mimic or recreate some of the analytical abilities attributed to managers.

One example of a modern working format: teamwork

Within organisations, teams are becoming a preferred mode of working [Drucker 1992; **Scott and Jaffe**; and others]. **Walley [1993a]** feels teams will become a core aspect of organisations, ranging from project-based teams to alliances between organisations.

To **Hill** [1993], cross-functional teams (whose membership derives from various corporate functions) assist the business re-engineering process within electric utilities.

Willier [1995] mentions the possibility that employees may form stronger bonds with *their peers* whom they work with as part of inter-departmental teams, rather than with their bosses or subordinates.

Drucker [1992; 1993: 77-81] identifies the simple type of team, which has its members in fixed positions like a baseball team. Sport teams do not vary their format, *but organisational teams need to*, particularly if there is a change in the flow of information. Team approaches now vary depending on say how information is reaching the factory floor, for example.

Benefits claimed for teamwork are several.

Team work is put forward as a work architecture that increases commitment and unity of purpose.

One of our true motivators is the need for acceptance. Furthermore, we perceive ourselves primarily in relation to others [**Brown and Brown**]. So it is appropriate to place greater emphasis on the power of teams.

The buzz in working as part of a motivated team seems to compensate for long hours spent working away from one's family [**Kanter 1989b**].

Teams have a team leader and enjoy varying levels of autonomy.

ESB's I T Services function has embraced the team concept more fervently than some other corporate units of the company. The description "team leader" replaces that of "supervisor". The creation of team-based work would seem to help empower I T Services staff who are engaged on software project work: there appears to be more discretion granted to the team members.

A survey quoted in Brown and Brown shows that strong line teams satisfy customer demand better; increase productivity; and improve quality - these goals are key factors in business re-engineering (a change-focused strategy popular in many businesses today).

Teams present other advantages: the sheer number of team members means that defects or problems are spotted; and a team can act in ways that an individual person would not dare contemplate.

Problems can arise with teams, including:

- ignoring incompatibility, such as having two "thruster-organisers" on a team;
- talking too much, too long;
- allowing an inferior mix of roles on the team - actors need specific parts to play and all parts should be played;
- falling into the trap of "group think" - wherein similar yet possibly incorrect conclusions are reached and decisions made.

The *Economist* cites a study which found that seven out of ten teams failed to produce the desired results [**"The trouble with teams"**]. One error lies in creating teams instead of taking more radical decisions. Volvo's much-lauded self-governing team approach in Sweden aimed to make work more interesting - and it did. But the increased cost forced Volvo to close the experimental plant in favour of traditional assembly line production.

Other mistakes in teamworking are identified. Failing to set clear objectives is one.

Introducing teams without changing **appraisal** and **reward** systems from an existing *individual* basis to a *collective* basis is another. As a result, employees could be expected to work together, yet to compete for individual rewards.

Further issues may arise. Since it appears the best teams are composed of people with wide-ranging skills, who can perform each other's duties, workers can be trained to do their colleagues' jobs: but such "cross-training" can be lengthy and costly.

Existing *power distribution* in the organisation is affected. Middle management feels threatened; workers, too, can be suspicious. Instead of feeling empowered, workers can submit to peer pressure and drive themselves too hard.

Employee relations and human resources issues

At present, structural changes underway in ESB appear to have lessened the likelihood of an adversarial union-management relationship. Historically, the public perception of such a relationship dates back to the upheavals of the late Nineteen Sixties.

In contrast to that era, **Lorcan Canning** [1981], ESB's one-time industrial relations manager, writes of the company's crusading spirit in the early Nineteen Seventies vis-à-vis industrial relations. The new spirit of employee-management co-operation was jeopardised by the oil crisis later in the decade. That hiatus overcome, 1980 saw the publication of *Personnel Policy in the ESB*, a document building "on the experience of the seventies" [Canning: 108].

Within this document, the corporate personnel objective was redefined:

"*To develop an effective workforce who are committed to high standards of service and who, reciprocally, have progressive working conditions, opportunities for personal development and equitable rewards.*"

Approaches to industrial relations

As Irish business practice modernised itself, the infiltration of information technologies from the Nineteen Seventies onwards was one of a host of issues facing company personnel managers and trade unions. I T was generally regarded as an industrial relations (I.R.) issue.

Turner, Morley and Gunnigle [1994] predict "an incremental modification" to the adversarial model of Irish industrial relations. But they do not consider that Ireland is moving to a new paradigm of employer-employee relations based solely on **human resources management** (HRM) practices.

Looking at the UK experience of International Computers Ltd (ICL), **Sparrow** [1991] spoke of the firm being driven during the Nineteen Eighties by an employee relations approach. Now ICL emphasises a human resources management approach in the workplace.

During the Nineteen Eighties, ESB changed the title of its in-house *Industrial Relations* function to that of *Employee Relations*, symbolic of a shift from a traditional I.R. role to one based on the employee relations approach.

In the mid-Nineteen Eighties, ESB management followed a similar path to that of ICL, in viewing the introduction of new technology as being an industrial relations issue. They were buttressed in this view because ESB's unions adopted a similar stance. Suspicion, not co-operation, symbolised the atmosphere of the day. Of course, such suspicion was evident in other industries undergoing technological change: the printing industry was a prominent example. In the course of time, within ESB, agreements were signed and accommodation was gradually reached with unions. Conditions for using VDUs were thrashed out: in the late Nineteen Eighties, a rest break of five minutes in each hour of working at a VDU and the installation of dimmable lighting were concessions made to staff in ESB's Fleet Street, Dublin offices.

Now the dominance of the "human resources management" (HRM) theme is influencing affairs: a human resources function operates within each of the company's Business Units.

An interesting sidelight is that ESB's I T function (I T Services) appears to have been the first of the company's units to appoint a "Human Resources Manager"

Ongoing change

The Nineteen Nineties have seen moves within ESB towards critical self-examination.

An internal ESB document, ***Connecting with the future*** [1990], identified, *inter alia*, a need to realise the full potential of staff.

A two-pronged assault on organisational problems followed. Teams of management consultants conducted wide-ranging studies. For example, McKinsey and Company produced a 1992 report ***Reshaping ESB to meet the challenges of the 1990s***.

This Report on ESB structure reflects an era based on organisational "downsizing" and "effectiveness".

A Review of Relationships within ESB also got under way, conducted by a steering committee colloquially known as the "the Cassells Committee".

The ***Final Report of the Joint Steering Committee on the Review of Relationships within ESB*** [1993] declared that even at the most basic level, each individual should be more involved in deciding how his/her job should be undertaken [: 30]. This Report (which had been presaged by an earlier ***First Report***) recommended a "free and open flow of information throughout the company" [: 33], using "modem media" where feasible [: 35]. (E-mail seems an obvious tool for enhancing this flow of information.)
In a point reminiscent of **Foy** [1994], the Report implied that even traditional **noticeboards,** if properly updated, would help in the communication process.

Corporate policy in the Nineteen Nineties strives to remodel ESB as more competitive, internally and externally. The ESB organisation which the Fletcher report of 1972 described as overstaffed [Manning and McDowell :238], continues to witness falling staff levels.
This process is perhaps aided by information technology changes: the handful of data processing staff remaining in I T Services (I T S) can be contrasted with a heyday in the Nineteen Seventies and Nineteen Eighties when larger numbers - upwards of 50 personnel for key punching alone - were formerly employed.

Consultants, management, unions and Government have not solely concentrated on employment levels in their joint effort to restructure ESB's business. They seem to be concerned with a new culture and ethos in human relations at the company. Following the strike in 1991, the Reports from the Cassells Committee reviewing relationships within ESB implied that a more "people-centred" approach was necessary. From that time on, a co-operative ethos in management-employee relations has been fostered. Trade unionists are aware of how businesses are changing: unlike the opposition to change evoked in 1984, today there is a wish to be *involved* in the change process. It is conceivable that greater involvement may lead to greater empowerment, deeper enrichment on the employee side of the relationship.

CHAPTER 3

EMPOWERMENT AND ENRICHMENT IN THE WORKPLACE

EMPOWERMENT
AND
ENRICHMENT
IN THE WORKPLACE

Empowerment and enrichment programmes can be compared with other initiatives that have sought to uplift the human dimension in business.

Before the twentieth century scientifically-planned change in the workplace was lacking. Now such initiatives have become popular.

Scientific management and MBO (Management by Objectives) adopted a stance based on improving the management of organisations. In the Nineteen Seventies, MBO was endorsed and studied by ESB managers as a viable approach to running their workplaces.

On the specifically-human resources front we have seen job enrichment and Quality of Working Life (QWL) put forward as strategies. More recently, TQM (Total Quality Management) and BPR (Business Process Re-engineering) became contenders for the title of workplace panacea. Yet amidst the acronyms do lie some very worthy concepts.

Power, control and autonomy

Power mist: The tendency of hierarchies in office environments to be diffuse and preclude crisp articulation.

[**Douglas Coupland** "Generation X: tales for an accelerated culture"]

Harrison [1992: 116-117] contends that an understanding of the basis of power is essential when trying to promote the development of people in an organisation.

It is possible to be eclectic about some of the classifications of power attempted by Harrison (who draws on the writings of **Handy 1985c** and Pfeffer 1981).

Resource power describes a condition wherein the individual controls a resource deemed valuable by those persons whom the individual seeks to influence.

Position power derives from an individual's role, say, within an organisation.

Expert power stems from the expertise an individual holds - we might say that this is particularly relevant in the rarefied atmosphere of information technology.

Personal power emanates from an individual's character and personality.

Negative power is signified by a withholding of effort and commitment by the individual.

Naturally, classifications tend not to be exhaustive, merely illustrative.

A definition of power supplied by Flippo [: 70] is "*the capacity to apply any force that results in behavior that would not have occurred if that force had not been present.*"

One expression of power is through **influence**. Being unable to instruct someone to do something is no handicap if they can be influenced to act in ways that are beneficial. **Cohen and Bradford** [1991] in their work *Influence without Authority* describe how influencing others is a form of management.

They suggest that employees at all levels should be able to use their initiative and to influence their bosses [: 7]. Managers and employees need to forge alliances with each other, and with their peers, based on mutual gain. The demands of organisational change mean influence and power can no longer reside in the hands of top management.

Clearly, power shifts of power and influence in the workplace are of real concern.

Stewart and Cantor [: 17] agree with Kanter [1977] in viewing **power** as the ability to get things done, to move resources in the direction of accomplishing some objectives.

They define occupational control as a process whereby the group or role is able to determine what others will do in the workplace, and sometimes outside it.

Occupational autonomy could be defined as whatever discretion is held by occupational groups and roles *after* other sources of control have operated.

To Stewart and Cantor, occupations and work are *not* static, instead they change as material conditions, government policy and the *consciousness* of workers change.

Citing surveys, they find American workers want meaningful work and independent working conditions. Young workers expect work to supply self-fulfilment and meaning through work: they are concerned about their autonomy and control over their own work [: 270].

Reasons for the rise of empowerment

Vogt and Murrell [1990] feel the Second World War set the stage for a re-examination of the "uniqueness" of the person. Psychologists - Karen Horney, Abraham Maslow, Erich Fromm, Kurt Lewin are nominated, among others - initiated *a focus on the self.* Clinical and social psychologists were supplanted by educational and organisational psychologists. New understandings of industrial psychology were applied to organisational settings. The Nineteen Fifties and Nineteen Sixties saw a focus on motivation, notably in **McGregor's** *The Human Side of Enterprise* (1960): his celebrated Theory X and Theory Y are still regularly cited.

A growing emphasis on human potential in the Nineteen Sixties and Nineteen Seventies was increased by an "explosion" [Vogt and Murrell] in technology together with innovations in management. People questioned organisational structures; they realised that working together could be more fulfilling. Even society's "confusion over which goals it should pursue" or people's feelings of alienation were an opportunity for "empowerment".

To Vogt and Murrell, empowerment depends on an understanding of purposes and methods. Individuals *and* organisations are *powerful* when they know what they want; *powerless* when they do not.

Brown and Brown [1994] assert that manufacturing and service industries which do not adopt a certain approach to empowerment will cease to be competitive in the changing economic environment. They propose *two strands* to empowering.

The first strand is to enable each individual to reach her/his potential.

A second strand consists of liberating the way organisations operate. This second strand liberates individuals and teams of individuals to take their own decisions.

Kanter [1977: 266], in examining U.S. corporations, says that both feminists and men stuck in dead-end corporate jobs have a stake in seeing organisations change, so as to open up channels of opportunity and to decentralise power.

Hierarchical systems of organisation fragment and divide groups. Inter-group competition should be replaced by looking at how systems of work are organised. Kanter adds that *improving "quality of work life"* and considering the *human consequences* of organisational arrangements are as valid as economic indicators in measuring a system's effectiveness.

She refers to Yankelovich's *Zeitgeist* of today, in which people want more challenge, meaning and self-expression in their jobs [: 265-6].

Being blocked from achieving these three goals affects an employee's performance. Worse, Kanter supposes the blocking of opportunity; powerlessness and tokenism (of equality) create undesirable attitudes such as a lack of aspiration. Companies need to take an interest in *effective behaviour* by their personnel.

Views on empowerment

Writers on the topic of empowerment such as Brown and Brown [1994]; **Clutterbuck and Kernaghan** [1994], as well as Scott and Jaffe [1991], give helpful guidelines on empowerment.

According to Brown and Brown, empowerment is a shift in philosophy which questions all older relationships and assumptions.

Empowerment affects work itself, the way work is done; empowerment impacts on relationships, the way people relate to one another. Empowerment has **supplementary issues** linked to it. One of these issues is that of *leadership*: now everyone is a leader at some time or other - yet simultaneously, "traditional" leaders do not always exercise that leadership role.

Another issue is challenge: people face new challenges in their workplaces.

Empowerment impacts on people differently.

For their part, employees experience what Brown and Brown refer to as *stretch*.

Meanwhile, managers' styles of managing may change. Managers' vision of their own future and of their employees aspirations may be focused differently than before.

Summing up, Brown and Brown ask their readers to *analyse themselves* in the context of empowerment [: 197] .

In another vision of empowerment, advanced by Scott and Jaffe, more staff in the business are allowed to emulate their more successful counterparts (their colleagues) - in a sense increasing the number of successful people.

These two writers describe empowerment as a fundamentally different way of working together.

It allows employees to feel responsible for the organisation doing a better job. It allows teams to improve performance for better productivity. Empowerment also permits the organisation to be structured so as to allow people to achieve the results they want; to do what needs to be done; and to be rewarded for it.

Clutterbuck and Kernaghan [1994] recount the theories of Bowen and Lawler, who contend that empowerment means sharing information about the company's performance; sharing rewards based on company performance; sharing knowledge that enables employees to contribute to organisational performance; and sharing power to make decisions [: 16].

Bowen and Lawler list three formats for empowerment.

Suggestion involvement is the most basic approach, in which employees contribute ideas through suggestion schemes and quality circles. Their work activities and power to implement change are not radically altered.

Following the format of *job involvement*, jobs are redesigned; more freedom in choosing work methods is evident; and feedback is given to employees.

"*High involvement*" is a yet more advanced format. This format means involving employees fully in decisions that affect the company's performance; providing complete corporate information across all organisational levels; and developing employees' abilities in teamworking and problem solving. *Semco* of Brazil is taken as an exemplar of this format.

Several notes of caution are sounded by Clutterbuck and Kernaghan.

The empowerment label can be placed on successful changes in organisations *after* the changes. This strategy was found to be more successful, than was the case in those organisations which *explicitly* set out to empower: in the latter cases, misunderstanding and frustration were caused by faulty empowerment [Clutterbuck and Kernaghan: 147].

Initially, empowerment will disempower people in the short-term. To Clutterbuck and Kernaghan, the concept is linked to other concepts: restructuring, downsizing, and business process re-engineering. Existing senior management can end up feeling marginalised.

(We would comment that middle managers, too, can feel excluded from the empowerment process, unless they are properly involved.)

You cannot empower someone else, you can only encourage them to accept power [Clutterbuck and Kernaghan].

Skilling employees for the process of empowerment involves training in negotiation, problem solving, team working and influencing.

Within the ESB context, training structures can enable employees to empower themselves by updating their skills and utilising these newly-acquired skills.

Writers who discuss empowerment feel that successful change management necessitates educating employees and managers about their new roles.

Further viewpoints

Empowerment is at odds with the Taylorist view which holds that every step of a job can be specified ["*Empowerment*", BBC 2 TV]. Taylorism was alleged to turn people into "robots". By the Nineteen Seventies, as we have seen, the Swedish car manufacturer Volvo had replaced the assembly line by teams of assembly workers, in a move away from the Taylorist model.

In the Nineteen Eighties the "empowering" of workers became a management buzzword.

Those interviewed on the TV programme expressed a variety of feelings. John Ridley, an assistant manager at a *McDonald's* restaurant felt empowerment meant passing down responsibility to lower levels, though this was backed up by management training and motivation. *"I'm telling all the crew today, when I ask them how they feel, I want them all to say 'outstanding'* ", he said.

Roger Owen, a *Landrover* employee, said he preferred the word "involvement" to "empowerment ".

Collins, the dictionary publishers, practice empowerment in their business; but a Collins employee said that despite raking through dictionaries they had been unable to find *another word* that describes empowerment. This perhaps indicates the fuzziness that surrounds some buzzwords.

Bob Cannell, Personnel Director of a natural food wholesalers co-operative, took a strongly hostile line. He felt that empowerment is seen by "*most people*" as a "*capitalist ploy*", as "*camouflage to hide their hierarchical domination*", to "*hoodwink workers into believing they have a say in how the company is run*".

Liberation

It would be incorrect for senior managers to view empowerment as simply a means of achieving corporate goals, without considering its impact on employees.

"Empowerment, a leap of faith?" [*Management Training* August 1993] cites one reason companies might favour empowerment: it promises the liberation of the workforce from the shackles of over-controlling management.

Furthermore, a leap of faith is required from managers in endorsing empowerment: they must *drive* decision-making; information; control over work conditions; and other job-related procedures *further down* the company ladder.

Managers cannot empower their staff: they can merely facilitate the process of empowering.

Significantly, it is asserted that empowerment is "here to stay".

John Bond, an IBM manager, indicates in "Empowerment, a leap of faith?" that managers of the "new corporation" cannot rely on exploiting hierarchical control. Rather they need to tap into good ideas; discover which people they need to collaborate with - then combine these two factors [: 14].

In what has been termed the *new managerial work* [**Kanter 1989a**; also Bond, "Empowerment, a leap of faith?"], there is no hierarchy to lean on. Very different ways of obtaining and using power must be discovered.

Empowerment can be frightening: it is novel, it is dangerous - the certainties of hierarchical control are removed.

As empowerment apparently cannot be given by management, employees must empower themselves.

It is likely that managers *can* adapt to these new criteria: perhaps not from reading textbooks, but from first-hand experience of empowerment, and of other transformations in the workplace. As one Chief Executive Officer (CEO) puts it, "*managing is learned from the process of managing, not from books*" [**Anne Byrne** 1993: 1].

For the time being, decision-making will continue to be viewed as the natural prerogative of the manager. Traditionally, senior managers cherish their own ability to decide. To quote another CEO, "*if managers can't make decisions, they can't manage*" [Byrne 1993].

It is opportune to comment that traditional *delegation* as practised by senior management is merely a step on the road to empowerment, as **Sinclair and Collins** believe.

Control and leadership

If we accept that there will always be inequalities in power relationships between people at work [Sinclair and Collins], we may also accept that these inequalities will persist in organisations pursuing empowerment. For instance, certain individuals within empowered work groups will tend to give leadership to their particular group [Sinclair and Collins: 18].

Simons [*Control in an age of empowerment* 1995] feels modern managers must permit employees to initiate process improvements and innovate ways to respond to customer demands. But organisations will still require a number of *control systems*.

Belief systems are needed to inspire commitment among everyone in the organisation.

Boundary systems define rules and discern "pitfalls".

Diagnostic control systems mean that managers can check if employees are meeting goals.

Interactive control systems permit senior management to concentrate on corporate strategic issues.

Keller and Dansereau, following other writers whom they cite, discuss the importance of linking empowerment to leadership issues. Empowerment, they feel, is important because empowering subordinates is a component of organisational effectiveness; additionally, studies show that power and effectiveness grow when leaders share power with subordinates. Summing up the hypothesis advanced by Keller and Dansereau [:143], empowerment provides benefits *to those empowering* (for example they are perceived as "fair" and are rated as "satisfactory" by subordinates) and *to those being empowered* (who increase their "perceived control"). There is a social exchange, in effect. The two writers are satisfied that their data shows a relationship between empowerment and leadership. Superiors who show reluctance in power sharing, in placing trust in subordinates, may receive less satisfactory performance from subordinates.

Empowerment may be a principal component of managerial and organisational effectiveness [: 144].

Brown and Brown perceive issues of leadership to be crucial in the empowerment process.

Sveiby and Lloyd [1987] go so far as to say that "to a large extent, leaders ARE the business idea". These are the people who champion individual projects, while being the prime movers in the development of business ideas.

Even leaders need to be *assisted* in the process of leading.

I/S Analyzer contends that the leader's role is to "transform resistance into commitment. Helping leaders to acquire this ability is the essence of leadership empowerment" [**Management initiatives for continuous quality improvement programs** February 1991].

To share leadership is one function of management. We say *share*: Brown and Brown endow employees in a truly empowered organisation with qualities needed for leadership - which seems to place upon them an onus to *participate* in leading.

The role of the supervisory level in encouraging commitment to the leadership vision is critical. Traditionally, supervisors were seen as a protective buffer *and* a channel of information between top echelons and the office floor.

Office supervisors have become increasingly involved in enhancing workplace relationships and the personal development of their staff.

To ensure effective supervision of the company's work processes, training and development of supervisors forms part of ESB's ethos. Supervision within that company is being transformed. In various ESB functions we find teamworking is supported: team leaders have a pivotal role.

Training for empowerment and for leadership

Nixon reveals how leaders can demonstrate a model of leadership. This differs from the old model which emphasised that leaders must not show vulnerability; they must always be "right", stay aloof, coerce their people and stay in control so as not to "lose". Nixon's new model calls for leaders to offer a vision of the organisation and encourage others to create a vision. Leaders must learn to love change and uncertainty (a useful trait in view of ESB's present process of transformation). They should possess other characteristics - such as the ability to listen, to ask "empowering" questions. Leaders need to encourage an environment of high self-esteem and of high expectations (a stance which is reminiscent of those "excellence" theories previously recounted).

Nixon proposes using the workshop method plus support groups within those workshops to develop people and change the culture within a group.

His "empowerment model" is a circular pattern [: 38] -

i) review the present

ii) develop a Future Vision

iii) decide Actions

iv) work on Key Issues (obstacles)

v) plan implementation and support -

followed by a return to the review stage.

This model helps groups and teams cope with change and uncertainty; fosters empowerment throughout the organisation; transfers "ownership" to the "client", such as a manager; and makes the workshop relevant.

ESB has employed an arsenal of courses and workshops over the years to develop its people. "Interpersonal communication" courses were being used in the Nineteen Eighties to train staff how to interact with and listen to others (customers, colleagues, bosses). Other courses have purely focused on identifying to staff the goals and structures of the organisation.

Training videos on "empowerment" centre on individuals' need for self-esteem.

In similar vein, courses on personal assertiveness and personal appearance (grooming being an example) have been offered to employees.

Such training is in keeping with the remit of ESB's human resources (HR) functions, in aiming to develop the employee as an "asset" to the company.

Taking responsibility and quelling resistance

Robert Heller [1981] feels participation is about sharing responsibility [: 193].

It depends on people being prepared to surrender, and others to accept, responsibility. Lately, in a more negative vein, he has written that *empowerment is an extension of enrichment*: it encourages the workers to take the law into their own hands [**Heller 1995**: 82].

Several strategies exist which those who *initiate* organisational change may employ in disarming resistance from those *affected* by the change [**Kotter and Schlesinger**].

One strategy is to ensure participation and involvement by the potential "resistors": this can often forestall resistance.

Writing before the Second World War, Mary Parker Follett seems ahead of her time in proposing that a co-operative effort by employer and employee (a "joint study") was preferable to a "face-to-face suggestion" [**Weisbord** 1987: 195].

This suggests to us a further benefit accruing from empowerment. If more people become empowered, they have a greater stake in the outcome of organisational change: in a sense, they have been enlisted as stakeholders. Effective change is thereby facilitated.

Empowering the corporate vision

"The process of change is an endless series of small battles. Someone must force the action, yet empowerment is only possible when workers and managers are capable of taking the power offered them and using it aggressively and well."

{Robert **Frey**, *Empowerment or else*, Harvard Business Review, September-October 1993: 94}

"So in the end, I like my job more than I ever used to. I do better work. I make more money. Yes, I suppose Bob Frey is getting rich on those same profits, but that's life. He has more invested in this company than I do. And that's fine."

{Ocelia Williams, an employee of Robert Frey's firm, quoted in Frey 1993}

During 1992, each staff member in ESB's Information Technology Services was issued with a copy of **Jan Carlzon**'s *Moments of Truth*. Carlzon, head of Scandinavian Airlines, averred that flattening the corporate pyramid was a consequence of decentralising responsibility to front-line employees. A side effect in his company was that middle managers (who did not see themselves as supporting people who were in fact subordinates) became hostile and counter-productive. The company had overlooked the fact that supervisors and middle managers had not been prepared for their new role. So it was decided to allow these managers to break down the overall company plans into smaller objectives for their teams.

But, writes Carlzon, delegating without giving people the prerequisites for independent decision-making "leads nowhere".

Empowering employees with real responsibility and authority calls for a radical change in the company. As Sinclair and Collins imply, where organisational structures limit the scope for action, these structures may have to be overhauled.

Connecting with the future [1990], an ESB strategy document circulated to staff, contained proposals which have a bearing on empowering change.
Authority and decision-making in the company would continue to be delegated downwards.
Policies, systems, standards and procedures of ESB management units would reflect the best international practices.
Investment would be made in I T "wherever it can support increased efficiency and effectiveness".

Concerning the last point, we are reminded of Doswell's formula [: 50]:

productivity = efficiency **X** effectiveness.

As outlined earlier, ESB's new order of things is steered by a vision statement.
Belasco [: 188-190] indicates three stratagems which management should undertake when it has created its new vision of the company.

Firstly, management should **empower the employees** with the attitudes and skills they will need in order to "use" and to *enhance* the corporate vision.

Secondly, management ought to **empower the vision itself by using** ***career development***. Techniques suggested include ***career planning*** in conjunction with the employee; ***job rotation*** (moving employees into different positions periodically); as well as ***promoting*** those staff who *simultaneously share the corporate vision* ***and*** who *perform well*.

Thirdly, management should **empower the vision itself by** ***demonstrating to employees*** how this vision enhances employees' long-term prospects.

Enrichment: what this might entail

"All the companies that are alive are realizing that they need more creative, vital and adaptable workers".

[James Whyte, quoted in **Galen and West**]

"Management must realise that there is an abundance of skills and abilities available to them and should broaden the promotional possibilities according to merit and not necessary academic qualifications"

[Verbatim quote from an un-named ESB Craft and General category employee, quoted in **Stubbs** 1992: 37]

"Fine, it's a safe secure job, but so is a prison sentence. There's so much politics it affects productivity."

[Verbatim quote from an un-named ESB Clerical employee, quoted in Stubbs 1992: 37]

"In aiming at greater efficiency and modernisation ESB is in danger of becoming less caring towards staff"

[Verbatim quote from an un-named ESB "Other officer", quoted in Stubbs 1992: 37]

It could be argued that, within the Irish context, longer-established enterprises such as ESB need rejuvenation. The process of enrichment may be able to inject that rejuvenating effect.

Among several explorations into the company, the Review of Relationships in ESB conducted by the Cassells Committee in the early Nineteen Nineties is notable. As part of its research, it endeavoured to survey as many staff members as possible. The results showed that after *"pay"*, staff found *having "interesting work" to do* was the second most important aspect in job satisfaction [Stubbs 1992]. *"Job security"* was in third place. *"Recognition for effort and commitment"* came fourth, followed by *"making best use of* {one's own} *skills"* and *"opportunity for career development"* [Stubbs 1992: 35].

ESB scored well on: providing interesting work; security of employment; "sense of accomplishment"; and "friendly colleagues". Staff were more critical concerning a perceived lack of recognition for effort and commitment, and lack of opportunity for career development.

Regarding *communications downward*, two in five ESB employees claimed to be fully or fairly well informed - less than the 50 % level which the MORI pollsters found in other utilities [: 36]. As for *upward communication*, over three-quarters felt there was insufficient opportunity for staff "to let ESB know how they feel on things that affect them and their work" [: 37].

We would expect enrichment in the workplace to emerge, not simply from limited programmes such as job enrichment or quality of working life, but from synthesised approaches combining the best that human resources philosophies have to offer.

Enrichment may be endorsed as official policy within a company or may be imperceptibly integrated into corporate culture. Most managers in ESB would adhere to the precept that work should be as "rich" as possible.

A former belief among a proportion of managers was that employees worked for extrinsic rewards - these were the source of their primary motivation. Job enrichment is posited on the notion that employees gain the highest level of satisfaction from the work itself - a Herzbergian viewpoint - and that "intrinsic outcomes" derived from the job encourage high levels of job performance.

Herzberg suggested that employers could shift some resources from supporting hygiene factors - as we have described earlier - to supporting job enrichment efforts [Herzberg **1968b**, reprinted with additional comments in 1987]. He felt job enrichment was *not* a once-off effort, but an ongoing commitment by the company. Expanding upon his 1968 article, he added: "*The key to job enrichment is nurture of a client relationship rather than a functional or hierarchical relationship*" [: 120].

As a management philosophy, job enrichment was studied in the Nineteen Fifties mainly in terms of factory production lines, as part of management's attempt to boost production. The belief that it is beneficial stems from a view that people need to be enriched, taken beyond the confines of a task, to achieve their full potential and gain from the experience of work.

Hackman and Oldham relate how the American multinational AT & T found benefits for that company and its employees arising from job enrichment.

Heller [1995: 82] defines job enrichment as asking workers about their jobs and making their jobs more interesting, their performance more effective. He is somewhat dismissive of job enrichment, as he is of empowerment. In common with other techniques, they raise performance for a limited time only, claims Heller.

A trend towards human resources management

ESB has followed the trend toward human resources management (HRM), as it had followed other management philosophies in the preceding decades.

Hastings [1994: 57-59] includes an overview of the evolution of HRM as a model for union-management relations. HRM, as it evolved in the Nineteen Eighties, was a shift in tack; it comprised several components.

Job design would tend to place accountability for performance upon teams rather than upon individuals.

Participation in the company management process would give employees more "voice" and influence.

Labour-management relations would be *less adversarial.*

Fulfilment of employee needs would be an *end in itself,* not merely a means to achieve other goals.

Employee *commitment* would be sought, necessitating increased employee efficiency and effectiveness.

The rituals and values of each organisation's *unique corporate culture* were recognised as shaping that organisation.

Dillon and Flood used various questionnaire formats to test *organisational commitment* (a term virtually synonymous with *employee loyalty*) as it related to the effect of HR practices. Their findings were inconclusive: they saw "echoes" of Herzberg *et al*'s 1959 view that personnel policy and practice *might reduce* dissatisfaction yet *never raise* the job satisfaction level [: 59]. So, by extension, they consider that such personnel practices cannot affect organisational commitment.

Increased spirituality or texture may engender feelings of enrichment

Galen and West [1995] say that firms are turning to *spirituality* to inspire workers and managers. They quote James Whyte, a consultant, as saying that the creativity, vitality and adaptability that companies need "resides in the soul".

Stewart Brand [1980] calls for more "*texture*" in the workplace. This could entail greater continuity of staff; more familial amenities (he cites daily volleyball and home cooking for lunch); more choice of working and vacation time; less supervision, unless it is by one's peers; more individual responsibility for tasks; clearer role definition; more good suggestions; and a "messier office" [: 132].

I T has the potential to enrich the quality of work

Sophisticated computer systems offer attractive benefits. Users can back-up their files for greater peace of mind against loss of data. A user may design reports and forms to high standards of presentation as if s/he were a typing pool and graphic studio rolled into one. Visual creativity, and in some cases artistic ability, can now flower. Well-produced work which is pleasant to look at produces a more positive response among workmates. Delays are reduced. Work is now produced to meet the deadlines demanded by faster workflow. Styles of presentation are standardised, increasing the sense of corporate identity.

Problem solving is aided by the data storage capacity calculating of computers.

Inter-office communication is speeded up by fax and phone.

Influencing one's managers may be facilitated: E-mail messages can go direct to managers without intervention by intermediate organisational layers. Employees can draw attention to their ideas.

The availability of laser and colour printers encourages higher quality of presentation in reports. These may reflect credit upon the report creator.

All these skills and technological tools, which involve colleagues in projecting themselves or in "selling" themselves, will prove more valuable to ESB as it becomes a "flatter" organisation in future.

CHAPTER 4

DEVELOPMENT AND IMPACTS OF INFORMATION TECHNOLOGY

DEVELOPMENT AND IMPACTS OF INFORMATION TECHNOLOGY

Towards a definition of information systems / information technology

Laudon and Laudon [1993] define an Information System as "a set of interrelated components working together to collect, retrieve, process, store and disseminate information for the purpose of facilitating planning, control, co-ordination and decision making in business and other organisations."

These writers identify three steps inherent in using information systems:

- INPUT (of information into a system);
- PROCESSING the information;
- OUTPUT of the information.

The **ESB Information Technology Impact Study** [1991: 35] recognised that by the mid Nineteen Nineties, most ESB jobs would require basic I T literacy skills, to enable data *entry*, *enquiry* and *outputting*.

Knowledge, *information* and *data* are terms which have been freely bandied about in the world of I T. Laudon and Laudon state these three terms are *different yet interrelated*. *That knowledge* ***transforms*** *data* ***into*** *information* might be a summation of their view. They say the aim of information systems ("I S") is to create and disseminate useful information to solve a business problem. But it is *people* who *experience* the business problems. Traditionally the business is treated as an entity separate from the individuals who participate in it. The business, or any organisation, has a corporate identity. Yet people are increasingly seen as part of the business system, as part of the business solution.

The Systems Approach to I T

Researchers have utilised the Scientific Method for several hundred years. This method rigorously examines each unit of the cosmos in minute detail and derives a general corpus of knowledge from the specific data gathered. This is a dissectionist approach, which is alleged to be valid for dead organisms and living organisations alike.

A different tack was adopted from the Nineteen Thirties onward by thinkers such as von Bertalanffy. He and others developed *General Systems Theory*, (GST) supplementing the study of individual parts of a system by a scientific study of the whole of a system [**Drechsler and Bateson** 1986]. A system is thereby defined as an assembly of parts of components, connected in an organised way. This system has an objective or task; that is, *it does something*.

Theories of information developed by von Bertallanfy, as well as those shaped by Claude Shannon and Warren Weaver, have been cited as formative [**Drechsler and Bateson**; Doswell]. Shannon and Weaver [*The Mathematical Theory of Communication*, 1949] laid the foundations of information theory [Doswell: 48].

Shannon suggested that the amount of information processed by a given system reflected its complexity [**Roger Lewin** 1994: 38]. Since then, complexity has become a scientific discipline of its own, as researchers struggle to unravel the tangled web of systems which make up our cosmos.

However, Shannon's theories described the flow of information through a channel as a mechanistic, scientifically-calculable process; little thought was applied to *the role of the human* in the process. The role of people in the information system is today a major focus of research.

To assist the flow of information, one particular function of the traditional office lies in facilitating contact between colleagues.

Contact can be facilitated by office structures - closeness of desks within a team atmosphere transforms "firefighting" and "buck passing" into mutual help: employees begin to cover for one another [Brown and Brown 1994].

The office as a physical institution can also *impede* the information flow. The traditional organisation is divided into separate units operating from different floors, different rooms.

The hunger for information

Jacqueline Atkinson [1992: 199] asks why people are so anxious to have information. She proceeds to supply three reasons: procrastination by gathering information delays the need to take possibly-wrong decisions; information lends status to the possessor of information; and information is a sensation.

We may conjecture that this third point is pertinent because humans are sensate beings, needing stimuli. A certain level of boredom can be a fact of office life. Acquiring information not directly related to the work itself may enliven some of that monotony.

Atkinson provides her own recipe for approaching information - namely the *managing* of information. Information can *manage us* if we let this happen, she warns.

Information overload and infoglut

As early as 1985, Bruce Christie and M. Polly Kaiser [: 31] sketched a scenario where users were being drawn into the trap of receiving information more easily. At first, these users do not notice the inherent risks of becoming swamped with information. They "bask in the afterglow" of having access to more information then before. Then the full realisation "hits home". Considering the position in the Nineteen Nineties, yet more information is available. The issue remains one of sorting the chaff of useless data from the wheat of usable information. The inflow of information needs to be harvested for maximum personal and corporate advantage.

In human relations, exchanging information can be an inefficient procedure. Research shows that up to **80 %** of information can be **lost** in only **five** "*exchanges*" of that information [**Reitz** 1981: 314].

Coupled to the risk of *degradation in the quality* of information has been *a rise in the quantity* of information entering the organisation or arising within it.

As **Murphy and Adam** [1994] point out, the *volume* of incoming information is constantly growing.

Individuals are receiving more information than they can digest - **"information overload"** as it is labelled - yet they have no desire to slow down the flow, lest the value of information lost is outweighed by the gain from reducing information overload. They cite Drucker's statement to the effect that *flooding the senses with stimuli is certain to shut off all perception*.

Murphy and Adam indicate that for most organisations, information has become a signal and a symbol. Gathering information reassures people: it is linked to correct decision-making processes; it gains status for well-informed managers.

The two writers see this as a wrongly-limited view of information's value. They refer to Daft and Lengel in support of their case, which is that senior executives need to find out what is happening outside the company, as opposed to being swamped by internal information.

Daft and Lengel apparently distinguished two parameters.

The first is that of *uncertainty* - this is tackled by gathering amounts of mainly-quantitative data, as answers to specific questions;

Secondly, equivocality implies that when events are unclear, managers who are unsure which questions to ask will rely on their experience and intuition.

One result is that answers are *lost* in a welter of information: ironically, the *surfeit* of data - termed **"infoglut"** by some - is wrongly perceived as a *shortage* of data. In reality, it is the *retrievability* of data which is at issue.

Murphy and Adam remind us that information can also be employed by managers as a *weapon* to propagandise their position.

Despite predictions, paper has survived. In the Nineteen Fifties and Nineteen Sixties it was believed that if more data was stored in computers, less would be kept on paper. But the use of paper in business did *not* decline with the advent of computers, for several reasons [Laudon and Laudon: 560].

Firstly, information is not a fixed quantity. Most writers agree that the flow of information will continue to grow. Secondly, people *like* paper, as "hard copy". Paper is portable and reading paper is 30 % faster than reading from a screen. Thirdly, the number of information workers has increased.

Steps towards formulating an I T policy in ESB

We can date the rise in an information systems ethos within ESB from the Nineteen Eighties.

During the Nineteen Eighties, investigations by consultants Arthur Andersen, together with subsequent views expressed in the Miller / Barry Report, pointed out a certain lack of co-ordination in ESB's various hardware and software functions. The consensus was that continued fragmentation of information systems development was inhibiting development and use of information as a system-wide resource. Optimisation could be achieved: efforts should be made centrally, with user involvement.

James O'Reilly, an ESB staff member, conducted research which is germane here.

He examined the flow of information in ESB in the light of a major **Information Needs Study** [1982] undertaken within the company. That Study's findings and recommendations are cited by O'Reilly in the following manner.

While managers in ESB generally had a clear perception of the information they should have, "the major problem" was "the lack of well-designed, modern information systems to deliver the information in an effective way".

The greatest unfulfilled information needs were those of middle managers.

There was lack of direction and general framework for systems development; systems development was departmental, not corporate, in nature [O'Reilly 1985: 95].

The Study had recommended that "key users" become more involved in developing information systems; that a more coherent approach be adopted towards the *in-house* development of ESB systems; and that the use of [software] "*packages*" be considered [O'Reilly 1985: 99-100]. In accordance with the recommendations, a **Chief Information Officer** (CIO) was also appointed.

The Information Needs Study felt that the proposed information systems contemplated by ESB would:

- improve effectiveness, productivity and performance;
- improve cost control, reduce overheads;
- improve managerial ability to extract data from corporate databanks;
- provide accurate, timely information to manage the business [O'Reilly 1985:101].

(ESB's Executive Information System described by **Duignan** [1993] typifies a system aimed at keeping senior management staff better-informed.)

Within ESB an Information Systems Department (ISD) was established [**Malin**]. In the Nineteen Nineties, ISD combined with ESB's Telecommunications Division to form Information Technology Services.

Information requirements

In an organisation, "information needs are satisfied in the majority of cases from local or in-house resources and to a lesser extent from external resources" [**McGillivray**]. It is assumed that ESB, in order to stay informed, relies on its own *internally-generated* data *and* on *externally-derived* business information - official reports, rumour and the like. O'Reilly [1985] studied the information climate within and surrounding ESB. In the years since then, tools for electronic information-gathering and dissemination have become more widely available within the company. Staff can now see up-to-date newspaper reports concerning ESB on their computer screens; E-mail advises them when a colleague is retiring. They are immersed in an ocean of information.

King [1993] cites Matheson's vision of a "seamless electronic environment" with individuals having easy access to a variety of knowledge and information resources, independent of place, time and subject disciplines. We believe that electronic browsing will become more attractive to employees, as a way of finding out; up to now, managers have been to the forefront in using systems to gain an overview of the workplace, not to mention the industry as a whole. This ability to view data may be filtering down to the general workforce, due to the ready availability of cheap hardware, such as PCs. This belief could be tested for also.

Better access to information

Patricia Seybold [1993] writes as an I T consultant who wants better *access* to information. She calls for a "knowledge economy" in the business environment, with its rules written in English, so she can understand what is happening. She wants to be able to see, in graphical form, what is happening in the business, not what is supposed to be happening.. Seybold also desires rules that are separate from her data, yet linked to it; in short, for people to have the information at their fingertips. She suggests two approaches.

Firstly, the science of object-oriented programming could be used as a means to model the business and its processes;

Secondly, a work-flow approach (see Glossary) could be adopted, where the rules governing the business are *visible to* and *modifiable by* the employee.

Information technology: studying the historical process of development

To study information technology, **Friedman** [1994: 367-397] uses a concept put forward by Lewin in 1952: namely, that studying the ***field*** of a subject provides us with an analytical tool in the social sciences. A field is the totality of facts which are mutually interdependent (to simplify Lewin's definition). Friedman [1994] modifies Lewin's idea:

- ***by widening*** the scope of a field so that it reaches beyond itself to its *environment*;
- ***by not measuring*** or ***judging*** the field's ***measurement*** (Lewin was normative in his approach);

- ***by viewing*** the field - in Friedman's case, I T - as an ***"inherently dynamic entity"*** [: 372] - whereas Lewin saw fields as *normally* in equilibrium. This dynamism is caused by interactions in the I T field and in its relations with its surroundings.

Friedman [1994] contends that the history of I T has been dominated by the displacing of problems, not by new solutions or by dominant designs.

The first phase, lasting until the mid to late Nineteen Sixties, was dominated by computer hardware constraints.

Even then, software was problematic: programming was laborious and prone to error [: 375]. Alleviating, though not eliminating, hardware constraints helped propel software to centre stage.

Concerning Friedman's analysis, we should interject that hardware design remained a driving force beyond the Nineteen Sixties. An in-depth account given by **Kidder** [1981] of the race by computer professionals to develop a new minicomputer makes stimulating reading. Kidder describes the introverted world these professionals inhabited. Their search for "the soul of a new machine" was concerned largely with the technical workings of the minicomputer system: making the best use of the limitations of the hardware and software. User-friendliness towards the users of the eventual product was not an-over-riding concern.

In the subsequent second phase defined by Friedman [1994], software constraints created "the software productivity gap".

That phase produced greater emphasis on *managing I T*: stricter division of labour, structured methods (of programming).

The current third phase, he thinks, is concerned with problems of "user relations".

Significant features of this phase ought to be noted.

Information systems are being employed in novel ways.

Also, existing computerised data bases have been utilised for applications which had no well-structured manual (non-computerised) equivalent, such as decision support systems

(DSS). Decision support seems a more important application than replacing low-level administrative activities, which had been a concern previously.
Higher echelons of management have become I T users - certain information systems have been designed with these managers in mind.

A corollary to executive use of information systems has been greater pressure to satisfy users - because highly-placed users possess more influence, compared with clerks [: 379].
Phase three has unleashed a variety of issues. One issue lies in the task of providing those systems which users *really* want. Another issue concerns new strategies being pursued by I T departments to satisfy users.
In addition, new techniques of direct manipulation for systems are apparent. Friedman [1994] cites the mouse and touchscreens (although we can also look ahead to voice control of information systems). Meanwhile, improved displays and representation of *graphics* imply some superseding of *text* [: 380].

Looking for insight

Technology plays a part in assisting the process of empowering employees, of enriching their experience - if we are to believe a number of advertisements for information systems which were encountered during this study. But according to the socio-technical model, technology is bound up with the work process itself.
Stewart and Cantor [: 51-52] mention Kusterer's contention that workers have to **know** more and **do** more on a job *than is believed* by outsiders or by "superordinates" (we might say bosses). But they cite Friedman from 1970 in supporting their view that workers are inclined to *exaggerate* the amount of knowledge, skill and judgement involved in some of their work..
They hold that generally, a member of an occupation performs a *set* of tasks rather than *a* task.
We must treat "task", "skill", "training" and "prior experience" as claims which are indeterminate, though significant to the worker *and* to those persons s/he makes contacts with

in the work context *and* in the social context. This point of Stewart and Cantor should be borne in mind when researching worker attitudes.

One difficulty in studying actual employee reactions to technology was encountered by **Shoshana Zuboff [1988]**. She found "a window of opportunity" for her research, in that period when new technology had just been introduced into a workplace: people were filled with questions and insights about their new experience. Twelve to eighteen months after that, people had become familiar with the technology, having "accommodate[d]" themselves to it - so fresh insights proved hard to find [1988: 13]. Sadly, such an era, from around the Nineteen Eighties up to the present, is passing within ESB, without much attempt being made to record individual or collective reaction.

Zuboff's computer-mediated work

A mood has arisen in the twentieth century which regards technology with some suspicion. Karel Capek's 1921 play, *R.U.R.*, concerns robots created solely to benefit humanity: ultimately, however, the human race is destroyed [**Asimov**: 193]. As a science fiction writer himself, Asimov ensured *his* robots were designed to serve mankind; they were forbidden to cause humans any harm.

Human relationships with technology have been dissected less sensationally by Zuboff. In her 1982 article, she defined a new relationship: when I T reorganises a job, it "fundamentally alters the individual's relationship to the task". This phenomenon she called "**computer-mediated work**" [: 144-5]. She hypothesised that new technology "inevitably" changed the ways people are "mobilized to work", together with the skills and behaviours needed for productivity. *Clerical* work (high-volume work included) was changing by means of office automation, WP and electronic mail. *Managers* were using ***decision support systems*** and ***management information systems.*** The mathematical logic at the heart of computer systems was also being applied to "formalize the skills and know-how" of jobs, integrating these into computer programs. Job deskilling was affecting routine jobs, but also more cerebral work, such as decision making and analysis. Job discretion, whereby the worker has some choice about the manner in which tasks can be performed, was in part eliminated by new computerised procedures.

In her studies - expanded later as a book ***In the age of the smart machine*** [1988] - Zuboff highlighted other reactions towards the new technology. We shall describe four of these.

Firstly, employees she had spoken to felt frustrated: the effect of working "through" a glass screen (the VDU) caused them to feel they had lost direct experience of their jobs. As a result, they found more difficulty in exercising judgement. The rigours of the system often meant employees had to work the way the *system* wanted. We can understand this frustration. The jobs Zuboff was studying - such as those held by insurance clerks or bank employees dealing with customers - call for discretionary use of personal judgement. Should this be impaired after the work has been mediated by computer, job *performance* - the outcome of the work itself - may suffer.

Secondly, some workers would lose contact with their work to a degree.

Thirdly, in banks which she studied, planners did not just automate existing work practices - they created new procedures.

Fourthly, social interaction in the workplace *was* affected. Earlier, Zuboff [1982: 146-7] had cited "decades of research" to show that "**community" within the organisation is important to organisation members**. People will be averse to yielding the benefits of being part of a community, *if* that is what they perceive computerisation will entail.

Analysts have written concerning the advent of the *information economy*.

But **Zuboff [1995]** has recently questioned these views. She considers that a true information economy requires "more than just a proliferation of computers and data networks". A new vision of what organisational membership entails and a "revised social contract" are demanded; new "patterns of morality, sociality and feeling" have evolved less rapidly than technology [: 162].

Enriching communication within the organisational network

The impending pervasiveness of communicating technology was hinted at by one of Studs Terkel's interviewees:

"In coming of age, communications has become an end in itself....... we are all wired for sound." [Wright Morris, quoted in **Terkel** 1972: 59].

The network emerged as a concept in management literature during the Nineteen Seventies, partly inspired by computer technology [Sveiby and Lloyd 1987].

A number of computers linked together to form Local Area Networks (LANs) pointed to a "new paradigm - the company as a communicating organisation" [: 55].

In a parallel progression, psychologists and sociologists were exploring the network of other people that form what we call "community, "society".

Information technology seems to have drawn together the strands of human networking and computer networks. Human networks rely on many supports, ranging from lists of customers (which can be computerised) to "systems of contacts" [: 55]. It is accepted that any individual in a company gradually builds up a complex web of contacts.

Personal information managers (PIMs) are software products which help keep track of this growing complexity, so the individual can *leverage* these contacts to maximum advantage. PIMs can bring portability to the exercise of human contact: they can be carried around on *laptop computers* (portable computers); or on *personal organisers* (small computers holding details much as a Filofax does). Apple's Newton, a leading *Personal Digital Assistant* (PDA), provides handwriting recognition, allowing users to write directly into the device with a stylus. Such portability and handiness was not the case in 1987.

Writing at that time, Sveiby and Lloyd [: 56] felt that the potential of computer networks for maintaining and "cementing" relationships was not widely recognised, as they were mainly used by computer professionals.

Today the extension of networks such as LANs enables any corporate user who has access to leave messages in electronic "*mailboxes*", theoretically to recipients in any part of the globe.

Sveiby and Lloyd assert that computers do not replace, but merely strengthen and widen the network of existing relationships.
Healthy, supportive and mutually-dependent relationships within an organisation enrich the work experience of the participants involved.

"The improvement of relationships within ESB is regarded by management, staff and unions as a key objective" [***ESB Corporate Plan 1992***: Page (v)].

So wrote Kieran O'Brien, an ESB Director, pledging full support to Peter Cassells, who was at that time chairing a steering group reviewing relationships within the company.
In retrospect, I T probably will be regarded as beneficial in fostering workplace relationships. Future organisations may become "virtual" communities, in other words represented not so much by concrete edifices filled with people, but by computer networks linking those people.

Technology and complexity

Information technology is a child of its past. It has grown out of impetuses as diverse as medieval paper-based systems; Victorian office practice; and a drive for greater efficiency, parading under the banners of Profit, Productivity, Output.
Postan *et al* note that the shorter formal education received by Mediaeval Italian merchants did not impair their arithmetical accuracy. Bookkeeping errors are rare [Postan *et al* 1963: 89]. Technology was available: Postan *et al* record how it was "indispensable" for a business career to learn "the lines", in other words the use of the *abacus*. This device was the "calculating machine of the Middle Ages", being found in every counting-room.
But the increased volume and complexity of modern commercial life encourages us to use spreadsheets and accounting software. The Italianate model - concise, limited in variables and laid out on some pages suited the business activity at the time. Postan *et al* indicate that in medieval Northern Europe, the Hanseatic League's bookkeeping regime, which lacked automatic checks for errors and omissions, was adequate for smaller systems. But it broke down when structures became complicated [: 110].
Whether, medieval or modern, office work seems related to a search for order - for *system*.

As early as the seventeenth century, Blaise Pascal created a device which he hoped would make numerical calculation easier.

Today's I T has capabilities undreamt of by Charles Babbage, who in the last century devised a machine he called the Analytical Engine - again as a tool for alleviating the chore of calculating figures, not as a means of expanding people's abilities.

Progress was slow but gradual throughout the nineteenth century, as it witnessed inventions of impending value to business: the telegraph and the telephone were notable examples.

Office technology

Doswell [1983: 28] defined the office as "the place where machines and people manipulate information."

Butera and Bartezzaghi, writing around 1983, felt it was outdated to view offices as *places*. Rather the office is *a series of functions* around which are created :

- organisational units;
- information systems;
- physical places;
- and groupings of people [: 107].

Office technologies provide new options concerning the location of office functions. The two writers spoke of a *multi-function workstation*, supplying the worker with *E-mail*, as well as software for information *management / processing / retrieval* and *electronic filing* of personal information. They suggested that E-mail could alter the work of a team working on a project, not to mention affecting their interaction [: 106].

The definition of office work continues to be extended by developments such as portable computing, meaning work can be done outside the confines of the building.

At the end of the nineteenth century, typewriters and telephones were already in use in offices [**Otway and Peltu 1983**: 15].

For a while after the typewriter had been introduced into the office, it was used exclusively by male clerks, as simply another clerical tool.

But typing in the twentieth century became "women's work". The typewriter as an office machine becomes identified with the traditionally-female secretary.

Pringle [quoted in **Purcell**] found in her research that *secretarial work had always lacked a clear job description*. Much of the secretary's role centred around two feminine skills: acting as a hostess for her manager, and being a typist.

The broader "feminisation" of clerical work was identified in Canada by **Graham Lowe** [1987]. An equivalent phenomenon in Australia is mentioned by **Joy Damousi** [1994], who relates how war lead to a shortage of male clerks.

To cope with growing complexity in its operations, the Electricity Supply Board has employed techniques and technologies as these became available: telex, and accounting machines provide good examples.

Over a decade ago, this researcher came across a letter written in the Nineteen Forties concerning the acquisition of what were probably the first electric typewriters used in ESB. By the Nineteen Fifties, ESB accounting systems were partly "mechanised", as described by Fogarty [1957]: he clearly saw the machines as an adjunct to, not as a replacement for, human intervention in accounting.

Since the Nineteen Fifties, the computing scene had been dominated by "mainframes" - large computer systems operating in air-conditioned suites tended by skilled staff. Indeed, office methods had been steadily adapted in ESB from this time onwards, so as to accommodate the batch processing undertaken by these big machines [**Fogarty**, Administration, 1957]. Weekly accounting reports, payroll and engineering analysis were just some of the functions carried out by them. Sackman [Mumford 1983: 69] states that with these early machines the user was secondary to the machine: "technical matters" interested computer professionals more than "human matters"; users were "troublesome petitioners" who should be satisfied with what they received.

The Lyons Electronic Office, which carried out basic computing for the U.K. catering firm Lyons from the Nineteen Fifties onwards, is cited as an early venture towards office automation.

In the Nineteen Forties, Lyons wished to ensure their administration could meet the demands of their large business [**Murphy 1971**: 14-15]. They collaborated with Cambridge University, resulting in the Lyons Electronic Office (LEO or Leo). **Cane [1994]** recounts how Lyons sold these early computers to other businesses from 1954 on. He agrees that these computers are now just footnotes in the history of computing, but says that Lyons realised that successful automation depends on *understanding the potential* of the machine in question, together with *planning* and *documentation*. If this lesson had been learned by other computer users more computer project disasters could have been averted.

As time passed, computers became less cumbersome, as their processing power grew.
Murphy [1971: 44] declares that computer hardware had progressed at a faster rate than software: the result was that hardware's *full* potential was not exploited due to a lesser software "know-how". But he concedes that at that time - 1971 - software was steadily progressing, to become the "main area of attention". (Friedman [1994] also discusses how software lagged behind.)
Initially, states Murphy, software applications packages were derived from normal clerical procedures: this reflected computers' early use for simple, repetitive tasks [: 51-52]. He saw the computer being increasingly used to help management make decisions, based on accurate information and presented in an understandable format. The computer, he envisaged, could "report directly to the management". Murphy speculated that education about computing would overcome management, shop floor and clerical fears. Middle management had most to fear: their role of information collection and despatch to senior management would be most affected. Retraining of this echelon was indicated.

I T has shown itself capable of altering responses to jobs. In earlier days, clerical work was re-designed to suit the computer. There was little discretion for clerical staff inputting data ("batch processing") to exercise discretion. Some of the work consisted of monitoring the computer system, the type of routine work which Hackman and Oldham [: 52] believe can impair effectiveness. It appears to this researcher that modern software used on personal computers might summon fresh, constantly-changing responses from users, a view open to testing.

Forerunners to automation

Until the Nineteen Seventies, the widest use of computers within organisations had been in performing clerical operations. It was purely a mechanisation of calculating, sorting and recording tasks [**Newman, Summer and Warren** 1972]. It has been contended that industrial processes can only be said to be *automated* if there is a "Feedback" mechanism, which influences the process as it proceeds. Otherwise these processes are merely *mechanised* [**Goodman** 1957: 37]. By the same token, the introducing of earlier office machines would justifiably be termed *mechanisation*, not automation - the ability of a system to offer feedback (say, in correcting the spelling of the word processing operator) appears to be inherent in automation.

Laver [1980] felt that almost all policies for successful advances in productivity stem from improved technology. Technology often simplifies the processes involved to a "trivial" level [: 34]. Computers increase productivity because they operate at high speed - and relatively lower cost - and are **programmable**. This last factor renders them *versatile*, as they can be adapted to a diversity of tasks. Writing at the outset of the Nineteen Eighties, he observed that computer specialists were concerned with the technical aspects of computing, not with human relations or the impacts of computer on job satisfaction. Trade unions had traditionally developed to defend a status quo, giving them a conservative, not a creative stance [: 43].

Revolutionary change followed the micro-chip revolution of the Nineteen Seventies.

Faggin [1992], a pioneer of the silicon chip, describes how since the invention of the integrated circuit in 1959, electronic components were being made more compact. By the Nineteen Seventies the stage was set for the arrival of the microprocessor. That invention gave rise to the personal computer. Faggin was surprised at how the PC became "a socioeconomic phenomenon": to him, it serves as an example of the unpredictable consequences of technology [: 150].

It would be fair to postulate that the silicon chip was *a technology seeking an application*. The modern office provided potential applications by the score.

The pace of change

Christopher Baldry wonders ["*Computers, Jobs, and Skills*" : vi] "whether the pace of technological change is something which has its own momentum or whether it is within the control of human beings."

Sveiby and Lloyd [: 123] use the model of the electronic calculators to illustrate the pace of technological change. The first models in the Nineteen Seventies seemed clumsy. Then the increasing miniaturisation afforded by the silicon chip and the ever-improving performance of calculators meant that by the Nineteen Eighties the product life-cycle (the process during which a product moves from being created to being obsolete) fell to six months. The two writers speak of the significance of this "change in the rate of change".

Initially, a mundane application such as the electronic calculator epitomised the usefulness of electronic office tools for repetitive calculations.

But the shrinking of electronics and the increasing power of computers forced the pace. The spread of the smaller minicomputers and microcomputers brought computing into the arena of office politics. Dedicated word processing systems arrived to handle text processing.

Macintosh, a precursor

A public perception of computers had been of machines which, though powerful, were slow and large. The Apple Macintosh, the "Mac", revolutionised computing in the Nineteen Eighties, with its speed, its compactness.

Apple used some of the ideas developed at Xerox Corporation's *Palo Alto Research Center (PARC)* to overcome the barrier presented by existing user interfaces **[Levy 1994]**. The Macintosh introduced a fresh dimension in user-friendliness: that of *metaphor*. Levy writes that the graphic images on a Macintosh represented "elements of an office"; so that clicking on an *icon* of a "trash can" represented the throwing out of a file. The metaphor became the reality it represented [1994: 10].

Quittner considers that the Macintosh attracted millions of converts who realised that computers might represent *personal empowerment*.

IBM-compatible Personal Computers (the "PC" which is now standard throughout ESB) owe much to the Mac's originality.

Foy (1994: 186) opines that in the Nineteen Seventies the PC "grew out" of the typewriter. There is no doubt that the QWERTY keyboard common to both blurred the potential which the PC held for manipulating information.

Office automation

A gamut of writers in the Nineteen Eighties explored the new office technology, under the label "*office automation*" - a term which has endured. "Electronic office" or "office of the future" were also fashionable terms.

Office automation is defined by **Cheung** as *computer systems designed for office applications and end-user computing.*

Danzin [**1983**: 19] spoke of office workers fearing the advance of new technology into their work. These individuals worried that traditional office would change. Such a change should be evolutionary, rather than revolutionary, counselled Danzin. He identified *four* operations of the office:

- information capture (collection);
- information processing: performing calculations and editing it, for example;
- information storage (filing);
- information retrieval: accessing the filed information [: 19-20].

Information is the uniting factor: it is the *raison d'être* of the modern office [Danzin].

The formerly-separate fields of computing, telecommunications and electronics began a "convergence" [Danzin: 23], into the field we call "information technology".

Danzin refers to the "software barrier": software programming is a specialist activity, not seemingly amenable to automating, unlike factory production. Ironically, if the work of programmers was proving intractable, that of their clerical colleagues seemed less so. Hence office automation became a focus of activity.

Looking back, Foy [: 187] describes how in the early Nineteen Eighties, IBM supplied its staff with PROFS (Professional Office System) to cut costs and make optimum use of network and computer investment. PROFS gave each IBM person a measure of information and, believes Foy, helped prepare these staff for the crisis which IBM faced in the Nineteen Nineties. By 1986 all IBM staff had developed keyboard skills.

The implications of a single inter-linked system are enormous, says Foy.

Foy makes further pertinent points [: 189]. Systems like PROFS are enriched by information; this enrichment was lacking in the management use of E-mail, based on status, that precede PROFS. Any company's success is linked to its informal information network. Foy was concerned that PROFS would erode traditional travelling, meeting and phoning (which feed the human communications network) within IBM: but the company reassured her that PROFS did *not* replace these activities. IBM used the productivity derived from PROFS to change the jobs people did - transferring them to revenue-producing areas like sales.

The low cost and claimed success of the PROFS experience, despite the fact *that IBM supplied older machines to its workers than it sold to customers*, encourages Foy to state that it is the management and training, not the technology, that make the difference in a system's "successfulness".

ESB's experience with the introduction of new technology in the Nineteen Eighties could be illustrated by two case histories.

The first of these concerns the arrival of word processing in the company's Head Office. Management thinking current at that time was to centralise the WP activity.

A word processing unit was established in ESB's Head Office at the end of the Nineteen Seventies. It employed a handful of screens and also housed some OCR (Optical Character Recognition) equipment - meaning outlying ESB offices lacking in WP could use a special golfball typewriter to output type text for input to the OCR reader.

Being viewed as just an extension of the typing activity, the WP equipment was located in the same room as traditional electric typewriters. After a short period, management, together with the employees involved, decided these two activities *did not* blend well together and needed to operate from *separate* rooms. Such an outcome was not foreseen; it became necessary through expediency.

Our second ESB case history from the Nineteen Eighties coincided with a state of conflict between ESB and its unions. This conflict in large measure stemmed from the upheavals caused by company re-organisation, following the Miller / Barry Report.
ESB, having embarked on a programme to overhaul its information systems (as discussed by O'Reilly 1985), encountered opposition from its white collar union, ESBOA, over a number of issues. One issue centred on the introduction of new technology and its impact on productivity and, by implication, on job numbers.

We find some evidence for these difficulties, and how they were gradually being resolved, in the ***ESBOA Annual Report*** for 1988. To take a case in point, the second phase of the Customer Accounting System (CAS) was then being implemented. A pilot scheme in the company's Fleet Street offices and a subsequent extension of the System country-wide were being dealt with under a **Code of Practice** agreed between ESB and ESBOA. This code provided for full disclosure of information by management of the likely impact of the system on work and jobs. [: 26]. Although the union's dissatisfaction with the CAS outcome is clear from their rejection of it, the approach towards joint management-union consultation is significant, in the light of recent events. ESB's recent Cost and Competitiveness Review (CCR) brings that process to a higher plane.

A second issue raised was that of productivity. Since 1985, contended the Union, the Miller / Barry reorganisation, policies of early retirement and non-recruitment and "*the introduction of major new technology systems*" had resulted in productivity improvements: the resulting savings should be shared with union members, went the argument [: 27].

Computers versus humans

"Unlike memory, which people are bad at and computers are good at, decision-making is something that people are good at and computers are bad at."

[Pinker 1994: 207]

Pinker was referring to the computer's difficulty in deciding what is the meaning of an English sentence which would present humans with no difficulty in understanding: for example, "time flies like an arrow; fruit flies like a banana" [Pinker: 209].

Desmarais says that we describe innovations using the terms of the objects they have replaced. The first cars were horseless carriages. *Office calculators* replaced those *humans* who were calculators. The computer is basically a "*symbolic* calculator". We see it as merely *replacing* the typewriter, desktop and filing cabinet, though Marshall McLuhan took a wider view that computers *extended our central nervous system* [**Desmarais** 1994: 286-287].

Zuboff [1988] demonstrates that the steps of a clerical activity are broken down into their basic components before being translated into computer programmes: programmes which make it possible to rationalise activities more comprehensively than if these activities were performed by a human being [: 8].

Information technology not only *imposes* information in the form of programmed instructions, I T also *produces* information. By replacing human activities while rendering these more *transparent to analysis*, I T supersedes the traditional role of automation. She coins the word **"informate"** to describe this process [1988: 9-10].

Whereas automation *concealed* aspects of the enterprise's operations from the workers, the *informated workplace* calls for a divergent approach:

- information technology increases the *intellectual content* of work;
- work depends more on *understanding / managing / creating value from* **information**;
- as a result, a more equitable distribution of knowledge and authority is postulated;
- opening the "knowledge base" of the organisation to all workers is a corollary [Zuboff 1995: 164].

Rajan [1984] analysed the effect of new technologies in the United Kingdom banking and insurance sectors. He emphasised how managements used new systems to streamline operations - enriching of the staff's work was not a major concern of the process.

O'Mahony [1986] compared some of Rajan's findings with the impact of on-line technology and skill levels among Allied Irish Banks staff. There was no evidence of deskilling resulting from the on-line technology, found O'Mahony. New skills were acquired - say, involving keyboard and workstation use - using an adaptive learning process (computer-based training). The job specific skills associated with changed tasks were similar to the old tasks in that they were of a routine clerical nature. Productivity was improved, through the "integrative" nature of technology allowing several discrete operations to be combined into one operation.

By 1988, the white collar union ESBOA was *welcoming* the positive aspect of the introduction of technology and system development for the advantage it could bring their members, namely the potential for new jobs; new career opportunities; "access to and higher quality work" (*sic*); and an improved work environment. [*ESBOA Annual Report 1988*: 8]. As we have seen, they still retained concerns over the health and safety aspects of new technology.

Medcof [1989] utilised the Job Diagnostic Survey (JDS) of Hackman and Oldham in testing the effect of extent of use of information technology and the user's job upon task characteristics.

He administered the JDS to 30 clerks and 23 underwriters in the insurance industry.

Results among the clerks gave a number of indications.

Extent of information technology use **is positively correlated** with *skill variety*; "*feedback from agents*"; and *dealing with others*.

There is **no** correlation between *extent of use* and *task identity*, *task significance* and "*feedback from the job*".

The nature of the I T user's job **moderates** the relationship between *extent of use* and *task characteristics*.

Among the underwriters (non-clerical workers), extent of I T use was **negatively correlated** with *skill variety*; *"feedback from agents"*; and *dealing with others*.

Medcof suggests a model that differentiates between *I T-using* and ***non-I T using*** components of a job.

Changes in skill level

Skill is an issue in the informated workplace. The use of advanced technology is usually associated with a rise in skill levels [**Gallie**: 340].

Anne Fearfull [1992] detects a "divide" *between* clerks experienced in traditional or partially-computerised work *and* those who have *only* worked in a "post-computerization" workplace. She sees a problem in that younger clerks, used to a computers-only office environment, may not have sufficient skill in coping with errors in clerical work - or even recognising them - compared with older workers who have known an era *before* widespread *information / office technology* (*IOT*). The younger clerical workers place greater blind faith in computers, compared with the older clerical employees she studied. Experienced clerks incorporated their pre-existing work skills into new computerised work methods, whereas newer employees have not easily developed the knowledge held by the experienced clerks [: 432]. She argues for a preservation of clerical skills which can aid effectiveness in doing a job: some elements of clerical work should be expanded rather than removed or substituted by IOT. Without training newcomers in certain traditional clerical skills, these skills may be lost.

By 1987, **Sterne** saw office automation tools spreading throughout the workplace, but not under the heading of office automation (OA) *per se*: to him, OA was a dead issue.

Research into OA continues, however: as recently as 1993, Cheung examined office automation training methodologies among Hong Kong financial workers. His questionnaire found, for example, that very few organisations had "self-learning" facilities for OA training.

We can conjecture that in the Nineteen Nineties, much of the sting has gone from issues relating to office automation, largely because computer-mediated work is now so intrinsically a part of office life. Currently, software products used within ESB, such as EMPOWER!, enable users to better co-ordinate and automate office activities - E-mail, word processing, document filing - which they carry out at their terminals. Open-ended responses from our survey Respondents provide a check on users' attitudes to office automation software.

Writers' views

Reading Mason [1980]; Maldé [1980: 134]; or Zuboff [1988], it appears as if the dehumanising aspects of technology have concerned many thinkers.

Zuboff found plant workers unsettled by new production control systems: working through what she terms *the data interface* - such as a terminal screen - their previous knowledge and experience was confronted by systems that separated them from physical contact with their work. Jobs were represented by abstract digital symbols [: 62-63]. We might see this form of physical *alienation* in the office, were we to ask office workers for their equivalent experience.

Reitz wondered if I T increased the potential for gaining "insight" [: 181]. He outlined some indicators for *creativity* [: 178] as:

- *exposure* - the person must be exposed to information continuously;
- the person must *work at* creativity *consistently*;
- *motivation* - the person must want to create.

Baldry [: 5] sees micro electronic technology as liberating us from soul destroying or physically unpleasant tasks: productivity will also free time for leisure and creativity.

But he recognises that an opposing view has been proposed. In this scheme of things, technology, far from enriching our lives, has been a dehumanising process, taking away our "skills, creativity, and the ability to control our own work" [: 7].

In the Nineteen Eighties, Butera and Bartezzaghi [: 112] were positing that technology would entail several results.

They predicted an end to "conversion work". For example, the process of writing down information from a phone call, then again converting this information to documentary form for transmitting to other departments, might be performed by computer.

More complex communications media was expected to complicate co-ordination.

Maintenance of procedures; know-how; standards and software would become more important; there would also be rapid innovation of technology and procedures.

Otway and Peltu [1984] saw a danger in the comparative *informality* of white collar work, relative to the *rigidity* of manufacturing work. To "unthinkingly" impose structuring, monitoring and measurement on the office - which office automation seemed to require - would harm staff motivation and work effectiveness. They suggested describing office automation as *computer-assisted* office work [: 3].

Cultural beliefs about the use of information systems

Experience shapes our view of the technology: hence Zuboff [1988] met differing reactions during her research. The cautious attitude of some plant operators differed from the welcome given by process engineers. They could use the new systems for better analysis of variables and their interactions. Following "the right model", the system could be managed. While most managers in one plant she studied agreed that the new systems facilitated better plant management, some wondered if the expertise level would ever match that achieved by workers who had hands-on experience. Many managers believed the traditional knowledge of the plant workers would *inhibit* creativity and flexibility [: 67]. Plant operators viewed their acquired knowledge as a positive asset, and some felt powerless now that the machine appeared to be in control, not the other way round. [: 66].

Data processing (DP) managers mistrusted the arrival of the microcomputer in the Nineteen Seventies [**Franks**: 16]. This forerunner of today's PC was accused of being poor in performance and software. So it was alleged to be not "viable" as a business tool. But the *end-users* of systems saw the microcomputer ("the micro") as a means to take back some of their "destiny" into their own hands.

Kimble and McLoughlin [1995] found that middle managers used information systems (I S):

- to monitor the work of the people they supervised;
- to analyse and create information.

Senior managers used I S *less* than middle managers did. These senior managers gave various reasons (which Kimble and McLoughlin do not recount) for this fact but claimed that the systems did not contain information they wanted in a suitable form.
They further admitted to a lack of information systems skills.
Kimble and McLoughlin are convinced that the real explanation is cultural, not technical.
These two writers focus on *beliefs* among managers that information systems "turn managers into typists" and that older managers could not cope with new technology.
Zuboff [1988] had spoken of how this belief, that older managers could not cope with new technology, became a reason for making them redundant: she termed it a "ritual justification". Kimble and McLoughlin cite her writings, while developing further the idea that technology can impact in ways that appear to *undermine the stated objectives for introducing the system* [Kimble and McLoughlin: 62]. They record that senior managers "frequently" see a potential within information systems for removing middle management layers.
In most companies. the information technology department itself has gained power.
Friedman [1994] sees what we might call a deeper penetration of I T into the organisation allowing senior I T professionals to influence corporate strategy [: 381].

Productivity issues

Levels of productivity claimed for office automation seemed less significant when the cost of systems was taken into account, reports **Strassmann** [1985]. He thinks that the amount of office work performed in a "bureaucracy" is determined by organisational design. The principle challenge of I T (at that time) was how to deal with "unpredictable" office work. Office automation principally delivered gains through "enlargement" of work roles [: 243].

A more recent examination was undertaken by **Alexander** [1992] reporting on a survey of users at Unum Life Assurance. A survey was conducted to quantify the use and importance of desktop computing for 3,300 employees at the company's headquarters. They used a random sample of 250 employees to ensure representation of all levels. The focus was on productivity. Only two respondents said technology was a drain on productivity. Over two-thirds said technology saved a significant amount of time. *Electronic mail* clearly improved productivity. E-mail, writes Alexander, enhances internal and external customer services by providing faster and more complete information. It also allowed users remain in touch with each other yet work independently; allowed users to conduct business anywhere, anytime; eliminated organisational barriers; and provided an audit trail to eliminate confusion about past events.

Respondents identified higher productivity arising from presentation software than from WP and spreadsheet packages. The same study showed little use of Executive Information Systems (EIS). These systems have little value for the information they contain, but are seen by the study as holding value in how they are used (An EIS can reveal patterns and relationships within the business that formerly appeared disparate).

Alexander was unable to quantify the cost savings arising from use of an EIS.

We suggest this may be due to the nature of problem solving, in which an EIS is designed to assist. Problem-solving is less amenable to time measurement, and hence less susceptible to productivity analysis, say in comparison with word processing. Typing speed is a measurable quantity; but should a user discover a solution to a problem using an EIS, it can be difficult to tell if there was a better, quicker way to have solved the problem.

Keyes [1995] complains that one trillion dollars have been spent on I T by U.S. corporations without a significant "payoff" in terms of increased productivity. She feels the time spent learning how to use a WP program, instead of getting the office secretary to write the letter, can be "*counterproductive*".

One view is that computers have failed to increase productivity because software suppliers have included too many useless features in software products [**Bicknell**].

McClimans [1995] points out one reason empowerment may not be helped by technology. A company can be caught on a race to have the best technology. Focusing on this, while strategic problems of a long-term nature are ignored, is wrong. Technology will be only one part of the solution for **strategic** problems. **Tactical** problems (which we might define as those problems of a more immediate nature, having less widespread ramifications) can be addressed by cheaper, temporary technologies.
He said that while office automation succeeded in the past - spreadsheets simplified bookkeeping, E-mail superseded written memos - the increase in productivity has been marginal. Overall tasks and job functions, however, did *not* change. To redress this, companies should go beyond simply automating tasks, and allow individual business units to be creative, flexible, adaptive. This will entail decentralisation of the information systems function of the company.

Technology aimed at increasing productivity can have the side-effect of lengthening the working day.
Since the first portable computers were developed, advances have been made in extending battery life; reducing power demands; lessening the weight of units; and increasing the operability of portable systems. Portable computing - taking notebook computers and laptops as typical examples - has extended the *range* and *working time* of the office. One magazine advertisement offered a laptop computer whose battery had staying power: it promised to work for ten hours "because you do".

During the early years of office automation, Bruce Christie and M. Polly Kaiser made a number of assertions about putative problems presented by information systems.
Referring to ***role perception***, they posited that electronic systems allow better communication so linking people and clarifying the understanding of their roles. Electronic systems need not be destructive of traditional social interaction. These systems should not discourage informal quasi-social contacts, such as chats after a meeting. In our current decade, it appears that I T tools are being used to bolster interpersonal communication, not as surrogates for this.

Role overload implied that a user was unable to meet expectations made about her/his role. It was linked to the concept of information overload. More *responsibilities* deriving from the use of technology meant more dangers of *information overload.* There was not enough time for everything to be done. Role overload contributed to ***stress***, as did ***role conflict***: job performance can be impaired by role conflict [Bruce Christie and M. Polly Kaiser].

Brown and Brown [: 198-201] point out putative benefits of stress and pressure. Properly handled, these can make managers thrive; projects with a deadline become exhilarating. Pressure became the "spice of life". Too little utilisation - where individuals are "understressed" or experience "role underload" - may lead to them becoming bored, listless, apathetic. These two writers imply that proper working habits reduce stress, releasing thinking and decision-making for higher matters [: 204]. Human resources practitioners are under no illusion that the individual will be harmed by incorrect stress levels.
Role ambiguity is another identified phenomena. This could be defined as having insufficient information to do one's job as well as possible [***How modern technology affects the experienced worker - Ireland*** (1986): 45].

In the Nineteen Eighties, as office automation took hold, confusion over the relative roles of employees may have been apparent. Today, as I T tools become more integrated into the office, we suggest that future conflict will not be about who uses the tools, but about how best to use them.

Potentially I T can bring about changes in a person's job: a loss of "job content" or an increase in job quality spring to mind. The replacement of typing by text-processing is now complete. Presentation software - for example, PowerPoint - and desktop publishing can enhance the appearance of text-based work.
Read [1992] describes I T tools as capable of enhancing an employee's image. He mentions *presentation software*; *clip art* cartoons, to enliven one's overhead transparencies; and

graphics packages such as Harvard Graphics, allowing anyone to create good overhead transparencies which are easy to update.

ESB users may be able to describe some other benefits which they derived from I T.

I T: possibly a disparate outcome for women

An article headed "**Technology fails to help promote women at work**" [*Computing*, 22 September, 1994: 34] cites Dr. Juliet Webster. She claims that I T has not altered the substance of women's work in ways that were predicted. Nor has I T fundamentally changed the sexual division of labour. In addition, occupational segregation by gender in particular jobs has not been altered - women, especially in the service sector, are still concentrated in lower-grade jobs.

Part of the problem is the absence of women from the design and implementation of I T. Webster said the needs of women were not sufficiently considered in technological innovation, design or use. The culture of software - the computing profession itself - alienated females: it was a male domain, she implied.

Barker and Downing [1985] hold the view that certain forms of "resistance" in the office are "feminine". They speak of the boredom of office work and the fact that work has not been seen as "central" to women's lives, of how the "secretary" is affected by her role: she is not paid to think but to type.

The ways in which office workers (including those women bored by office routine) avoid boredom or compensate for enforced idleness are described: these workers do not clock in, for example. All the little jobs - plant watering, arranging birthdays - are escapes from the routine of "typing" (the activity of typing, according to Barker and Downing, was still a "focus" of office clerical life at that time).

Automation was set to change that pattern, predicted Barker and Downing [: 149].

Rush *et al* [1988] contend that when previous "revolutionary technologies" appeared in the field of communications, men were more active in "shaping these technologies", while women

acted as "passive recipients" of that which the technology offered. Many of those technologies arose from "male-dominated" commercial and military enterprises. Rush and her colleagues warn women not to become the "workhorses" of the Information Society.
On a more promising note, a recent study has found that women make more "proposals of ideas" when they communicate through E-mail than when they meet their colleagues face-to-face. Women were found to make equally as many idea proposals as their male colleagues did, provided E-mail was the forum for exchanging ideas [**"E-Mail or E-Femail?"** 1994].

Craig [1991] cites the disproportionate effect that the health risks of using computers represent for women. The eye strain and musculo-skeletal disorders attributed to prolonged VDU use are likely to affect women more than their male colleagues, because they are intensive users, say in typing duties or keypunching.

Other changes in work due to technology

Crawford [1993] reminds us of an adage that *information is power* - greater access to information by employees empowers them to use their initiative in improving customer service [: 105]. A good I T network assists the information flow within the organisation, and so can assist the empowering process, he implies. His employers, Bull UK, aim to use I T to create an "empowered" organisation.

Yankelovich - quoted by **Keller** [1980: 148] - considered that the "new breed" of worker was more aware, better educated and would be more demanding. Keller herself felt we would eventually see a more contented class of technicians, service workers and professionals, beside an unemployed, perhaps unemployable class. She cites Jungk as predicting a division between those doing non-routine, interesting work and those who do not " 'create', influence, make decisions for others" [: 148-147]. Referring to **flexitime**, an innovative approach to assessing time spent at work, Keller deems it to be a success.

(Her view was later recalled when one of our survey Respondents rated flexitime as being "at least as significant as" PCs in having an effect on work practice.)

Flexitime uses an electronic system to record instantly changes in time worked up. Within ESB, its initial introduction into the Head Office area was followed by union pressure for its *extension* to ESB's Regions, in order to meet staff demand [*ESBOA Annual Report 1988*: 9, 13].

The arrival of the **clock** changed civic life in the Middle Ages [**Zeldin** 1994] and working life in the Industrial Revolution [Burke 1978], making them both subject to regulation by a mechanical device. The flexitime system has in all likelihood altered working practices beyond its original purpose. Yet like its predecessor, the punch card clock, the flexitime terminal is more readily classified as a recording technology (albeit a superior one) than as an information one.

Further impacts on the business

Healy [1994a] contends that because of computers:

- *paper increases*;
- staffing levels increase, hence so do costs;
- the working week gets *longer*, not shorter.

He states that Strassmann's Return on Management theory is at work here. The value of capital investment is related to the use that management makes of it. Since computer systems are a cost of management, they can only contribute to a "return on Management" by impacting Net Revenue.

On the positive side, Healy cites a case where a small firm asked its salesforce how they might be helped by computers. The salespeople asked for a "differentiator", some feature to render their sales pitch unique. They were given colour portable computers: sales volume increased. Then the salespeople asked that reporting functions be built into the software to increase the salesforce's efficiency.

Seemingly people do appreciate how software tools can help them compete.

Formerly, the I T function within a company used to act as a "technological gatekeeper" [Reitz], funnelling technology down to end users.

End users are seeking more effective support from I T departments, parallel with having a deeper input into I T solutions. At other times, users have striven to implement their own independent solutions.

Strategies have been suggested which I T departments might adopt to cope with an imminent world of user power, as predicted by industry watchers.

Brousell [1993] offers expert opinion that I T departments would in future have to focus more on client (I T end-user) relationships. These departments would have an arduous role, because they would be managing *not* a ***physical*** data centre (where data is processed centrally), *but* a ***virtual*** one (one that is spread throughout the enterprise).

One source suggests using a corporation's costly systems to drive transactions and maintain data integrity, while users' PCs perform the simpler tasks of generating images on screen. Networks could be looked periodically to cut costs and improve productivity [**"Beyond downsizing, beyond rightsizing"**]. A *centralised network* was also suggested. This might increase the "efficiency" and "end-user satisfaction" of information systems - as might establishing a *specialist help desk*.

In the early Nineteen Eighties, ESB established an Information Centre handling I T queries. Currently such help desk functions are handled by an in-house *I T Service Centre*. Any ESB employee who has a I T-related query is encouraged to phone specialist support staff located in the Centre. These support staff are trained in customer service, while being knowledgeable about ESB's software and hardware systems.

Software design and training issues

The importance of systems design

Designing computer systems with the needs of users in mind became an issue in the Nineteen Seventies onwards.

Examining aspects of systems design in the work of **Galitz**; **Glastonbury** *et al*; Preece *et al*; **Simes and Coombs**; **Senn**; **Witkin**; and others, various issues surfaced.

Galitz [: 20-21] declares that people are "perceptual". They perceive the world according to a stored model; but they have a limited capacity for perception, which can also be affected by, say, fatigue, or "interference" in the "signal" they receive. Certain system design considerations do not either over-load or under-use the perceptual capacity of system users.

Many office tasks are *cognitive*, in that they use the human mind to understand: other office tasks are physical or social in nature [Galitz: 39-41]. From this observation, we might expect that well-designed technology systems would take these various aspects of office activity into account. Praise or criticism expressed by ESB users, for instance when responding to a survey, might signify how successful the systems design process has been.

The design of the office worker's *workstation* needs consideration: such design helps to *integrate* the "physical trappings" of the office [Galitz].

Just as a flickering display soon tires the worker's eyes, so software that fails to carry out a command can leave the user trapped in a screen *cul-de-sac*. To struggle with poorly-written software is frustrating. The user feels impotent , unless help can be called for or the problem circumvented. Exhaustion sets in under these circumstances.

Suchman [1987, quoted by Preece *et al*: 452] casts a provocative sidelight on the research work carried out at Palo Alto Research Centre (PARC) in the United States during the

Nineteen Seventies. There, researchers found that users actually *preferred **existing** forms of design rather than* ***their own creations***.

For many end users, the *reports* and *output* from an application *are* the system [Senn 1989]. So their ability to use the information provided in the manner it is provided will "to a great extent determine the usefulness and acceptability of the system" [Senn: 414].

Rubenstein and Hersh stated that users expect their use of computer (which is a form of interaction) *to follow the rules and conventions of interpersonal interaction*.
[1984, quoted in Witkin: 304]

Schneiderman [1983, cited by Witkin] made the point that users are not interested in technical aspects of systems, such as CPU speeds and the like. To users, the system only appears in the form of messages on a screen or as printed output.

Human Computer Interaction

Ours is the first civilisation to face the questions raised by a field of research known as **Human-Computer Interaction** (HCI). The study of HCI provides a useful background to how humans interface with computers.

HCI covers a wide range of scientific, psychological and sociological disciplines. An extensive array of tools is used.

The U.K. National Physical Laboratory goes to the extent of making video recordings of computer users, to examine how software is utilised in the workplace. [**Peltu** August 1993; Preece *et al*]. The flexibility of graphical user interfaces heightens the value of human factor design: software developers face added challenge. Microsoft is one software provider which follows the discipline of *usability engineering*, with "structured task analyses" of the functions that users require; video cameras observing software tests; and "usability bug tracking" [Peltu August 1993].

Some software products appear on the market containing "bugs". Bugs (program faults, which users find annoying) can appear in new products. The elimination of such faults was one of Microsoft's aims in widely testing Windows 95 before launching it on the market. Keyes [1995] implies that the *mainframe* era was a golden age of software quality. Now much commercial software contains bugs, due to the haste in producing it.

On the negative side, it should be pointed out that in the early years of computing, human factors were ignored; it seemed programs were written for *other programmers*, not the end user, to understand.

Approaches to interface design

In order to communicate information, a series of *interfaces* have to be gone through [Doswell: 48].

Computer user interfaces have undergone several stages of transformation.

Initially, systems designers utilised the *command line* type; a most basic approach.

Growing system complexity, coupled with an increased power to generate informative displays, resulted in *screen menus* becoming a popular form of interface.

In more recent times, the *graphical user interface* has become prominent.

In practice, variants of all three are encountered in ESB systems.

Two main approaches to interface design are defined by Preece *et al.*

The ***constructivist*** approach says our "representations" and "memories" intervene to construct a model of the world: this model should 'stand out'.

The ***ecological*** approach seeks to ensure that interface objects "**afford** the action" performed on them. This concept of *affordance* [Preece *et al*] connotes the ease with which an object permits humans to interface with it.

This second approach implies that we detect information by a direct process.

One way interfaces do help user to find information is by structuring the information so it is easy to "navigate through".

Neither too much nor too little information should be visible. The data should be grouped logically on screen - it should not be provided in an arbitrary order. Dialog (dialogue) boxes should be consistent.

It is interesting to note that European languages are read downwards and left to right: screen design formats encountered in ESB reflect this heritage.

A variety of ways have been devised to gain the attention of a user:

- spatial cues;
- temporal cues;
- colour;
- flashing/reverse video;
- auditory - previously, this was limited to a "beep" but in future, audible messages may *tell* users the kind of mistake they have made. One obvious drawback: this is likely to distract neighbouring colleagues.

According to Schneiderman [cited by Witkin], a "bad" screen message is one that does not follow the rules of discourse:

- it ignores the expectations of the user;
- it does not explain the relationships between message;
- it is not easily understood;
- it leaves the user feeling inadequate, defensive and frustrated.

The once-common "Syntax error" style of message was gradually replaced by slightly friendlier ones [Shneiderman]. *"You can't do that in Windows"* may be a future ultimate message.

Program message should follow standard rules of grammar and meaning. The symbols :\ used as a divider between computer filenames caused confusion for this researcher as a novice: they seemed to lack any intuitive character.

Franks [: 90] gives an examples of the confusion that can arise from screen messages.

He recounts that 0K, meaning "disk full" (no Kilobytes of memory left), was interpreted by one user as **OK** (in other words, that everything was "okay").

Rubenstein and Hersh [Witkin] suggest software designers should avoid idiosyncratic meanings or hybrid terminology: words invented by computer programmers form the arcane language of "computerese", which is off-putting to many users. Their view is that, rather than have better error messages, we *should try to avoid errors in the first place*.

Input design

Senn provides some indicators when considering input design.

Labour costs are high, so cost of preparing/entering data is high. Input is slow, whereas the computer system is fast (and can lie idle waiting for input).

Designers can speed up data entry, so speeding up the outputting of results to users.

Bottlenecks should be avoided (a bottleneck is "a processing delay resulting from data preparation or data entry operations" [Senn: 424]).

In addition, errors in data should be avoided. Senn holds that the manner of entry affects *the incidence of error*; and that there is a need to *detect errors* contained in the input by using "input validation techniques".

Extra steps in data entry should be avoided. Each extra step in large scale processing is multiplied by each transaction.

He recommends keeping the process simple: perhaps the best advice to designers is to try and achieve the objectives stated above in the simplest manner possible.

"The best-designed system fits the people who will use it in a way that is comfortable for them while providing the error-control methods management must have.
Simplicity works, and it is accepted by users. In contrast, it takes work to get users to accept complex or confusing input designs, and there is no guarantee of success in installing a complex system". [Senn: 424-5]

Testing

Human Factors Testing, as a discipline, attempts to ensure that the final system matches the attributes of human beings. It is a misconception that people will invariably have problems interacting with a system, due to human shortcomings.
The system analyst who designs system software must give the user an indication of what to do if the system screen goes blank (or does not respond).
People *do* act correctly in a given situation; they act in natural ways when things happen [Senn]. System designers have the unenviable task of developing software applications which do not present unreasonable difficulties to users. Well-designed systems will be used correctly, because they cater for our human proclivities.

The need to consider human factors is one reason why software design seems so painstaking. For example, to avoid puzzling the user, a screen message should be displayed when:

- the screen is *meant* to go blank (when an ESB computer user selects the office automation product known as **All-in-1**, s/he sees the screen message "*Calling All-in-1*"; such helpful messages reassure her/him that the procedure is under way);
- a long sorting step or lengthy printout is involved: in this case, there is a need to indicate what percentage of the data is processed or printed.

System analysts need to observe *how* the user enters data.
Senn suggests pertinent questions. Does the user use different keys to those expected - for example, the top row of numbers on the keyboard instead of the numeric keypad? Are keystrokes awkward and consequently likely to induce errors? Can screen contents be modified to reduce *excessive detail* appearing on screen? On a more physical level, can the *location* of equipment be changed to reduce *screen glare*?

These last two questions cover areas where insufficient attention to design can provoke irritation among users, feels Senn.

A casual observer of ESB's POAP system (see Glossary) might conclude that one particular screen contains a great deal of information. Yet this system was developed through a extensive design process: the opinion of actual users of POAP is surely the best gauge of its clarity and usability.

Designing an application should be an exhaustive process.
Human factors of software should be validated with users at various phases of the design process [Schneiderman, cited by Witkin].
To thoroughly *test* their prototypical design, systems designers use:

- *live* test data, (in this case, users enter *real* data - but this is not usually extensive enough for full testing);
- *artificial* test data, which is generated by specialised software.

Designers maintain sets of up-to-date data to thoroughly test a system of programs.
Vendors today go to extremes in order to "fireproof" their products from customer complaints. When developing Windows 95, Microsoft involved tens of thousands of potential users in testing this product.

Screen Management using "windows"

The modern approach of having a computer screen divided into *windows* has become the dominant convention. Senn points out that the use of windows allows overlapping.
(The windows convention also seems to utilise our ability to be aware of several items at the same time).

Having good standards for use of windows is the basis of good screen management, states Senn. The designer - perhaps a system analyst - must provide for a number of window areas.

Figure 2: Window areas

[Source: Senn]

- **Title Window** - Title, function being performed or application that is running
- **Instruction Windows** - Tells user how to:
  - Enter Data
  - Select a "processing alternative"
  - Exit
  - Typically contains a single introduction to initiate the next system action
- **Main Text Window** - (Largest portion of screen)
  - Data entry template
  - Menus or processing alternatives
  - Data
- **Navigation and Menu area**
  - Instructs user on how to move between "pages of information", screens or menus
  - identifies "escape information"
- **Message Window** - Contains information and control message
- **Flag Window** - An alternative that may be used to signal current activities or instructions being processed

DOS is being eclipsed

As the pace of development quickens, there arises a succession of software operating systems.

As the IBM PC had become the industry standard in the Nineteen Eighties, so too did Microsoft's MS-DOS become the international standard operating system [**McManus** 1994].

But DOS (Disk Operating System) is being supplanted by systems using a *Graphical User Interface* (GUI), such as Microsoft (MS) **Windows**, which has become a standard operating system for PC users throughout ESB.

The term *WIMP (Windows Icon Pull-Down Menu Pointer) interface* sums up the various elements used in a typical Graphical User Interface. Such a GUI allows the user to operate computer programs by using a pointing device, such as a mouse, to click on a screen icon representing an individual program or on a pull-down menu to select commands and options.

Williams ["Is there life after DOS?", October 1994] speaks of a "human centred interface with less dependence on the archaic keyboard".

The GUI "eliminates the need for extensive training, and the use of the PC becomes more intuitive for users" [*ISD Jargon*: 11].

A contrasting view holds that using a GUI is *no more intuitive* than driving a car - it still has to be learned. Additionally, the knowledge gained may *not* be applicable to other systems. But it is accepted that icons as used by Macintosh and Windows systems do make certain operations easier [***Computing for the Less-Terrified: Troubleshooting***].

Today's GUIs are liked by users in a manner that the older **DOS** was not. One systems developer quoted in **Thé [1992b]** commented "*if you offered people a DOS application now, no-one would accept it*". Indeed, GUIs are so "configurable" (adaptable to varying requirements) that *testing* by the software manufacturers has become very difficult; so testing has to be automated. Increased numbers of clicks, pull-down menus and dialogue boxes included by software manufacturers exponentially increase the testing workload.

A Microsoft advertisement brochure claims that millions of users choose Windows because it is an operating system which offers real ease of use with power and flexibility. Because it is based on a GUI, it is claimed that people find it easier to use PCs in the way they want. One copy of Microsoft Windows is sold world-wide every 1.5 seconds and the system comes pre-installed on many PCs [McManus 1994]. Within ESB, it is likely that the proliferation of GUI - especially when these are standardised within the organisation - brings familiarity to the workface, reducing the learning time because people meet similar procedures no matter where they go in the company.

Other points for systems designers to bear in mind

Sustain the external myth, advised Rubenstein and Hersh [Witkin: 303]. The external myth relies on this fact: that *what users see* may be independent of how *system internally operates*.

Secondly, the boundaries (limits) of the program should be clear - no program can do everything.

Rubenstein and Hersh say "multiplexing" keys are very perplexing: they cite the example of a control key that prints a letter in one mode and an ASCII character in another mode.

The amount of information needed to run program should be kept to a minimum.

Witkin [: 30] emphasises *reliability* - meaning the system and its software should be tested, and problems should be known. If something untoward happens, how to put it right should be made known to the user.

In the Nineteen Seventies, the PARC researchers at Palo Alto brought **icons** to the fore, as they experimented with the ground-breaking STAR workstations.

Icons (small graphic images on screen) eliminate the need to learn special abbreviations, notations or nomenclatures:

- they communicate information immediately as they are familiar;
- they do not add to the complexity of the other tasks which a user is performing.

Icon design and selection are crucial factors in modern systems.

Witkin comments that designers should select icons which are "immediately recognised and understood"; and he considers using an English text narrative label to be a better approach than requiring people to learn an unfamiliar label.

The value of colour and graphics

In the Nineteen Eighties one recommendation made was to use a maximum of four colours on a screen or report. Although improved screen resolution has helped to make the broad spectrum of Windows colours popular with users, excessive or poorly-planned use of colour may prove confusing. Too much use of colour can result in "colour pollution". Potentially, this possibility could be explored among ESB users.

Researchers formerly considered black and white (mono or achromatic) as sufficient for many tasks [Christ 1975; Luder and Barber 1984 - cited in Glastonbury *et al*]. Achromatic screens compared with colour screens showed more benefit to the inexperienced user, (because screen items were easy to identify). Older ESB screens tend to be monochrome - green or orange - although colour is standard on all new monitors.

Graphics are used for improving "effectiveness of output reporting for the targetted recipients"; for managing information volume; and to match personal preferences of the user.

Images such as graphs are helpful in reducing information overload. Graphs are superior to tabular and narrative forms of information for detecting trends in business performance and for comparing (such as a comparison of sales results).

Presentation software, such as PowerPoint, can produce graphs for easy transmission of concepts at a business meeting. Well prepared computer graphics have good eye appeal, but do not automatically improve the effectiveness of the presentation.

Research has found that business graphics are *most effective* for detecting patterns in data; for detecting trends or changes in trends; and for identifying performance relationships between elements.

Business graphics are *least effective* for determining the values of specific data points; for determining the absolute change in numeric values represented in trends or patterns; and for representing a small amount of data (when there only a few data points).

The preferences of users is important - unless there is a good reason to, it is recommended that a familiar pattern of presentation should not be changed.
For example, accountants will not accept graphs as a replacement for traditional tables showing profit and loss - even though "graphs have the same information content as tables, they only appear to have less detail in the graphic version".

Modern software packages are being designed for greater usability, greater immediacy.
A user can enter items onto an Excel spreadsheet and watch the columns of a three-dimensional chart change. This can be enlarged, say, with PowerPoint presentation software to create impressive charts - useful in presenting financial data to a group.

Voice input

Tyler [1995b] feels that **voice recognition** has become viable (owing to technological improvements), but that it is not being adopted widely enough. This technology enables the user to dictate speech via a microphone into the system, which reproduces it as text - to be read on a screen, say. Lengthy documents can now be recognised, with an increasingly-acceptable level of errors.
A range of benefits claimed for voice recognition. There is less risk of RSI (repetitive strain injury) among keyboard users. It is attractive to those with limited keyboard skills.
Speedier typing output is predicted, as typists would simply have to correct and edit text already verbally entered by the dictator. Faster dictation times, compared with dictaphone-style audio-dictation, are indicated.
Faster input will speed up the work of executive personal assistants ("PA"s), as less keyboarding is required - additionally, the PA's role is further differentiated from that of a

typist. The new generation of mobile executives could dictate their work into a laptop, for example, while away from their office base.

Research has been undertaken for some time into voice-activated input as a means of interfacing with computers. 1994 saw the formation of a Speech Application Recognition Committee by I T companies including IBM and WordPerfect: it aims at defining a common interface so that software designers can integrate speech recognition into their Windows applications [**Frampton** July 1994]. In the same year, IBM released their *Personal Dictation System*. This *IPDS* has a vocabulary of 32,000 words, accepting dictation at the rate of 70-100 words per minute - faster than the average typist.

An accuracy rate of around 96 % is claimed. After acquiring such a system, the user needs to "train" it to recognise her/his voice: seemingly, this process only takes an hour or so.

An IBM speech recognition specialist feels that the main application for speech recognition is still voice processing, with electronic mail a close second. Much research is continuing, and in five years time people may wonder why they had to learn to type; by that time, voice accessed menus will be a reality [**Hobby 1995c**: 34].

South Western Electricity Board (Sweb) in the U.K. apply their voice recognition systems in looking up incoming customers' account details when customers phone in with routine queries. This frees staff to deal with more complex customer queries [Hobby 1995c: 35].

Because voice input is in its infancy, it will be some time before it reaches most ESB desktops - although ESB's I T Services have conducted trials of the IBM product.

Data management issues

Data that is gathered needs to be *managed*.

Computing novices are likely to face problems of data management [*Computing for the Less Terrified: Troubleshooting*, BBC 1 TV, 10 July 1994]. Users should assume that if something *can* go wrong it *will*.

If you *share* a system, say on a LAN (see Glossary), it can grow chaotic.

If users *only* keep their data on computer, then *backing-up* data - in other words *making copies* of it - is essential. But back-up alone is not enough - backed up data which is faulty ("corrupted") remains faulty.

The TV programme reminds users to use anti-virus software (that is, software which checks for harmful programs that would corrupt data) to ensure floppy disks are safe to be introduced into the system.

Franks also emphasises [: 109-110] the essential need to make back-up copies of floppy disks, in case of loss or damage to data. (It seemed a pertinent question for our survey to ask users how easy they find taking such back-up precautions.)

He suggests that certain issues are crucial in business computing: users should think and plan ahead to avoid these problems. One of these is running out of disk space - which always happens at an inconvenient time. Another is coping with limited memory - especially where memory demands are high: examples would be accounting data files, spreadsheets or WP applications. To find space in their computer system's memory, users may have to look at the storage demands of luxury items. (Computer magazines, for example, suggest cleaning up a system's hard disk or *uninstalling* Windows features such as "wallpaper" as means to recover hard disk space).

Based on anecdotal evidence, most PC users have run out of memory at some stage: this can entail the inconvenience of shutting down applications to "free up" disk space.

Reviewing computer systems is necessary from time to time, in order to ensure that *optimising techniques* such as *file compression* are being used [Franks]. These techniques aim to improve the performance of systems towards the optimum. (We might be tempted to ask if the system should not automatically perform such functions on behalf of users, rather than relying on a user's own initiative.)

Franks [: 61] points out that users need to know about simple directory management operations, such as finding their computer files; and making back-up of files resident on disk drives and floppy disks.

Two prime means of transferring files between computers are currently in use [Franks: 127].

Physical media, such as three and a quarter inch floppy disks, have become fairly *robust*; very *portable*; *reliable*; and *compatible* between systems. Thus, data may be transported easily between offices.

Communications links between computers including networks, have hastened the delivery of information, distance being less of a restrictive factor.

Increasing system efficiency and making systems work together

"Interoperability" denotes the ability for different computer systems to work together. But even at a basic level users have difficulty. The *Economist* discusses how the increasing volume of software on PCs - *software bloat* - means that despite their vastly increased speed - compared with a decade ago - PCs have a problem coping ["**When the bloat comes in**"]. One of several solutions is Object Linking and Embedding (OLE). At present, much of the PC applications - spreadsheets, word processors, organisers, DTP - duplicate features such as spell checkers and graphics software. Microsoft's OLE allow applications to call up graphics programs, for example, from other programs, using interactive links. The wider use of efficient features such as OLE would benefit users. Microsoft predicted that Cairo (as its object-oriented software was then known) would oust other operating systems within three years of launching. The company patently believe that users prefer features such as object-orientation (in this case, objects being self-contained programs, each performing a single function). The article notes that manufacturers prefer to add features, rather than drop them. ESB users are likely to hold opinions about how well they manage their complex software and what they think of new features when they are launched.

Documentation

Laudon and Laudon [: 572] say that **documentation** (the written material - a user manual, for example - which relates to a system or software product) is an often-overlooked, yet vital part of information systems control. It is vital from the user's viewpoint. Yet we hear accusations that no-one reads manuals, that these are too wordy. Some ESB staff

appear to ignore the index supplied with a manual and try wading through the text.
Documentation must be accurate (that is, reflect the application) if it is to be credible.
Therefore **on-line help**, manuals or charts that the *end-user* sees must "preserve credibility". Paraphrasing **Bailey** [**1995**: 130], help menus can be defined as programs within programs which provide assistance to the operator as to how to run parts of the main program, such as a word processing program. Modern software users have the advantage that help is available directly from the computer (on-line) as well as from traditional manuals.

Large manuals are still *de rigeur*. In the ***Handbook*** supplied with **PowerPoint** [: Page xv], Microsoft give two reason why the book is so big: firstly, PowerPoint has "a lot of sophisticated features"; secondly, much information is duplicated in the book. The reason given for duplicating this information is to ensure that users find the answers to their questions: because users look for help in different ways, information is repeated under different headings.
The manual for Microsoft's word processing product, Word for Windows, is over 800 pages long. Add to this the various manuals provided for the rest of the Microsoft Office suite of programs (Excel, Mail, PowerPoint) and several thousand pages of reading face the prospective user.
Manuals themselves are not graphic enough, appearing to this researcher as excessively text-based.

In fairness, we expect software products to be backed up with documentation, especially if software problems arise. Also, since computer memory is no longer as constrained as it used to be, software nowadays arrives with a great deal more assistance built-in. The advent of on-line help menus is intended to save time hunting for explanations of a feature. On-line help, incorporated into most modern software products, is a form of assistance obtainable upon demand by the user of the software product. But improvements can be made here: examples of the feature *in use* are rarely, if ever, given - just a dry explanation of the feature.

Introducing a system into the workplace

Christie [1985c] asks us to consider, before introducing a system, the *need* for a solution.

We need to ascertain the nature of the problem we are trying to solve. Examine previous solutions and previous approaches that have been tried, he advises (presumably the belief is that we can learn from our mistakes). Christie tells us that the effect of a system can spread through the organisation, so we should try and gauge this "spread of effect". (Obviously, ESB introduces any new system precisely so that it will have some effect.) He tells us to judge the effect on pay scales, and to assess the likely timescale involved in implementing the changes.

I T training

Franks makes an interesting assertion relating to age and adaptation to information technology. He claims to know cases where *older* workers have adapted well to new I T, whereas *school-leavers*, finding the discipline of business computing boring, may adapt their standard of work accordingly.

In the case of telephone exchange staff undergoing training in new digital exchanges, a study found that less-experienced workers were less affected by change than experienced workers [*How modern technology affects the experienced worker - Ireland* (1986): 145-146].

All systems have a learning curve which varies depending on their complexity. While the rudiments of Windows can be learned in a matter of hours, achieving proficiency takes longer.

As systems evolve, users have to cope with new learning to obtain the best from those systems. It should be possible to ask ESB subjects about their learning experience each time they receive a new feature or upgrade.

Training users to cope with technology remains a focal issue within ESB. In 1992, results from an ***Information Technology Education / Training Survey of Managers and Supervisors in ESB*** were published. Targeted at 2,618 staff, the Survey made findings of relevance to our study [: 3, 6].

Most Managers / Supervisors had easy access to terminals and PCs.

Only 14 % of these Managers / Supervisors felt they fully exploited the information technology available.

59 % of them were not familiar with the relevant manuals.

Almost half of those responding considered themselves inadequately skilled in the PC software available to them.

Standardising and simplifying the log-on procedure (see Glossary) and disparate keyboard configurations were seen as essential steps towards "successful training", as were improving ease of movement between systems and the speed of response.

Insufficient training and non-availability of I T training locally impede exploiting the available technology. Time constraints and a perceived lack of management commitment to I T training also limited the exploiting of I T.

Better manuals; a good Help Desk (where users' queries can be sorted out); and regular communication concerning system enhancements would assist in exploiting the technology.

Preferred methods of learning were classroom-style (with an instructor) and on-the-job training.

It was felt that improved training would ensure better use of PCs.

The survey also concluded that *Technology-based training* (TBT, virtually a synonym for computer-based training) and ESB's *Learning Centres* might meet some of the training needs.

Computer-based training (CBT) encompasses a variety of training tools that utilise modern technology [*"Training: Computer-based training works"*, 1994]. Specially-designed training software is available on computer disk or CD-ROM.

Computers can also assist by providing *job aids* (information or instructions relating to a particular task or job).

Reaching out to educate and empower

Learning within formalised settings reaches back as far as ancient civilisations, probably further; the basic desire to develop the learner lies at the heart of modern training methodologies.

ESB's commitment to in-house training is a long-standing tradition. One indication that this remains so lies in the company's establishment of Learning Centres at its major locations country-wide. These Centres provide a range of instructional material, of which computer-based training is most notable for our purposes. This technology utilises CD-ROM to instruct novices in Windows and software, for example. The "multimedia" approach of modern CBT combines sound and vision to enhance the learning experience, as recommended by pedagogic theorists.

People are adaptable: they may also adapt wrongly if that is the natural option to choose. They may get used to inefficient procedures for editing and saving word processing documents. They may take up the time of their more-experienced colleagues while learning about new technology.

This could be called a "hidden cost" of technological change. Some users learn just enough to get by, so they can move on to the next feature they have to grasp. Some users may reach saturation point and stop absorbing information.

Formalised training is a cost to the organisation. When people were recruited as typists, and spent many years doing the same work, when the pace of technological change was slow, then retraining of the workforce was not an expensive, on-going part of the business plan. But now, as workers expect more from their careers, as managers expect more from employees in terms of ideas and intellectual input, learning is an integral part of the empowerment process. The working experience of an organisation's members may be enriched through the learning experience.

The more people learn, as when they use a graphical user interface, potentially the more they *can* learn.

Software applications and I T tools

If we are in the third phase of I T when software usability has become the main issue (as Friedman [1994] has claimed) - it seems opportune to consider software applications and software tools which potentially may enrich the work of end-users.

The enhanced processing power in corporate mainframes will continue to support finer systems for end-users; simultaneously, desktops are gaining in MIPS (*m*illion of *i*nstructions *p*er *s*econd) abilities, declared **Ryan** [1 February 1992: 135]. Desktop computers capable of performing over one billion instructions per second show great potential for speedy office applications, he adds.
Software applications can be grouped according to their purpose. Some of these are *ubiquitous*, meaning they are widely found on corporate computers. Some more exotic uses for information technology - videoconferencing seems an obvious candidate - have not made deep inroads, as far as ESB is concerned.
However text-based systems, notably word processing and desktop publishing, are extensively used in the company.

Word processing software

Danzin [1983: 28] defines a word processor as "equipment designed specifically for text handling office tasks". Initially the word processor was perceived as an advanced form of typewriter. But unlike typewriters, word processing software has become accessible to many ESB staff, because this form of software is found on all PCs and many other terminals. Various ESB offices have utilised a gamut of standalone word processors over the years, including IBM, Wang and WordPerfect products. However, two WP products currently predominate throughout the company: the All-in-1 **WP** word processing option, from Digital Equipment Corporation; and Microsoft Word, installed on the company's PCs, generally as part of a suite of applications known as **Microsoft Office**.

Word processing software is designed for text-based applications, such as creating letters, reports and other documents. The files so created can be retrieved and edited. Text can be formatted/underlined/bolded/italicised for example. A WP facility called "*mailmerge*" allows a data base of names and addresses to be combined with the text of correspondence, for sending to a number of recipients [ISD Jargon: 32].

Word processing takes as its antecedent the office typewriter. It has harnessed the power to store and manipulate data electronically to the existing QWERTY keyboard, and produced a minor revolution. O'Broin and Farren writing in 1978 were unaware of the changes to come, as were their research subjects, civil service typists. ESB no longer has a profession of typists dedicated to that sole task: typing (word processing) is now one of a range of tasks performed by a Clerical Officer category, which has a wider-ranging job description.

Before looking at some of the aspects of word processing, we sound one discordant note.

In a letter to "New Scientist", based on her own experience, **Anne Armstrong** reports "*Yes, constant use and dependence on word processors diminishes both handwriting speed and legibility*".

Most WP products, and DTP products such as Aldus (now Adobe) PageMaker, have sophisticated spell checking facilities - the user manuals supplied with Word or PageMaker will testify to this.

Spell checking ensures that inputted text is checked by the software for user entry errors - basically, any combination of characters which the software product did not recognise. Users have the option to correct or ignore a typing error (for example) or to add the unrecognised text to a personalised dictionary.

A macro is a software feature which allows users to store a regularly-used sequence of keystrokes and mouse clicks under a simple command, which is called up when required. Alleviating tedium is the stated intention of this feature. Macros in Harvard Graphics or in Word are intended to augment the productivity of users at work. [Read 1992: 13; **Lynch** 1993].

Word 6.0: an example of improvement in a WP product

Manufacturers are constantly developing their products. Take the example of a best-selling processing product, Microsoft Word. Reviewing the version known as Word 6.0, **Garry Ray** describes it as having an abundance of new features, while offering enhancements which make Word's original and newer functions more effective.

Its redesigned Toolbar is an example. This array of icons can speed access to a number of functions that might normally be found within menus and dialog boxes. In Word 6.0, the configurable Toolbar brings these functions to the forefront. Context-sensitive Toolbars incorporated in Word 6.0 can be "customised" (adapted to the user's preference) by adding or deleting functions and tools. Creating a custom Toolbar icon is as simple as clicking on a Word 6.0 command in the Customize dialog box, then dragging the command to an existing Toolbar. A menu of icon patterns appears on the screen: the user selects the one s/he wishes to apply to her/his custom icon. A new icon can also be created with a drawing tool; also, icons are easily removed from Toolbars.

Word 6.0 allows users to change any pull-down menu to their liking. For example, if they do not like menu command ***Tools Options*** (which can easily be confused with the adjacent Tools Customize), it takes only a few mouse clicks to *rename it* ***Tools Configure Word***. New pull-down menu commands based on macros or embedded Word functions can also be added.

Ray felt users would be able to gain immediate productivity using default settings, menus and Toolbars ("default" indicates the standard features provided by the manufacturer). The new Word 6.0 background printing function means the user's screen is no longer tied up during long print jobs. Users can select and automatically open any number of regularly-used documents from the File Open dialog box or by using the new File Finder feature [Ray].

Features have been added which aid editing and formatting.

Tennick [1993] feels two useful features of Word 6.0 are *AutoCorrect* and *AutoFormat*.

The former corrects typing mistakes as the person types them. Users can add their commonest typing errors to Word's in-built list of common typing mistakes. These are eliminated from text as it is typed in.
The second feature, AutoFormat, allows text to be typed in Normal mode, then it can *automatically* format this text. The AutoFormat command will examine any document and automatically apply a series of document styles, fonts and formats from its active style libraries. At the end of this process, users can accept or reject each formatting suggestion.
Ray found AutoFormat to be reasonably accurate and speedy: a 135-page ASCII document was reformatted in less than 10 minutes. Although the document still required substantial fine-tuning, without AutoFormat this process would have required far more adjustment.

Tennick considers that these two features remove much of the drudgery of *spell checking* and *outlining* of text. However, he comments adversely on the product's requirement for computer memory.

Desktop publishing

As **Daly** [1994] points out, the rise of desktop publishing coincided with and was in part fuelled by the success of Apple's Macintosh computer. It appears to be a classic case history: the computer industry did not imagine that the ability to prepare reports and newsletters by using a package literally on one's desktop would be so keenly sought, once users saw the possibilities.

Today's desktop publishing - generally shortened to **DTP** - is so fully-featured that high quality output is expected from it.
DTP products such as Aldus PageMaker (used in ESB) have all the features of word processing: spell checking and formatting features, for example. They are specifically designed for producing documents which themselves will be reproduced. Hence one of their key functions is the origination of material for printing.

Spreadsheet Products

A spreadsheet could be thought of as the software equivalent of a large sheet divided into cells, laid out in rows and columns. On this sheet **numbers** - such as budget figures - and **formulae** can be entered. Spreadsheets are intended to facilitate complicated calculations. Reports can be produced from the information they contain.

From their inception, spreadsheets such as Visicalc proved wildly popular: they provided a genuinely-useful application for the burgeoning personal computer market.

Lotus 1-2-3 is an established product within ESB, while Microsoft's Excel has also become widely available on the company's PCs.

In a recent book about the Apple Macintosh ("*Insanely great: the life and times of Macintosh, the computer that changed everything*"), **Levy [1995]** notes that spreadsheet and word processing packages *are not just superior to* paper-based methods, that Windows *is not just a simile for* paper files and folders. They have **not** simply *replaced* the "real thing" - they have ***become*** the real thing. Word-processing packages are not just better typewriters; they can also check spelling and grammar; facilitate editing; and allow whole blocks of text to be shifted around and between documents.

Linking documents together: a trio of tools

Appleton considers that management information systems have not imposed much structure on the "professional knowledge worker" whose tasks can vary on an hourly basis. They may experience a "chaotic in-flow of paper-based and electronic information from colleagues, suppliers and customers". Meanwhile they are under *time pressure*. The data needs to be "massage[d]" (*refined*), before being sent to an "ever-changing" set of recipients.

In ESB, such knowledge workers range from chemist to financial analyst. They present a potential target for the document management tools and linking software features described by Appleton, which include Dynamic Link Libraries (DLL); Dynamic Data Exchange (DDE) and Object Linking and Embedding (OLE).

OLE is perhaps more familiar than DDL or DDE: we shall concentrate on this, reproducing an example provided by Appleton. Using OLE, a user can "click" on an icon (that is, select the icon) to invoke thousands of drawings indexed in a Lotus database; then s/he might call up a desired drawing using Lotus Notes (a groupware product).

The key here is the integration afforded by the ability to *link applications and data*. As will be seen, questions in our survey instrument investigate issues of data linking.

Graphics software and graphic design

Computers are being utilised to replace traditional flat artwork [***Computing for the Less-Terrified: Design***, BBC 1 TV programme, 26 June 1994]. The problem with such artwork is that any changes made in the artwork are hard to incorporate. Computerised graphics and drawing packages - such as the Micrografx and CorelDraw! used in ESB - claim to be more flexible. A designer averred on the TV programme that computers have not taken away his job as he feared - it had only removed the "nastier" aspects of his job. *Scanners* (input devices which can capture images - say, a photograph - or text) can be used to scan in images which are then capable of being manipulated by the designer. *CD-ROM* allows libraries of images to be stored: these can include "clip art" (see Glossary).

On screen, designers can alter the contrast, hue and saturation of the image, so pandering to our human liking for visual impact.

References in Read [1992: 74 and so on] and in the manual supplied with Aldus PageMaker indicate that graphics products help people who cannot draw to produce creditable results. Read [1992: 89] notes that users can do a lot of "tinkering with colour" in Harvard Graphics. A question worth exploring arises here: since potentially time could be wasted using this feature, it may act as a drawback to productivity.

Optical Character Recognition (OCR): cutting down drudgery

Evans [1995b] declares that OCR is becoming a standard office tool.

OCR is software designed to "read" printed text, converting it into an electronic, computer-usable form. For example, using OCR software, a page of printed text could be *scanned* (using a scanner) into a word processing product, for later editing. This facility is intended to reduce the incidence of documents being retyped. The accuracy of scanners is improving. Evans quotes typical error rates ranging from 5 % down to 0.05 % - though this is lower than that achievable using manual keyboards: from 0.5 % to 1.25 %. Hand-written text is less amenable to OCR capture, but Evans predicts more use of OCR for manual (written) data capture in years to come.

Wszola describes OCR *uniting with* fax, so that an incoming fax document can be scanned into the user's PC; it then becomes available for use in word processing software or databases and for viewing by colleagues.

Time saving with software

In order to make knowledge more "productive", Drucker [1993: 174] feels that the "managing" of time is required.

Software facilitates two notable facets of time management.

Firstly, modern software provides features which avoid duplication of effort or which save time intrinsically. A set of examples will help to clarify this assertion.

The *cut-and-paste* facility allows, say, blocks of text in word processing, or groups of numbers in spreadsheets, to be replicated easily. Such an ability to select a piece of text which has already been typed in, then to repeat this text in the document, obviously will reduce inputting time.

Being able to apply a format or text style, say bolded text, quickly throughout a document appears to be a potential boon, unknown during the typewriting era.

Spell checking and grammar checking, in addition to being aids to accuracy, might save time in avoiding retyping of documents or consulting text-based dictionaries and grammar references.

ESB end users are in an excellent position to gauge any time saving implications arising among their daily office tasks.

Secondly, software exists which has been specifically designed to *keep track of* and *plan out* working time. These are the electronic equivalents of *calendars*, time and event schedulers and Personal Organisers. **Stibic** [: 1] singled out *"professionals"* as needing to schedule their tasks and appointments - but this need probably applies to all knowledge workers. (Mintzberg [: 148] found that managers become *slaves* to their appointments diaries. It is fair to wonder if an electronic version of the diary alleviates this state of affairs, or simply computerises the problem. The real issue is *the optimising* of management time.)

Aside from the efficiency issues attached to computerised scheduling, we might expect in future a beneficial side-effect: freeing up of time during the day may leave more time for personal development - or simply to gain respite from hectic activity.

Time management at work, as Atkinson [1992]; **Higgins** [1994b]; or **Godefroy and Clark** demonstrate, can be facilitated by following proper methods and by using appropriate tools. **Harvey** [1994] has listed various information technology tools which supervisors can employ in managing their time.

Project management software

Among the four categories of organisational structure described by Flippo is that of the project structure. This structure is usually created for a particular task, "the project", for example, the design of a new aircraft. By creating a special structure, the organisation is endeavouring to give this undertaking special emphasis. This is especially true where the project is of vital importance to the company's business or policy objectives. The project structure can be very effective in a accomplishing important goals.

The field of I T itself, in developing both software and hardware, has made widespread use of the project-style structure.

The vagueness and complexity of the project structure is made up for, says Flippo, by the "coordinative power of the knowledge and expertise of the participating specialists" (on the project team).

Organisations may create a series of parallel project teams, each of which develops a sub-system. (We could surmise that project management software can co-ordinate some of the resulting complexity.)

In the context of undertaking knowledge work, Drucker [1993] feels we need to "organise our ignorance", because there is more ignorance than knowledge about a given situation.

Project management is a classic example of the knowledge work that teams undertake.

In recent years, the tools developed to enhance project management have been refined. These have been computerised: now it is possible to obtain a project management package that runs on a fairly basic PC system. Such packages allow for diverse business activities to be treated as "projects" and so to be scientifically controlled.

Project management software (PMS) is designed to help users plan and manage a project. Microsoft's product called **Project** is project management software which users can install on their PCs. It can generate Gantt and Pert charts, for example: these are used in tracking the project's progress.

Yet it still requires much identifying of *critical paths*, of *key points* and *decision points* of the project prior to tracking the project [**Johnson** 1993]. It cannot do this on behalf of the user, who has to define the project parameters. Constraints such as this obtain throughout the data management field: the user has to do much of the groundwork.

It seems evident that many predictions cannot be made about what a particular project will entail, until we know more about the project. Trial and error appear inevitable. The computerised approach to project management assists us in keeping the human-created parameters on track and up-to-date, or in revealing new linkages between data not previously noticed.

Workflow automation

Thé [1995] sees **workflow automation software** as a means to develop applications which "squeeze out" the time lost between tasks, where workers, having completed one task, are waiting to begin another task. Much time is wasted in the lag between tasks: this, claims

Thé, is why office worker productivity remains stagnant while factories have gained in efficiency [: 65].

Customer service representatives at Consolidated Edison now use an automated **workflow** system to deal with customer inquiries **[Glister]**. The aim of the system was to allow paperwork relating to customers to be tracked and retrieved electronically - filing cabinets would be eliminated. Among additional benefits, apart from improved productivity and efficiency, was the ease with which manager could access data in real-time at their desks, providing timely reports. Because workstations operated under Windows, users lacking computer experience could learn the system quickly.

Executive Information Systems (EIS)

The title of this information system gives a clue as to its original purpose.

An Executive Information System (EIS; plural EISes) was originally designed to permit more effective decision-making by senior management. As such, a limited number of personnel, holding executive positions in the corporation, have access to this breed of system.

Information has always been vital in the decision making process. Decision making is a function of the executive in the twentieth century corporation [Flippo; Mintzberg].

Ein-Dor and Jones assert that information is an important organisational resources [: 1].

U.S. corporations are using EISes for *data mining*, to extract every atom of value from identifying customer purchasing patterns and so on **[Cronk]**. Powerful analytical tools of EISes search for relationships and trends within databases; a drill-down capability permits the underlying statistics to be viewed..

Reflecting a change in how such systems are regarded, and their wider use by non-executive levels, EIS has more recently come to mean *Enterprise* Information Systems.

The Executive Information System which was installed in ESB (described by Duignan 1993) is intended to facilitate effective decision-making by senior management. As such only a limited number of personnel have access to it. In an interview (May 1994) with this researcher, an ESB manager expressed a view that, while facilities such as the EIS provided senior management with information, those lower down in the organisation were not as well served.

Beginning in 1995, ESB staff have been able to use their terminal screens to view current newspaper items concerning the company. But this feature is not interactive: information cannot be manipulated to project the possible outcome of events, for example. It remains something of an electronic newsletter in that respect.

A chasm is opening in the access to informing technologies available to different categories of ESB personnel. At the pinnacle of the office echelons, senior executives have EISes and secretarial services using WP and E-mail. Among the non-office echelons are found Craft and General staff (examples being electricians or cleaners) who generally do not even have access to a computer terminal.

Knowledge-based systems

Hedberg; Laudon and Laudon; and others discuss some of the salient points of a **knowledge-based system** (KBS; plural KBSes). A KBS can hold an accumulated store of knowledge about a particular field or subject - say, medicine - providing information to solve problems upon request. Sometimes KBSes are administered by *knowledge analysts*, who are skilled in the subject area and so can help retrieve the required data more efficiently.

Certain KBS applications can access third-party databases without the user's intervention.

A KBS can make use of **time-dependent** data. A real estate (property) system has been given as an example. The accuracy of some information decreases as soon as it is acquired (for instance a house could be sold or taken off the market). The beliefs formed from such information could eventually lose their validity. Therefore, the KBS must recognise when a belief is no longer valid and re-establish the supporting fact (data) if the belief is still essential.

In one sense, a KBS is designed to act as an oracle, dispensing wisdom.

Case-based reasoning

The recent arrival of case-based reasoning (CBR) demonstrates that computers can supplement human reasoning in the solving of problems. Naturally, this path is being followed. The very nature of CBR, as outlined by Hedberg [1993]; **Liebowitz** [1993]; and **Houlder** [1994], permits us to view previously-encountered situations and to profit from that knowledge. CBR is designed to match our current problem against a stored data bank of previous cases.

Corporate knowledge for all

Despite the seeming complexity of KBSes and CBR applications, they hold some promise of manipulating data to the benefit of not just professional users, but less-specialised employees too. Within ESB, the use of a KBS might some day be envisaged to provide *all* employees with facts about the company's activities and plans. We could term this body of data "*corporate knowledge*". The benefits of a powerful information system enjoyed by senior managers - ESB's Executive Information System being a case in point - would thus be extended to a wider staff audience, who could manipulate data after downloading it.

To give all employees access to the corporate knowledge base will be costly and it may endanger the status quo. But an organisation that allows this has taken a great leap of faith into an unknown future, where an idea can spread like wildfire, instead of having to be fanned slowly from the top down, sometimes expiring without the oxygen of interest which ideas need.

Data analysis and prediction

We might consider chaos theory as providing some explanation as to why our predictions of effects cannot always be guaranteed in advance. This scientific concept holds that a slight change in system can produce major effects on the system as a whole, as the effects spread, throughout the system like ripples in a pond.

To help predict events within a business environment, software is available which can run "what-if " scenarios: these test the likely outcome of an event, given differing factors in the equation. Software developers incorporate " what-if " feature as a useful tool in spreadsheet products, EIS and *Decision Support Systems* (DSS).

For several years, the appeal had been mainly to executive staff, whose work calls for greater long-range planning. Providing what-if capabilities in software is likely to prove increasingly useful to non-executive employees at the customer front-line.

Database products with their data entry features were invented to handle large volumes of data. *Database management systems* (DBMS) have evolved into sophisticated tools. Microsoft's product *Access* and other database products found on many ESB PCs are capable of retrieving large quantities of data items and of performing complex relational analyses upon the retrieved data. Modern databases, holding customer records for example, are open to data mining by relational database management tools, aiding employees in sieving through the mass of business data.

Controlling paperwork

Opportunities for automation still exist. Consider the case of one ESB department's *attendance sheets*: formerly the originals of these were created on a typewriter, but are now created using DTP. A significant difference is the neater appearance, as well as speedier updating when employee details change. But each employee still must fill in the paper form manually; the forms are then checked visually by another employee.

This resembles a wasted opportunity - though perhaps cost and complexity issues intervened, as they tend to do with I T investment possibilities. Technology exists which would allow employees to sign an electronic "form", which could then add the data to a database - and produce an on-screen report should anyone wish to check on attendance. It should even be possible to send a signal via the flexitime card of each employee, as s/he clocked in, to indicate that s/he was present.

More linking of existing systems is touted by vendors as the way forward for information systems. A " systems approach " is the goal of many I T managers - but the goal is proving troublesome to reach.

Take the use of imaging technology. Formerly, to simply make a copy of a document when it entered, or was created within, an organisation would have been a reasonable use of the available technology - the photocopier. Office copiers surged ahead from the Nineteen Sixties onwards because they met the needs of large organisations; cheap photocopies, however, can represent costly clerical time spent in making copies [Strassmann 1985: 168-169]. Today's organisations can go further than simply adding to the paper mountain. Document management attempts to harness documentary information, not just replicate and file it. State-of-the-art scanners can read many formats: newspaper and magazine articles; pre-printed forms; typed memos; charts; photographs. An organisation may scan its documents into an imaging system, storing them for later retrieval. Companies ranging from insurance to public utilities are utilising *document management systems*, sometimes in conjunction with *document flow systems*, for regulating organisational paperwork.

Some systems which are specific to ESB

Any detailed study of ESB's I T structure will encounter systems which have been developed specifically to cater for the company's particular requirements.

The Customer Accounting and Information System is one of the most important and complex systems in ESB, providing information concerning over 2.3 million customers.

The **Management Operations and Cost Control System (MOCCS)** was developed "as an interactive budgeting, costing and management reporting system which provides management with the physical and financial information necessary to plan, budget, monitor and control all ESB's activities".
"It provides physical and financial performance reports, related to organisational responsibility levels, which compare results with plans and highlight areas requiring management attention" [ISD Jargon: 17].
MOCCS provides timely operational and strategic information on how the company is spending money and performing against key business targets.
One of the intended aims of MOCCS was "reducing the paper mountain" [***We've put management control at your fingertips. MOCCS***].

The Materials Management Information System (**MMIS**) refers to a number of systems relating to the materials management activity of ESB, notably the Warehousing and Stock Control System and POAP.

The **Purchase Order/Accounts Payable** (POAP) system provides on-line real-time entry and enquiry on data covering the Purchasing and Accounts Payable aspects of the MMIS. It is also referred to as AP/PO [ISD Jargon: 20].

Demand is growing for systems which can retrieve text and image information from documents, making the contents available more widely to the organisation. ESB's **Distribution Facilities Information System (DFIS)**, described by **O'Loghlen** is intended to streamline the flow of documentation relating to the electricity distribution activity. The DFIS is primarily a computerised model of ESB's entire electricity network. It is capable of holding all available information relating to every component of the network.

The **Distribution Work Management System (DWMS)** facilitates the planning, organisation, and control of all work carried out by ESB's Regions.
Traditionally, work in the electricity distribution system was controlled by a paper-intensive system: the volume and complexity of information collected led to an overload of possibly-outdated information [**DWMS: Distribution Work Management System**, *T & D (Training & Distribution) Journal*, October 1992: 22]. DWMS is a screen-based replacement which aims to provide rapid access to information.

Colin Richards-Carpenter [1993] writes of how a Computerised Personnel Information System (CPIS) can help deliver valuable human resources information within a corporation. ESB's **Personnel Management Information System** (PMIS) is a personnel information system available throughout the company to Personnel / Human Resources staff, to Payroll staff and to all managers. It contains comprehensive personnel details (including skills and training), absentee records, sick leave and related data for all ESB employees and Pensioners [ISD Jargon: 20]. It has been designed and implemented as part of the decentralisation of the Personnel function. ESB's "Corporate Centre" (housing certain centralised functions) and constituent "Business Units" utilise the system.
PIRS (Personnel Information Retrieval System) is a text retrieval system which contains all the text of all ESB personnel procedures and ESB Industrial Council Recommendations, for example. It is available throughout ESB to managers and to those involved in industrial relations activities [ISD Jargon: 20]. The system contains thousands of documents, which are continuously updated.

Non-voice-based communicating systems

Electronic mail

Electronic Mail (E-mail) permits users to type the text of a message on their computer screen, then forward that message electronically and instantly to a one or more colleagues. Naturally E-mail is also used to read incoming messages from colleagues. Within ESB E-mail would be most familiar as a feature of the All-in-1 system. Plans to improve E-mail facilities for ESB users are under consideration .

E-mail is also offered by Microsoft as part of its "office suite" (Microsoft Office) and by Lotus as cc: Mail, to name but two of a range of competing products. Foy [1994] describes how some companies use E-mail for "rapid transmission of news items" as well as business communications.

ESB would fit this mould. When this researcher surveyed the E-mail output reaching his terminal, a variety of messages was revealed.

Messages included news of colleagues being reassigned; taking retirement; or receiving promotion. Notices of meetings and training courses were occasionally received. News of corporate reorganisation and company policy was being broadcast company-wide. Product news; advice on PC problems; and notification of computer and telephone system faults constituted less-frequent categories of message.

Successful use of E-mail (if empowerment is the aim) tends to depend on the proportion of useful information that arrives electronically and on the proportion of the people in the organisation who use E-mail [Foy 1994: 230-231].

Testing this in an ESB context, it emerges that fewer than 2,000 of ESB's total staff of around 9,600 have an All-in-1 "account" (which provides access to E-mail).

Furthermore, judging from this researcher's own experience, more information reaches him and his office-based colleagues through non-electronic means than through E-mail.

Therefore E-mail in ESB seems to form a lesser part of the inflow of information than some other media.

In ways, E-mail parallels the effect the telephone had on office life. The phone has not replaced face-to-face meetings between staff nor the sending of correspondence. Similarly, people utilise E-mail as an adjunct to other communication media. To them, it has an appeal as a speedier form of communication, guaranteeing delivery of the message.

If tension or stress is relieved on the sender, secure in the knowledge that the message will be received, this can be cited as a beneficial effect.

In the view of **Alexis and Wilson** [: 316], the reliability and availability of a communication system are related to:

- the way "decision units" select and transform information input;
- the communication structure of the organisation;
- the perception of the "communicators", who may perceive things according to their own needs and goals.

E-mail and industrial democracy

Occasionally, E-mail's use can be controversial, as the following incident illustrates.
In 1994, two staff candidates for an ESB internal election broadcast their election messages using E-mail. In an subsequent E-mail message broadcast to staff on 3 June 1994, ESB's Chief Executive opined that the All-in-1 system was intended as "an aid to business" with "benefits in providing relevant and speedy communication". He did *not* consider the use of All-in-1 for internal election canvassing as coming within that definition. *Capacity*, *time* and *cost* implications of the system needed to be considered, he added.

Mantovani [1994] outlines the political implications and potential misuse of E-mail, which he classifies as a ***computer-mediated communication*** (CMC).

He considers it to have a *democratising* potential. Yet he recognises that the more "open" the CMC is, the more *"chaos"* could arise in the flow of information. There are also potential *misuses.* One unforeseen outcome of the electronic mail revolution has been "*flaming*", the practice of sending contentious, even obscene, messages via E-mail.

E-mail messages have retained much of the appearance of the older-style memo; at the same time, the language they contain is becoming increasingly *informal* - possibly due to lack of "secretarial mediation" [**Burton** 1994: 101]. It is likely we shall see the tone of electronic memos becoming more "slangy" in the times ahead.

Ovans identifies a risk that E-mail, because it has to be typed in on a keyboard, is encouraging message senders to keep their messages short, curt and possibly "rude". Furthermore, E-mail does not capture the "interaction" that callers enjoy over the phone. Callers can seek explanations of the other person's comments or supply additional information: "*I forget to tell you*" and so on.

Software as an aid to work groups

Work groups can become more than the random collection of employees in an office, supposedly working toward a common goal.

Software companies offer ***workgroup computing*** as a way to link the abilities of the individual in a group (say, a project team) to harness their individual creativity into a synergistic whole. In theory, people may be more productive when they can communicate with colleagues working on the same project. Workgroup computing is intended to increase productivity.

Workgroup software is a burgeoning market, with numerous vendors offering products which aim to improve efficiencies among work groups - for example, office colleagues. Microsoft's publicity material for its *Windows for Workgroups* claims that it "builds on the benefits of Windows", while adding features that make it easier to work closely and more effectively with one's colleagues. Being able to share information, communicating more easily with other PC users, ensures one's team or workgroup will produce successful results.

Groupware (software that links employees together) is designed to facilitate group working: it is widely touted as a support for teams. **Ramanathan** contends that groupware can aid collaboration, and so improve quality by improving the flow of work.

Sharpe writes that groupware has the potential to link workers together, encouraging what is termed ***computer-supported co-operative work*** (CSCW). This link can be:

- *synchronous* (when both ends of the communication loop *are* simultaneously linked, for example, videoconferencing);
- *asynchronous*, (when they are *not* simultaneously linked, E-mail being a case in point).

Dr. Vaughan Stanger [quoted in ***GEC project explores the world of virtual working***] suggests that computer-supported co-operative working would emerge in certain fields such as computer-aided design, spurred on by the "**convergence**" of communications and computers. He believes that the connecting of computers represents a shift from personal to collaborative computing. Groupware is the basis for this shift.

Globally, the dominant groupware product is Lotus Notes (though it is not used as a standard product within ESB). Lotus claim 1.5 million people use it in more than 5,000 organisations. Its main feature is its ability to "replicate" a database across different computers - if one user updates the database, the update "travels across the network" to update all other copies of the database [**Technology briefing: Lotus Development's Notes**]. Nearer home, the Irish Civil Service has focused on Lotus Notes, with its benefits of workgroup functions [**McColgan 1994a**].

Bailey [1995: 153] believes that the PC is likely to become as much a *communications device* as a "computational unit". Significantly, software suppliers are meeting the communication needs of the modern office, not simply at the hardware level, but also by designing powerful communicating software products.

Middleware is a layer of software which connects applications and data sources with each other. It promises a future era wherein every application can communicate with every other application, no matter which computer system the user is employing, in a way that is completely "transparent" to each user [**Chappell**].

Fax: productivity and teamwork impacts

Facsimile transmission (commonly called **fax**) allows an image of a document to be transmitted over a distance to another machine, which can print out a copy of the image.

PCs can interact with fax: text from a fax transmission can be stored electronically in the computer's memory.

Cook describes how a whole document - in this case, a completed questionnaire received from a customer - can be read by an OCR device and the data then stored on computer. The article considers fax to be a key means of communication for team members and field workers (presumably the latter indicates sales/service personnel). Combining fax transmission with a PC allows customer survey results to be relayed to a head office, where the results are scanned electronically: a quicker, less tedious approach than manual transcription.

Linking PCs and fax can boost productivity. Workers need not queue to use fax machine: instead they can fax documents and graphics directly to their workstations. Incoming faxes can be viewed directly on the PC screen; they can be routed automatically as E-mail messages to a user's workstation. Text and other data from a fax can be stored in electronic filing cabinets and viewed by all members of a team [**Snell**: 116, 117 for example].

Speaking from the viewpoint of one who endorses empowerment, Foy observes that fax, despite being widespread, is **not** much used for employee communication.

In the context of communicating with employees (an activity which Foy sees as fundamental to empowerment):

- fax can be used in a dispersed form of organisation (ESB being, of course, a multi-location business);
- fax can transmit press reports and newspaper clippings for placing on noticeboards.

It is worth recording that a daily document called "Today", containing newspaper clippings which refer to ESB, has circulated throughout the company for many years. As already mentioned, a screen-based companion to this document has been launched, allowing users to view press items on their own terminals.

ESB staff appear to use fax mainly for correspondence directly related to their business; whether they would be interested in company news being broadcast to their local fax machine is a debatable point.

Of course, fax can be *integrated* into the user's PC for even greater convenience [Wszola].

Voice-based communicating systems

Zuboff [1988: 77-78] reminds us of Clanchy's findings that in medieval times, the written text was not held to be as reliable as the spoken word. Writing seemed less concrete than the immediacy of speech in the predominantly oral past. Perhaps we can surmise that increased education allowed written text and mathematical symbols to assume a reality of their own, though they began as abstractions. Writing words and numbers are key reasons for using computers. But speech remains important in business life: presentation software such as PowerPoint is often used to *support* oral presentations. More significantly, the corporate telephone system has been *enhanced* by voice mail and portable phones as well as being *supplemented* by paging systems.

A hundred years ago there was but a single voice system in use in business: the telephone.

The twentieth century telephone network has grown, forming the "largest machine" on this planet, according to pundits.

In the Nineteen Fifties, an "Executive-and-Secretary Telephone" was considered leading-edge technology. Siemens designed this instrument in order "to relieve the executive of a substantial amount of telephone work", hailing it as a significant advance [***Executive-and-Secretary Telephone Systems*** 1954]. It linked manager and secretary, offering them a telephone service which was comprehensive for that era. Managers' secretaries could "screen" incoming calls.

Instruments such as these (or later improvements on them) were in use by ESB managers at Divisional level and higher, throughout the Nineteen Sixties and Nineteen Seventies; lower echelons of staff used a simpler instrument.

ESB's telephone system has been steadily upgraded over the last decade and a half.

The system is, of course, digital and up-to-date, uniting communications within this dispersed organisation. Modern *digital* telephony harnesses the power of electronics and computing providing a more sophisticated telephone service. Consequently, each ESB office worker's desk boasts a modern telephone instrument, augmented with switchboard-style features - such as Baldry [: 4] described.

The telephone instruments are DTMF (dual tone multi-frequency), providing a range of features. Employees can transfer incoming calls or place callers on hold. Phones can be set to ring an engaged number until that number is free, saving the employee the chore of redialing.

A variety of features for facilitating efficient communication are available.

Call forwarding allows the employee to be reached at her/his own extension number, even though s/he may not be at her/his own desk.

Abbreviated dialling permits frequently-called extension numbers to be stored in the system's memory, then dialled using a couple of digits (instead of the full extension number).

Conferencing allows a number of office workers to share the same telephone conversation.

Modern telephones may have an LCD display on the instrument, showing the caller's number or the status (current state) of the instrument - showing, for example, whether call forwarding is in operation.

Two issues of usability

The *loudspeaker telephone* perhaps demonstrates how, occasionally, the nature of a technological device appears to limit its applicability. This telephone allows the user to listen to and answer calls "hands-free": the other party can be heard through a loudspeaker on the instrument. Loudspeaker phones seem to be more prevalent in ESB management offices than among ordinary office staff. Apart from cost issues, it is likely that the sense of privacy needed to use a loudspeaker phone is absent in multiple-occupant offices. Additionally, since most non-managerial staff share their office with colleagues, those colleagues could be disturbed by the instrument's volume. **Janner** [: 174] asserts that besides affecting privacy, and creating an "inhuman echo", such phones render it more difficult for the caller to project her/his "charm, enthusiasm, confidence and persuasion" to the listener.

The growing number of telephone features on offer has increased *the complexity* of the telephone user interface: instruments can have around twenty buttons today. The many features offered by these instruments have raised issues concerning training and the interaction between user and system [**Christie 1985b**: 80]. A survey among users might discover telephone usefulness to be offset or negatively impacted by the complexity of push-button telephones.

"Although today's telephones are replete with keys and buttons which, in theory, are a window to a plethora of useful features, in practice very few people understand and use them." [**Schmitten**: 66]

Voice mail

Before the Second World War, voice recording was in its infancy, when dictabelts and record disks were the norm. After the war, magnetic tape began to spread as a recording medium. One use of tape was in the telephone answering machine. This acted as an aid to office efficiency: callers could leave their messages on the machine if the called party was absent.

In the Nineteen Nineties, ESB uses a far more sophisticated system than mere answering machines: ***voice mail***. This technology has married telephony to electronic recording equipment, bringing the benefits of call answering automation to more and more staff.

Using voice mail, callers can leave messages for later retrieval by the called party. The person retrieving the message(s) can do so from her/his own phone or another phone, by dialling up their "mailbox", as it is known.

Messages can be broadcast from a centralised call centre, giving information to users who pick up their handset or switch on their loudspeaker phone. Examples of such messages might pertain to the state of the telephone system itself (such as faults) or to problems with the computer system. Voice mail in ESB is frequently found on the phones of secretarial and managerial staff, as well as other staff who have requested the facility. It appears that a high proportion of staff in I T Services (the department responsible for installing/maintaining the voice mail service) uses voice mail, compared with some other Head Office departments.

Video as a medium of empowerment

Video is an *informing* technology, rather than an information technology: yet it is destined to play more of a role in the workplace in conjunction with I T tools.

Advantages attributed to video include:

- its higher entertainment value compared with written material;
- its transportability, which negates the access problems experienced by people in outlying locations;
- its standardisation - the message delivered on video is standard and identical for all viewers in the company;
- its relative cheapness - additionally, the technology is simple to operate.

A videotape based on ESB's strategy document, *Connecting with the future*, had been shown to staff at the outset of the Nineteen Nineties. The effectiveness of the medium of video to deliver a corporate message was again tested in 1994: each member of ESB received a copy of a videotape entitled ***Changing to compete***. On this videotape, senior managers could be viewed reiterating the need for company-wide change.

ESB has adopted video as a training tool. For example, the company's Learning Centres utilise video cassette recorders: on these staff can view videotapes on topics as diverse as change management, personal development and empowerment.

Videoconferencing is a technology which allows two or more users to communicate directly via TV cameras and monitors.

According to **Clive Davidson** [1993], the benefits of videoconferencing are clear. He quotes Mike Swalwell, the managing director of Dell UK and Ireland, who says that the advantage is not just the cost saving, but the ability to respond quickly and to "talk through" issues: "the visual image is a much more powerful form of communication". The combination of desktop videoconferencing with multi-function applications software is likely to become a key sales point for PCs. Microsoft already has dedicated videoconferencing systems in all its major offices and, together with BT, has demonstrated PC videoconferencing running under Windows for Workgroups. Microsoft expect a picture telephone function on the PC to become commonplace. As of yet, videoconferencing has not impacted office work in ESB; so this technology was not expected to feature in our survey results.

Towards the future

I T: tools are better than machines

Handy [1985a: 69] cites Schumacher, who distinguishes between **tools** and **machines**. Tools extend the reach and capacity of mankind. Machines become our masters, requiring us to work at their pace. Following this distinction, it is notable that software vendors nowadays create information technology that serves us as a tool.

The I T tools most likely to harness the untapped potential of office personnel have been speculated upon:

- A powerful database, holding corporate news and information;
- a word processor;
- a spreadsheet facility, with what-if ability;
- communicating features, be they E-mail, workgroup or groupware options;
- a scheduler and a shared work diary, so colleagues are able to locate each other;
- decision support systems.

With these installed in a *desktop unit*, incorporating a phone and fax facility, a powerful workstation is beginning to emerge. Additionally, providing the employee with a portable computer and mobile phone permits her/him to stay in touch with the work group irrespective of her/his location.

Now the employee is served with a *knowledge-and-work system*, to coin a phrase.

Future offices

British Telecom's team of thinkers have developed many concepts about how future offices may appear [**Cochrane, Fisher and Taylor-Hendry** 1993].

They wish to update the present concept of a desk as a repository for *storing and stacking objects*, cluttered with wires, a mouse, a telephone and other equipment, none of which items integrate with one another.

Among their envisioned improvements would be a separate screen for telephone directory listing and electronic "post-it" messages. This avoids cluttering up the main computer screen, which would itself have exotic three-dimensional icons whose varying size would reflect the importance of the application represented by the icon. (We note that most icons today are the same size as one another: distinguishing them can be a problem, especially for novice users). People could roam the office building carrying a wireless computer - which would be voice-activated for convenience.

Nick Negroponte is a pundit who proclaims a future where digital and analogue communications systems "converge" together. This convergence will be as potent as the Agricultural or Industrial Revolutions [**Evans 1994**: 46].
He envisages the extreme miniaturisation of computers and foresees speech recognition replacing QWERTY keyboards. His prediction is for a "peripatetic" workforce, served by communications at home or while on the move, using "smart" (intelligent) devices and filtering information using computerised software products known as "agents".
The disappearance of the desktop is already happening, according to Negroponte: we no longer hear people discuss "*the office of the future*" - it has *arrived* [Evans, 1994: 47].

Tyler [1995a] describes two strategies for better use of office facilities.
The first is "*hot desking*", which allows the employee to begin work immediately on arrival at her/his desk. At its most sophisticated, this involves transforming the desk into a *workstation*, fitted with a PC "docking station" into which the employee can plug her/his laptop computer. Technology also allows the employee's phone number to be routed to the hot desk.
"*Office hoteling*" means employees can arrange to call into work and use a desk that has been booked for them: the desk is not permanently assigned to an individual employee.
IBM, which uses office hoteling, includes within its offices a variety of spaces to accommodate different types of work. These include quiet areas for work requiring concentration; areas for phoning from without disturbing others; and finally "*cabana*" space,

consisting of simple work surfaces, fitted with phones and data connections for equipment (such as computers) - these are used by workers who drop into the office briefly.

Thus far, new technology has been obliged to fit into existing buildings.
However, "intelligent buildings" are appearing, in which lighting, ventilation and so on are co-ordinated by computer [**Wright**, "The shape of things to come" 1994: 59]. Structures of this level of sophistication are intended to suit the demands of technology, *and* those of people.

Ken Sakamura's concept of a *Hyper Intelligent Building* is on the drawing board already [**Patton** 1994: 18]. This building will have technology that routes incoming calls to wherever a worker is within the structure - not just to her/his desk. On that desk, a single device will serve as telephone, fax, copier, word processor and data manager. The worker will carry an identification card containing microphone, speaker and LCD screen. So it appears there is a future for the glass-steel-concrete monolith after all - provided it possesses intelligent systems.

Adapting to change

Handy [1985a] feels people should adapt to, not oppose, the Post-Industrial Society they are experiencing. People may view their work as a commodity to be sold. They may see it as their vocation: then it becomes their interest, their profession - even their passion. Through work, the respect of colleagues can be won, satisfaction can be gained.

Foy [: 258] feels Handy's view of the future of work, as he expressed it in the Nineteen Eighties, *has* come about. But she believes this has happened *not* through corporate planning, *but* due to individuals using fax machines and PCs to take "ownership of their diaries". She instances how this has enabled the "telecottaging" concept (a form of *teleworking*).

ESB, too, faces adaptation. The company is at a hybrid stage wherein electronic office systems have melded with paper-based ones. Other firms are moving beyond this, in creating *the virtual office*. The concept of a virtual office allows work to happen anywhere - on the road, in an office building, at home. This may put the sociability of office life, which developed indoors, under pressure. Some office work is already being carried out in a non-tangible electronic region within computer networks, a region which commentators call *cyberspace*. The rise of teleworking will see more work transacted, through the medium of computer networks, between the employer's building and the employee's car or "home office".

Plainly technology is destined to impact upon office life in the future, as it has in the past..

CHAPTER 5

METHODOLOGY

METHODOLOGY

Theoretical Framework

To draft a theory which can be tested, certain "Concepts" were derived from the literature covering I T, human resources and organisations.

Concept A: That software products and tools can empower users.

Empowerment implies greater power being utilised by company personnel.

- Such power can derive from having wider access to corporate information channels, through E-Mail and electronic bulletin boards.

Concept B: That software products and tools can enrich the working life of users.

Products such as spreadsheet products are claimed to:

- remove the drudgery of calculation;
- enhance its accuracy;
- allow prediction of business outcomes using "what-if " facilities.

Concept C: That I T can facilitate communication.

Communication is fundamental to the process of empowerment [Brown and Brown; Foy; and others].

Management needs to clarify its message to its employees and there are many tools to achieve this [Foy].

- Software products can enhance the quality of the message: presentation software and desktop publishing might be typical cases.
- Software can speed up the delivery of the message: E-mail and fax are examples.

Concept D: That I T facilitates work involving information, for example the managing of data.

- Spreadsheet products allow more refined control of quantities of numerical data.
- Database products permit managing of disparate data drawn from wide-ranging locations.
- Executive information systems and decision support systems allow analysis of information, as an aid to decision-making.

Concept E: That I T has had an impact on teams and teamwork.

- Groupware and workgroup computing in general permit the sharing of information across the workgroup.
- Project management software aids teams involved on a joint project.

Concept F: That the use of time by office workers can be aided by I T.

There are specific time management software products: calendars; schedulers; personal information managers.

Software tools can save actual time in doing tasks, in a range of activities:

- cut-and-paste;
- linking of data between applications;
- automated formatting of documents and spreadsheets;
- automatic spell checking of documents;
- automatic creation of charts in spreadsheets.

Concept G: That learning about I T and training in I T are key issues.

I T systems and software can be complex and therefore difficult to learn; the adequacy of training should match the complexity of the system being learned, where possible.

Concept H: That I T has had varying impacts on users.

Some users may be very little affected, others more so, depending perhaps on the extent of their reliance on I T.

- Organisational role may influence attitudes: clerical staff may report differing effects from those reported by managers, for example.

Concept I: That environmental factors in the office and ergonomic factors relating to technology have some impact on the level of enrichment felt by workers.

- Physical effects on users are a possible indication of inadequate I T design.
- If users do not appear to enjoy using a system or product, their negative feelings may be expressed in their responses.

Concept J: That workers may experience differing feelings according to their job description or working relationship.

- Attitudes among employees working within a manager-and-secretary relationship or as professionals engaged on specialised tasks may differ from those of a clerical worker in a large office.

Influences on the methodology

Various paths of research influenced the methodology.

In the field of *industrial psychology* we may encounter basic written questionnaires, administered in the workplace. At a more complex level, we find purely artificial laboratory-style experimentation. One example lies in the research carried out at the U.K.'s National Physical Laboratory, where responses of human subjects to, say, software in a controlled setting are analysed scientifically [Preece *et al*].

In similar vein, the idea of making the research "*interactive*" was considered early in the study. This would have involved supplying ESB staff with a floppy diskette containing questions and simulated software screens to which they could respond. Their responses could be analysed by specially-written software. The cost and complexity of such an exercise would have required sponsorship or corporate support, if it were to cover more than a few Respondents. Instead, a traditional written format was adopted.

One test of people's attitudes lies in their feelings towards a given set of circumstances.

Staff *attitude surveys* have previously been employed by ESB management and unions. Earlier examples include various surveys in the Nineteen Seventies and the Nineteen Eighties (including that reported by Hurley). The 1992 MORI survey conducted as a part of the "Cassells Committee" research is a more recent instance.

It was decided that the body of questions emerging from the I T and human resources literature should form the basis of a written instrument, covering those issues which most interested or intrigued this researcher. Views from I T users as described in these texts would also form the basis for questions. The raw half-formed questions would be modified into single-sentence statements to which the individual staff member would respond. In the event, it proved necessary to include some open-ended questions, as some factors proved intractable to simple one-line questions. For example, at the most basic level, it was clear that the free-form narrative of an open-ended question was better suited to discovering which training courses Respondents had pursued - because there were so many courses available. Open-ended questions could encourage Respondents to express their feelings in relation to word processing software, for example. Some of the answers might even match or might contradict comments of non-ESB I T users encountered elsewhere.

Devine [: 60] point out a major drawback with *correlational research* (which tends to correlate one condition as caused by another condition). The problem lies in eliminating alternative explanations for an event. Nor are we justified in forcing unwarranted conclusions out of the available data. A Respondent's feeling that "*computers have made my job easier*" may not allow us to say that computers have enriched that Respondent's experience of work. An "easier" job may not necessarily be a more fulfilling one.

Correlational research is carried out "in the field": in our case, the ESB workplace. There are alternative methods of such research - Devine mentions the "experimental" situation. Surveying the staff by mail became our preferred option, as it would be possible to reach Respondents more widely throughout the organisation.

The August 1994 questionnaire

Kane [: 24] separates the process of questionnaire design from the initial research outline which the researcher prepares. Questionnaire design is a specific operation.
A questionnaire was devised for circulating among a sample of ESB staff (see **Appendix F**). Its main structure consisted of a set of questions derived from intense thought about possible attitudes which colleagues might harbour. The researcher's feelings and suppositions were finally translated into concrete questions.
This questionnaire issued in August 1994. Those who responded to this questionnaire are coded in the results hereafter as **Rn** (n being the number assigned to each Respondent).
It was intended to obtain more detailed comments from a smaller number of staff at a later stage. This was accomplished in June 1995: those who responded at that time are coded in the results hereafter as **RJn** (n being a number assigned to each Respondent).
Simultaneously, this researcher acted as a participant observer within ESB, meaning that general attitudes of staff could be gauged as the study progressed.
It was hoped that the anecdotal evidence so gathered would form a touchstone for the Respondents' comments in the survey instrument.

The Pilot Questionnaire

A pilot design was sent to 25 ESB staff and the 8 responses received guided the selection of questions for the final questionnaire. For example, some comments provoked by the final open-ended question on the pilot instrument, which asked for Respondents' views on computers in general, are given below (note that the Number indicates the Respondent No.).

(1) "*Technologies assist us greatly* ";

(2) "*All in 1 - very useful system - sometimes slow, but not bad* ";

(3) this Respondent had "*always*" worked with computer on desk;

(4) this Respondent needed simulation packages;

the control centre where this engineer worked needed technology - if computers were not "*alive*" {direct quote}, people would have to use pen and paper instead - if ESB did not use computers, competitors would use them;

this Respondent also "*found E Mail very useful*";

(5) this Respondent expressed no opinion;

(6) "*Very little reference, no computer* {} *Will be getting CAD* ";

(7) this Respondent expressed no opinion;

(8) this Respondent expressed no opinion.

The eventual questionnaire

A design for the eventual questionnaire instrument was finalised.

There were 25 questions in all, covering 10 pages.

The questionnaire was in the form of a self-administered mail questionnaire [**Sudman and Bradburn** 1982].

Question formats were chosen from the following types:

- yes/no or similar;
- five-point, Likert-style, scale;
- a self-designed six-point scale of performance;
- open-ended.

Devine [1989] employed Likert scales in his study. He convincingly cites Krech, who asserted that the reliability of Likert scales, was "generally higher" than the reliability shown for other scales.

Closed and **open-ended** questions were designed to draw out the Respondent's perception of

- any training s/he received or did not receive;
- her/his self-learning;
- her/his use or non-use of I T;
- the access to I T and software features s/he wish to be provided;

- the ease of use inherent in her/his systems - for example, the extent to which help screens and error messages are helpful;
- how transparent s/he finds her/his systems to be;
- how I T enriches her/his work:
- I T's relevance to her/his work;
- how I T may improve her/his motivation as an employee or manager and her/his self-esteem as "a person".

Additional factors to be coded for, though not directly relating to I T, included age of Respondent, gender and educational level attained. Environmental and ergonomic factors were also explored in the instrument.

Use of the word "I" in the questionnaire

The whole thrust of self-improvement pundits is to focus on the self. These thinkers on self-development relate how well we cope with life to how well we "manage" it. **Skynner and Cleese** write amusingly in this vein.

A large part of our survey is in the form of "I" statements. Many of the statements in the survey were couched in the first person singular, to encourage a feeling that each Respondent was replying " for herself/himself ". The spectre of *stereotyped responses* haunts the researcher: such responses tend to represent "standardised" views, rather than the personal views of the Respondent. An additional risk sometimes faced by researchers is that Respondents will provide responses which they believe will "please" the researcher.

Personal, educational and job details

The opening section, Questions 1 to 3, sought the basic details of gender (placing female first for a change), marital status and age.

Gender could a determinant of response. Similarly age might prove relevant in testing how older workers viewed I T.

Such variables can be correlated to other responses, allowing the scope of a study to be widened.

The question on marital status was included to examine how this might relate to Respondents' attitudes; however, in the final analysis, this variable was not felt to be relevant for correlation.

Questions **4** and **5** aimed at finding out the education level which Respondents had attained, as well as their level of training on I T specifically.

Questions **6** to **7a** sought information about the Respondents' *length of service in ESB* - which could, for example, be correlated with their acceptance of I T - and their *job description* which was intended to provide a clearer understanding of the response to Question 7a.

Six broad categories of job headings were created; an open-ended line was provided for jobs which did not fit any of the six categories.

Question **8** asked how long the Respondent had been using a computer at work.

The office environment

Questions **9**; **9a**; and **10** asked about Respondents' immediate office surroundings: number of colleagues; method of office supervision; and description of the office.

One possibility considered was that of uncovering different responses from employees who work in single-person offices; under an open plan arrangement; or in a team situation.

Some ergonomic and physiological factors were addressed; questions were asked about office seating; ventilation; air-conditioning; eye tiredness and other bodily discomfort which might be caused by terminals.

Software use and usefulness

Pages 3 and 4 introduced actual software issues.

The "usefulness" of various systems/products was gauged on a five point scale ranging from *"very useful"; "useful"; "somewhat useful"; "not useful"*; down to *"useless"*.

As a large number of products are in use in ESB, a selection of common products was specifically stated, ranging from **All-in-1** to **Microsoft Paintbrush**, a drawing tool.

The pilot returns helped in selecting products for inclusion. Question **15** included four "open-ended" lines for the products of the Respondent's choice.

Question **16** focused on the **three products** most used during the working day of the Respondent. As was expected, and seemingly confirmed by the pilot, the choice of software would vary from person to person. The subject was asked why they ***"liked"*** **using** the product and **how many hours a day** they used it.

The **ESB Information Technology Impact Study** [1992] stated that after (information) systems were introduced, ESB jobs would require a higher level of *discretionary skills*. Filing and dedicated data entry jobs, requiring the least discretion, were being eliminated from the company. Even senior managers would have to acquire an I T "fluency".

Questions **17a** and **17b** focused exclusively on two of the most commonly encountered products, WP and spreadsheet software, to test the degree of difficulty experienced by Respondents in acquiring skill.

Questions **17a** and **17b** section **e)** tested the extent to which more training was needed to get the maximum benefit from the product.

In the case of a word processing product, important features often provided by vendors include a "spell checker" (which automatically checks the accuracy of spelling in a document using a built-in dictionary) as well as a "grammar checker" (which consults pre-programmed grammatical rules to see if a document conforms to those rules). Such tools are a by-product of the increased processing capacity designed into computers, and exploited by software manufacturers, making products more usable, more saleable.

From speaking to colleagues, it appeared that the spell checker was regarded as a useful feature, though not used for every document, whereas the grammar checker was little-used (perhaps because it was seen as too rigorous) - indeed few people seemed aware of its existence.

A spell checking feature is available with spreadsheets, so a question section was included for this also. Microsoft Excel can produce automatic charts from data entered into spreadsheet cells; we wished to find out how essential users find this (Question **17b**, section **g**).

Products disliked; software design; ease and difficulty of use

Question **18**, asking Respondents to nominate a product that they ***"disliked"*** **using,** was initially dropped from the instrument at the design stage. It was reinstated because it had produced interesting comments in the pilot version.

In Question 19 Respondents were asked to about the extent they would like to be involved in designing the software they use. If users of I T really do wish to be more empowered, we might expect a positive response.

Also examined was the level of difficulty that users might experience in data entry; word processing; and spreadsheet use.

Dozens of possible questions could be asked about data entry alone. In speaking to users, this researcher found that users were initially uncertain about making back-up copies of disks - experts say that even though **data back-up** is crucial, it is sometimes overlooked. Perhaps an initial difficulty in backing up data (which some novice users have experienced) persists as a fear in those users' consciousness, even when they have acquired proficiency on the systems. More likely, the chore of creating back-up copies is disliked.

Question 20, sections **a)** and **b)**, surveyed the ease or difficulty which Respondents encountered in carrying out procedures related to data management.

Sections **c)** to **k)** queried the ease or difficulty of WP and spreadsheet features.

General attitudes towards information technology: Question 21

A number of issues were examined.

Staff might feel they have been inconvenienced by losing space on their desk surface to the computer peripherals. Statements to the effect that the screen and keyboard take up too much room on desks were tested.

The function keys confusion issue referred to in Glastonbury *et al* and in Preece *et al* was tested by a specific statement. A conference of ESB's Information Systems Department [*ISD Conference Proceedings*] had also identified problems arising from *inconsistent key assignments* - keys that carried out different functions when pressed depending on the system being used. Users do not welcome these difficulties.

Because it is remains essential for all office workers to type data into their computers (widespread speech input is still a distant prospect), statements were included to identify the level of keyboard (typing) competence as perceived by the Respondent. Manuals such as **Rowe**'s *Type it yourself* [1981] emphasise speed and accuracy in typing. Many ESB staff have attended in-house keyboarding courses - All-in-1 (a product available to all our Respondents) even has a typing tutor program built in.

Training issues were explored in specific statements.

The helpfulness of software manuals was examined. In truth, a whole survey could be carried out on software manuals alone.

"Time-saving" features are a recurrent theme in the advertising literature relating to I T; statements were provided to test Respondents' views on these features.

Also investigated were Respondents' views about the **Directory of Files** (a fundamental aspect of using DOS or Windows) - as were the ease or difficulty **in printing out** documents.

Impacts on the individual at work: Question 22

The ways in which people have discovered new ways of working and new things about the computer were examined. The use of terms such as "boring" or "interesting" created *leading* questions, to test users' perceptions. Learning and enrichment issues were examined in further detail.

Respondents were asked to comment on their **improved** prospects of promotion, if any; additionally, they were asked how they have developed interpersonally, in their relations with colleagues and subordinates.

A number of questions were incorporated which examined the contra-indications of richness in jobs. These included feelings: of boredom; that the job is incapable of being improved; and that an employee can develop more "as a person" on the job.

This latter concept is admittedly so vague in psychological terms that it had to be hoped that Respondents would grasp its meaning.

One class of employee, "the manager", carries a weight of responsibility different from her/his colleagues. Enriching a managers' job through the medium of I T ought to be desirable. So a question would test that hypothesis.

A platitude of corporate life is to assert that everyone can be a manager. It is possible that even an employee not formally classified as a manager could view herself/himself as a manager, of people or of situations, so s/he might find the question interesting.

Section r) concerned the issue of communication through electronic mail and its power to keep staff informed - as discussed earlier in the context of computer-mediated communication [Mantovani].

Job performance

Question **24** departed from the "five point" format of most previous sections. We were attempting to gauge the extent to which hardware and software had improved individuals' performance of their job.

Reading the literature gave some indication of how analyses of job performance and the workers' perception of performance impacted on perceived effects of software.

A scale was developed that progressed from ***0*** indicating a response of no change in performance to a value of *5*, indicating a high level of improvement in performance.

It was hoped to find some quantitative basis for Respondents' views on how I T affects their performance. We believe that hardware - no matter how sophisticated - is of most value when linked to useful software. Sections in Question 24 were phrased so as to link a hardware component to its application in the workplace.

Finally, general comments on I T were sought

The final section employed an open-ended question format. Respondents were encouraged to adopt a narrative style; this of course leads to difficulties in coding the responses. It was expected that *one approach* to coding the responses, when they returned from Respondents, would be to ***group*** **similar positive or negative opinions** on a particular issue, say, usability of PCs.

The possibility of error

A survey may yield "uncontrolled variables", according to **Oppenheim** (who calls them "free floating" variables). These will be "confounded" variables which may affect the study but lead to new paths of exploration as they throw up new hypothesis; or they will be "error" variables, which will be randomly distributed. For example, if more males responded than females, the gender equity we tried to build into our sample would not be reflected in the response. However some conclusions could perhaps be drawn from non-reply, say, by females.

Similarly, if the number of Respondents did not match the impact of I T on engineers within ESB, then the results might not reflect the job description patterns of the company as a whole - so the study would be focused in its results towards certain categories of workers more than others.

The results would still be valid for the workers who responded, job description notwithstanding.

The population for research

Whatever instrument is chosen, the issue of administering the research remains.

In the case of the ESB "universe", only a portion of the 9,600 staff has access to or is directly affected by I T.

In terms of actual numbers, available December 1994 figures showed 3,989 "officer staff " (to use an ESB expression) in the company. This includes managerial, secretarial, clerical, administrative, engineering and other professional staff.

Table 1: Break-down of ESB officer staff as at December 1994

Job Category	**Female**	**Male**
Managerial staff (excluding engineers)	9	155
Managerial staff (engineers)	4	358
Secretarial staff	26	0
Clerical /Administrative staff	1019	613
Engineers (excluding managers)	22	317
Technical staff	2	883
Professional / Specialist staff	33	284
I T staff	34	78
Sales staff	57	95
Total	**1148**	**2841**

Note: See **Appendix A** for notes on composition of above Table.

Finding a target population

It would be necessary to identify I T users from amongst the general office population. Surveying users of personal computers had been considered, as had a random selection of all ESB office workers, whether they had regular access to a computer or not. Finally the choice fell on those employees who had an "All-in-l account", as it is known. This meant they had access to All-in-l, the office automation product from Digital Equipment Corporation. This product had been introduced into ESB in the mid-Nineteen Eighties. It has a number of features, including word processing and electronic mail facilities.

It has been used by many ESB office workers and is widely available, whereas more recent products such as Microsoft Office have less wide availability.

Having been in use for a number of years, this was what the I T industry calls a "mature" product and staff would be familiar with it (to varying degrees). Choosing All-in-l was intended to ensure that each person who received a survey would have a basic understanding of computer usage.

So the directory of All-in-l users was taken as a universe from which to draw a representative sample.

Finding a sample size from this population

At mid-1994, this directory showed that there were 1,882 All-in-l accounts on the ESB system.

A sample size was chosen with some trepidation, because the response rate of only 8 from the 25 *pilot questionnaires* sent out amounted to about 32 %.

At first a randomly-chosen figure of 100 subjects seemed enough.

It was decided to sample about ten per cent of the All-in-1 list. A small proportion of accounts would be invalid for the survey, as they did not represent actual *individuals* - instead they represented various functions assigned by ESB's I T department (I T Services). These were eliminated.

In the event, because of concern over a possibly low response rate, 250 questionnaires were sent out, with the hope of increasing the number of returned questionnaires.

National College of Ireland

Choosing the subjects who would be surveyed

Since it had been decided to sample an equal number of male and female subjects, the list of possible subjects was divided into male and female. Starting at the top of each list, *every tenth name* was selected - that is, the *first* name on each list was selected *first*; the *tenth* name on the list was the *second* name to be selected; and so on. When the end of the list was reached, the selection process was resumed from an appropriate place near the beginning of the list. This process was repeated until sufficient names had been selected.

It was realised that at least three factors may have affected the composition of the original All-in-l list.

Gender distribution

Firstly, many of the holders of All-in-1 accounts were male, possibly due to their predominance in the computer programming / systems analyst disciplines of ESB and in the engineering / managerial / administrative disciplines which were *early adopters* of computing. Female All-in-1 account holders might include early adopters in the secretarial / word processing disciplines (using the product for text-based work and for E-mail messages). Because the list included fewer females than males, it was necessary to go through the female list a second time when the end of that list had been reached. This was because insufficient females had been selected on the first pass.

Geographical dispersion:

Secondly, the list was dominated by Dublin-based users. This may be due partly to the fact that, in the Nineteen Eighties, when All-in-1 was first introduced, computer professionals were located in the Dublin Head Office of ESB. So too were many engineers and managers, together with administrative, clerical, secretarial and word processing staff. These would have been early adopters of office automation technology.

The location of a user may not be overly germane to the study. However as we move further from Dublin, in geographical terms, some impact may be experienced on the level of professional (expert) support for computer users (although distance is less a factor today, given telecommunications and other facilities). Additionally, the availability of computer facilities outside corporate headquarters has been increased by networks and PCs.

The final selection did include a number of users based outside Dublin.

I T Professionals

Thirdly, it became clear while selecting the sample that the All-in-1 list included a disproportionately large number of professional I T workers, relative to the ESB office population as a whole. In case these professionals might "skew" the results, should they turn out to have a somewhat skewed view of the impact of I T, the method of selection was slightly modified. When a number of these workers (who were from the I T Services department) had been selected, it was decided to select further I T Services workers ***only*** if *no* I T Services workers had been selected in the previous 9 selections. This naturally reduced the incidence of I T Services workers being selected.

Checking the names selected

After 125 names had been selected from each gender list (a total of 250), ESB's internal telephone directory was checked to obtain an address (work location) for each person chosen.

If an address could not be found for a particular person, an alternate name from the relevant gender list was substituted. Strict partitioning by gender was maintained throughout the selection process. The reason for consulting the phone directory was this: it was intended to reduce the risk of non-response due to non-delivery of the questionnaire - the person may have retired or moved location; the All-in-1 list could be slightly out-of-date; and so on.

Once the design of the instrument was completed, it was posted to the selected subjects in August 1994.

The June 1995 document

The procedure adopted

As mentioned earlier, it had been intended to get more in-depth comment from a smaller sample of staff, once the August questionnaire had been reviewed. A three-page document (see **Appendix G**) was issued in June 1995 to a sample of fifty ESB staff, also drawn from the All-in-1 list mentioned previously.

This set out to uncover users' feelings about I T issues relating to:

- problem-solving;
- impact on the role of office workers;
- impact on the quality of working life of the Respondent vis-à-vis job satisfaction, productivity, teamwork and other aspects.

As a guide for Respondents, the covering letter which accompanied this document stated that this researcher was "inquiring into the attitudes of ESB office staff towards information technology".

The letter went on:

"Information technology is a broad term, covering a wide variety of office systems, for example, *computers*, *PCs*, modem *telephones*, *fax* machines, *videoconferencing* systems - plus the computer *software* such as *electronic mail*, *word processing* products, *spreadsheets*, *databases*, etc. used with these machines."

Questions (apart from the initial ones) were of the open-ended type. The answers were expected to be in a more narrative style.

One disadvantage of the open-ended format is that the researcher is relying on the legibility of respondents' handwriting and any abbreviations or personal shorthand they may choose to use. It calls for some ingenuity to decipher occasional words; though generally the context helps in deciding on meaning - for example, in RJ12's completed questionnaire, "*co.*" was taken to mean "company", that is, ESB.

Page 1 of the June 1995 document initially sought some personal details.

In **Section A** (*Page 1*), attitudes towards software problems were sought. There were eight pre-defined statements, of which Respondents could choose one or more. **Box A.9** allowed Respondents to describe their own personalised reaction(s) to software problems.

Section B (*Page 2*) and **Section C** (*Page 3*) invited Respondents to express their personal opinions concerning I T

Each of these pages was broken onto two sections. There were two primary reasons for this.

Firstly, it lessened the intimidating nature of a complete page of blank lines to be completed. In other words, since Box B.1 consisted of 12 lines, the fullest answer a Respondent would be able to provide would be about 60-70 words (allowing for about 5-6 words per line).

Page 10 of the August questionnaire had been sub-divided into sub-issues - such as "Computers in general" and "Word processing products" - but the appearance was less formally divided than in the June 1995 document.

Secondly, it was hoped that Respondents would put a more "positive" response in Box B.1, and an opposing, "negative" response in Box B.2 - rather than putting an overall bland positive or negative response.

Respondents were asked to express their initial reaction to the question and then invited to express additional feelings.

Section B asked Respondents to express way(s) in which they thought I T had changed the role of office workers.

Section C sought to elucidate users' reactions to the effect on their own quality of life at work deriving from I T. Respondents were given examples of what "information technology" signifies.

Three specific headings - *job satisfaction, productivity* and *teamwork* - were given, as being representative of human resources terms with which people might be familiar.

A fourth heading called for Respondents to mention other way(s) in which I T might affect quality of life at work.

The June document was sent to fifty individuals who were selected from the list of ESB All-in-1 users by choosing every tenth name. In an effort to get fresh views on I T in the company, the document was *not* sent to anyone who had received a survey in August 1994.

CHAPTER 6

RESULTS OF THE SURVEY

RESULTS OF THE SURVEY

Response rate for the August questionnaire

A total of 113 completed August questionnaires were returned, a response rate of 45.25 %. The latest questionnaire to return was received in early October 1994. A couple of questionnaires were returned uncompleted.

In keeping with the guarantee of anonymity contained in the covering letter, the questionnaires carried no identification as to the Respondent's name or location. Instead, each completed questionnaire was given a sequential number (from 1 to 113) as it came back. The study will refer to Respondent R87, Respondent R102 and so on as a means of indicating each returned August questionnaire.

Analysing the results by computer

With the data gathered, the next step was to analyse it.

The software product known as **SPSS** is specifically designed for researchers in the social sciences. Its main application for the purposes of the present study is that it permits quantitative data gathered from questionnaires to be inputted and the results to be examined using a variety of statistical techniques.

SPSS permits a number of statistical operations to be carried out. For example:

- frequencies can be derived;
- correlations can be performed among groups of data;
- cross tabulations can be undertaken of groups of data;
- statistical tests can be carried out, as an indication of the validity of results.

All the data from the completed questionnaires, whether numerical or written text, was coded so that it would be in a suitable form for inputting into the SPSS software. This created a *dataset*. The data in this SPSS dataset was checked against the original questionnaires for accuracy. There were over 20,000 separate values to be entered in to the dataset, including a code for each **Missing Response** (that is, where a Respondent did not respond validly to a question).

It was then possible to analyse the data using the statistical functions incorporated into SPSS. For example, the data was summarised by finding the frequency distribution of variables and by computing averages that would describe a typical observation (the measures of central tendency). Using statistical software it is also possible to examine the variability of observations (a measure of how much the observations differ from one another), for example.

General notes on the results

- Some rounding errors, introduced by the SPSS program when it calculates statistical values, may be noticed in the frequency analysis of Respondents' responses or in Tables of results. As a consequence, some percentage figures do not exactly add up to 100 %.

- **Totals and other figures thought to be significant or interesting are highlighted in boldface**.

- In the questionnaire, Respondents frequently indicated their responses to a question using a five-point scale, such as below:

SA = Respondent Strongly Agrees
A = Respondent Agrees
D = Respondent Disagrees
SD = Respondent Strongly Disagrees
DK = Respondent "ticked" the Don't Know box.

In some instances other conventions were employed - such as:

- a range of responses from "Very Easy" to "Very Difficult", with "Don't Know" as a choice;
- a range of responses from "Very Useful" to "Useless", again with "Don't Know";
- "Yes", "No" and "No opinion".

- "**Missing Responses**" refers to instances where some Respondents did not give a response or where the response was uncodable. As a guide to the value for these Missing Responses, **0.9 %** is equal to **one** Respondent.

- In cases where **Pearson's *r*** or **Spearman Correlation Coefficient** are calculated, "Approximate Significance" is based on a normal approximation as provided by SPSS.

In the Tables showing Job Descriptions:

- **Manager (n-e)** indicates *Manager (non-engineering)*;
- **Manager (e)** indicates *Manager (engineering)*;
- **Profes/Specialist** indicates *Professional / Specialist*.

Results of August 1995 Questionnaire

Respondent Details

[Source: August Questionnaire Page 1]

- ### Personal Details

Among the distribution frequencies calculated were:

- Sex Distribution of Respondents
- Marital Status
- Age Groups of Respondents
- Highest Education Level Obtained (grouped as Primary; Inter Cert./Group Cert.; Leaving Certificate; Leaving Certificate plus qualification(s); Third-level Degree; Higher Degree).

Table 2: Sex of Respondents

No. of Female Respondents:	**53**	**(46.9%)**
No. of Male Respondents:	**60**	**(53.1%)**

Table 3: Marital Status of Respondents

Single	**30.3 %**
Married	**67.0 %**
Separated	**2.8 %**
No. of Missing Responses:	**4**

Table 4: Age Groups of Respondents

Age Group	No. of Respondents	Valid Percentage
		%
20-24	10	8.9
25-29	14	12.5
30-34	32	28.6
35-39	14	12.5
40-49	26	23.2
50-59	12	10.7
60 and over	4	3.6
No response	1	*
Total	113	100

- **Educational level**

Table 5: Educational level / Job Description

The following is a summary of the highest educational level which the Respondents report having attained, correlated with Job Description category:-

Number of Respondents attaining this education level

Job Description	Primary	Inter. / Group	Leaving Cert.	Leaving plus training
Manager (n-e)	0	0	0	0
Manager (e)	0	0	0	0
Supervisory	0	1	1	0
Administrative	0	0	5	0
Clerical	0	2	9	3
Secretarial	0	0	4	0
Technical	0	4	3	0
Engineer	0	0	0	0
Profes/Specialist	1	1	2	1
Total	**1**	**8**	**24**	**4**

Table 6 : Educational level / Job Description (*Continued*)

Number of Respondents attaining this education level

Job Description	Pursuing Professional Qualification	Third Level	Master's Degree	Doctorate
Manager (n-e)	0	3	1	1
Manager (e)	0	4	0	0
Supervisory	0	1	0	0
Administrative	0	1	0	0
Clerical	2	10	0	0
Secretarial	0	1	0	0
Technical	1	5	2	1
Engineer	0	12	2	0
Profes/Specialist	1	23	3	0
Total	**4**	**60**	**8**	**2**

Notes on Tables 5 and 6:

Primary = Primary Certificate.

Inter. / Group = Intermediate / Group Certificate (including additional training in some cases).

Leaving Cert. = Leaving Certificate (inc. Honours Leaving Certificate).

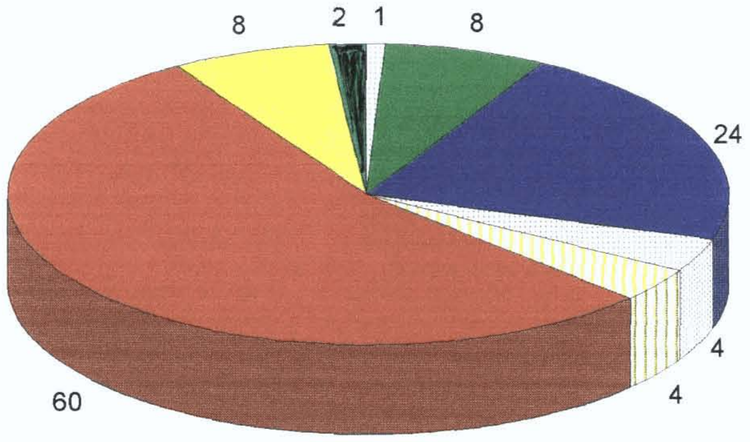
Leaving Cert. plus training = Course(s) in addition to Leaving Certificate.

Pursing Professional Qualification = Respondent currently pursuing professional qualification.

Third Level = Respondent indicated "Third-level" qualification / University Diploma or Degree or similar (excluding Master's Degree / Doctorate level).

Figure 3: Highest educational level attained by Respondents

Highest Educational Level Attained



Notes on main segments of Figure 3:

Green =	Intermediate / Group Certificate
Blue =	Leaving Certificate
Red =	Third Level
Yellow =	Master's Degree

- **Formal training received**

Table 7: Formal training received

	%
Secretarial courses / "Commercial {i.e. office practice etc.}courses" / Typing courses / keyboarding courses	63.0
WP courses	43.8
Word for Windows courses	8.4
All-in-1 courses	49.6
Focus courses	3.0
Smart courses	3.8
Database courses	20.3
Lotus 1-2-3, Excel and other spreadsheet courses	59.8
Desktop Publishing courses, including Aldus PageMaker	18.4
Harvard Graphics courses	25.3
PowerPoint courses	16.0
I T courses in general	16.0
Very little / minimal / occasional training received	4.5
Mainly self-taught / solely self-taught / additional self-learning e.g. Learning Centres	6.7
No training received	4.4

* **Length of service**

Table 8: Length of Respondents' service in ESB (grouped in years)

Service expressed in years: From	To	No. of Respondents
0.5	4	17
5	10	10
11	19	47
20	29	24
30	39	10
40	45	4

Commentary:

The largest grouping of Respondents (42% of the valid response) had over ten but less than twenty years service.

A total of 74 Respondents (66.2% of the valid response) had less than 20 years service.

There was one Missing Response.

- **Job Descriptions**

[Source: August Questionnaire Page 1]

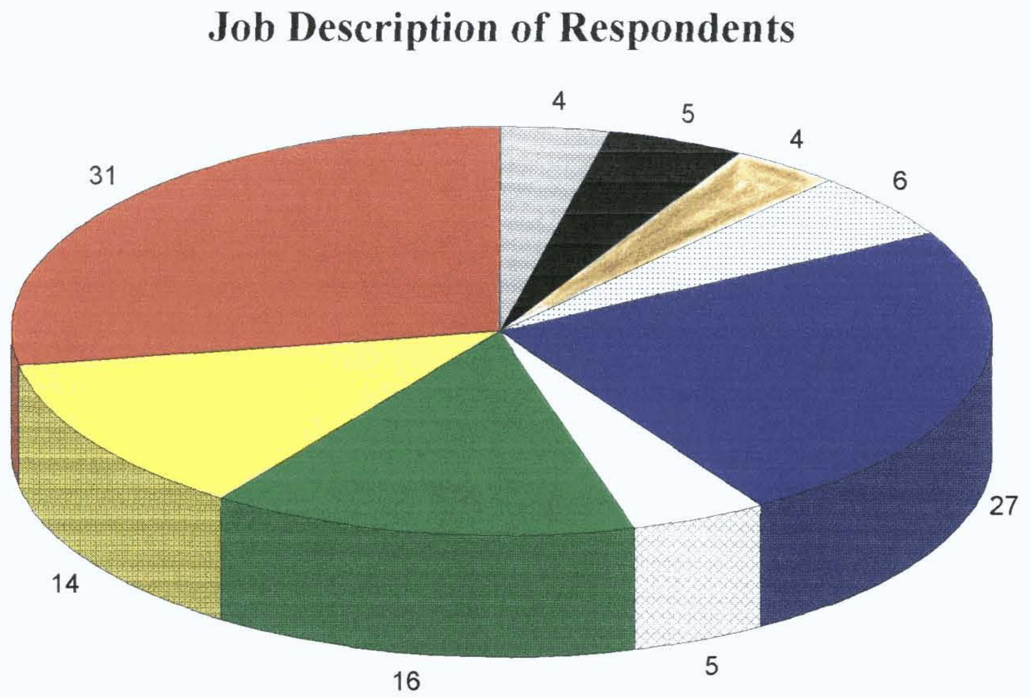
Table 9: No. of Respondents according to Job Description

Job Description	Number of Respondents	Percentage of total
Manager (non-engineering):	4	3.6
Manager (engineering):	5	4.5
Supervisory:	4	3.6
Administrative:	6	5.4
Clerical:	27	24.1
Secretarial:	5	4.5
Technical:	16	14.3
Engineer:	14	12.5
Professional/Specialist:	31	27.7
Missing Response:	1	*
Total:	113	100.2 ♎

Notes:

- The symbol ♎ indicates a rounding error introduced by SPSS.
- See **Appendix B** for details of composition of above Table.

Figure 4: Job Descriptions of Respondents



Notes on main segments of Figure 4 :

Green =	Technical
Blue =	Clerical
Red =	Professional / Specialist
Yellow =	Engineer (non-managerial)

Environmental and Ergonomic Factors
[Source: August Questionnaire Page 2]

Question 8. ***For how long have you been using a computer at work?***

Table 10: No. of years Respondent has been using a computer at work

From (years)	To (years)	No. of Respondents	Valid %
0.5	2.5	7	6.3
3	4.5	24	21.4
5	10	58	51.8
Over ten years:		23	20.5

Missing Response: 1

Question 9. ***How many other persons are employed in your office (i.e. in the same room; or nearby, if it is open plan)?***

Table 11: No. of other persons in Respondent's office

No. of other persons	Responses from Female Respondents	Responses from Male Respondents	Total
No other person	5	18	23
One other person	6	10	16
Two other persons	3	6	9
Three other persons	9	2	11
Four other persons	8	3	11
5 to 10 other persons	10	13	23
11 to 20 other persons	8	5	13
Over 20 other persons	1	1	2
Total	50	58	108

Commentary:

23 Respondents occupy a *single-person* office.

47 Respondents occupy an office having 5 occupants or fewer.

36 Respondents share their office with between 5 and 20 other persons.

5 Respondents did not answer this question.

Table 12: Type of Office Supervision reported by Respondents

	No. of Respondents
Traditional methods of office supervision	42
Relationship-style supervision	1
Teamwork	5
Looser methods of supervision / little supervision / mainly self-supervision	7
No formal supervision	10
Self-supervision	18
Missing Responses	2

Commentary:

Traditional methods of office supervision cover situations where the Respondent reports to someone within the same office or to someone in another office.

Relationship-style supervision is intended to cover the situation where, for example, a secretary reports directly to a manager.

Teamwork (where the Respondent is part of a team) was only found in a minority of cases.

Looser methods of supervision / little supervision / mainly-self-supervision covers those situations where the Respondent indicated the office was "loosely" supervised or, for example, where the manager only visited the office at intervals.

No formal supervision or **self supervision** includes for example, situations where Respondents said they supervised themselves. Naturally, this includes some of the managers who occupied a single-person office.

Table 13: Types of office occupied by Respondents

Type of office	Responses from Female Respondents	Responses from Male Respondents	Total
Open Plan	19	20	39
Room separated from other offices	34	38	72
Other type	0	1	1
Total	53	59	112

Commentary:

64.1 % of the 112 Respondents who answered this question occupied **an office separated from other offices**, *either* as the sole occupant of the office *or* sharing the office with other staff.

34.84 % of Respondents occupied **an open-plan office.**

One Respondent occupied a "Control Room" (listed as **Other** above).

There was one Missing Response.

Table 14: Office seating

Question 11: ***Is your office chair:*** a) Very comfortable

b) Fully-adjustable

c) In perfect working order

Question part	Yes	No	No opinion	Total
	%	%	%	
a) Very comfortable	63.7	23.9	9.7	97.3
b) Fully-adjustable	69.9	23	2.7	95.6
c) In perfect working order	81.4	11.5	3.5	96.4

Question 12. ***Please indicate the extent to which you AGREE / DISAGREE with the following statements***

Note: In the following pages, frequency of responses (in percentage terms) is shown.

a) My office is properly ventilated:

8.8 % Strongly Agreed.	23.9 % Strongly Disagreed.
29.2 % Agreed.	37.2 % Disagreed.
38.0 % were **Agreeing in Total.**	**61.1%** were **Disagreeing in Total.**
Don't Know: 0.9 %	Missing Responses: 0.0 %

Standard Deviation: 0. 94

---

b) The lighting in my office is ideal for working at my computer screen:

8.0 % Strongly Agreed.	17.7 % Strongly Disagreed.
42.5 % Agreed.	25.7 % Disagreed.
50.5 % were **Agreeing in Total.**	**71.3%** were **Disagreeing in Total.**
Don't Know: 6.2 %	Missing Responses: 0.0 %

Standard Deviation: 1. 048

---

c) The air conditioning in my office is excellent:

5.6 % Strongly Agreed.	26.9 % Strongly Disagreed.
16.7 % Agreed.	44.4 % Disagreed.
22.3 % were **Agreeing in Total.**	**71.3 %** were **Disagreeing in Total.**
Don't Know: 5.6 %	Missing Responses: 3.6 %

Standard Deviation: 8.605

---

d) The air conditioning in my office could be slightly improved:

27.9 % Strongly Agreed.	4.8 % Strongly Disagreed.
43.3 % Agreed.	15.4 % Disagreed.
71.2 % were **Agreeing in Total.**	**20.2 %** were **Disagreeing in Total.**
Don't Know: 8.7 %	Missing Responses: 8.0 %
Standard Deviation: 1.168	

e) The air conditioning in my office could be greatly improved:

34.0 % Strongly Agreed.	8.7 % Strongly Disagreed.
26.2 % Agreed.	22.3 % Disagreed.
60.2 % were **Agreeing in Total.**	**31.0 %** were **Disagreeing in Total.**
Don't Know: 8.7 %	Missing Responses: 8.9 %
Standard Deviation: 1.270	

- **Eye Tiredness**

Question 13: ***Do your eyes become tired from looking at your computer screen?***

This question was completed by *all* Respondents.

45.1 % answered "Frequently"; **46.9 %** answered "Seldom"; while **8 %** answered "Never". The parity between those answering "Frequently" and those answering "Seldom" is remarkable.

Table 15: Correlation of eye tiredness with office lighting

Correlating **Question 13.** ***Do your eyes become tired from looking at your computer screen?***

with **Question 12 - b)** The lighting in my office is ideal for working at my computer screen

Question 12 -b)

Responses	**SA**	**A**	**D**	**SD**	**DK**
Eyes "Frequently" become tired	4	16	15	15	1
Eyes "Seldom" become tired	4	28	12	4	5
Eyes "Never" become tired	1	4	2	1	1
Total	**9**	**48**	**29**	**20**	**7**

Note:

SA = Strongly Agree; **A** = Agree; **D** = Disagree; **SD** = Strongly Disagree; **DK** = Don't Know

- **Discomfort reported by Respondents**

Question 14. ***Please describe any discomfort you feel at least once a day which you think is caused by working at your computer terminal (e.g. stiff neck, sore back etc.)***

It is possible that the two examples of discomfort suggested in the question, and the issue of eye tiredness suggested by Question 13, influenced the Respondents' choice of reported conditions.

The Respondents reported a variety of discomforts.

Some Respondents reported more than one type of discomfort.

Seventeen Respondents indicated that they experienced **no discomfort**.

To facilitate inputting into the SPSS package, the types of discomfort were grouped into seven Groups of Discomfort and assigned code numbers according to the type of discomfort within the Groups.

Group 1: Neck and shoulder areas of body

Group 2: Back and shoulder areas of body

Group 3: Arms/wrist areas of body

Group 4: Legs / thighs / hamstring / buttocks areas of body

Group 5: General Discomfort

Group 6: Eyes

Group 7: General Fatigue

The numbers of Respondents reporting various discomforts are shown in the following Tables.

Table 16:

Group 1: Neck and shoulder areas of body

	No. of Respondents
Stiff neck:	16
Sore neck *or* neck discomfort *or* neck stiff and sore:	5
Sore neck *or* neck discomfort *or* neck stiff and sore - *but could be due to, or aggravated by, other causes*:	1
Stiff neck sometimes / occasionally:	6
Sore shoulders:	2
Stiff shoulders *or* discomfort of shoulders:	1
Stiffness of neck *or* stiffness of neck and shoulders:	4
Stiff shoulder {Respondent feels office chair is unsuitable}:	1
Painful neck / back *due to accident, says Respondent - so it is not computer-related*:	1
Total:	**37**

Table 17:

Group 2: Back and shoulder areas of body

	No. of Respondents
Painful back *or* sore back or stiff back:	18
Occasional sore back *or* stiff back:	3
Sore back due to office chair/office desk being unsuitable:	2
Respondent feels office chair is unsuitable:	1
Overall stiffness:	1
Sore shoulders:	1
Total:	**26**

Commentary:

Combining reports of shoulder discomfort only from Groups 1 and 2 gives a total of 5 Respondents reporting this type of discomfort

Table 18:

Group 3: Arms and wrist areas of body

	No. of Respondents
Sore fingers / wrists *or* sore hands *or* "Typist's cramp" :	3
Pains in arms / wrists:	2
Occasional discomfort in wrists:	2
Occasional pain / discomfort in arms / wrists:	1
Pains in wrists / hands / fingers:	1
Total:	**9**

Table 19:

Group 4: Legs / thighs / hamstring / buttocks areas of body

	No. of Respondents
Stiff legs /stiffness of legs:	2
Stiff / sore thigh *or* discomfort in buttocks *or* hamstring:	2
Tired legs:	1
"Restless" legs:	1
Total:	**6**

Table 20:

Group 5: General Discomfort

	No. of Respondents
Occasional headache(s) / migraine headache(s):	6
Headache(s):	8
Headache(s) is/are due to, *or* could be due to, "non-computer" causes:	1
General discomfort due to sitting for long period of time:	1
Discomfort disappeared with the passage of time:	1
Respondent's use of computer is not continuous *or* Respondent feels no discomfort, stating use of computer is not continuous *or* is intermittent:	6
Total:	**23**

Commentary:

R91 stated he was a migraine sufferer: "*I sometimes get this condition more frequently after prolonged periods in front of a* <u>*colour*</u> *VDU.*"

Table 21:

Group 6: Eyes

	No. of Respondents
Tired eye(s) / eye strain or discomfort:	18
Tired eye(s) / eye strain or discomfort occasionally:	2
"Sore eyes" {e.g. "scalding eyes" [R50]}:	8
"Sore eyes" occasionally:	2
Eyes need time to readjust after work:	1
Dry eyes (Respondent thinks this could be caused by air conditioning):	1
Total:	**32**

Commentary:

R38, who is 24 years of age, comments "Tired eyes (quit contact lenses!)".

Table 22:

Group 7: General Fatigue

	No. of Respondents
Discomfort caused by natural / artificial lighting:	1
Fatigue /general fatigue:	2
"Tiredness"/ tired / very tired:	4
No real discomfort while at work - only after work:	1
No constant/recurring discomfort:	1
Total:	**9**

Correlation of eye tiredness with Discomfort Group 6

Twenty-six Respondents who reported eye tiredness or other eye discomfort also said their eyes "**frequently**" became tired from looking at their computer screen.

However six Respondents who reported eye discomfort also said their eyes "**seldom**" became tired from looking at their screen (one of these wondered if the eye discomfort felt was due to the office air conditioning).

Table 23: ***Correlating* Question - 11)** ***Is your office chair*** a) Very comfortable

with Back Discomfort (Discomfort Group 2):

	Discomfort Codes					
	35	**41**	**42**	**43**	**44**	**45**
Response of Respondent						
Yes	0	0	0	3	12	1
No	0	1	2	0	3	0
No opinion	1	0	0	0	2	0

Chi Square	**Value**	**Degrees of Freedom**	**Significance**
Pearson	**6. 52186**	**4**	**. 16342**

Notes:

Code

35: Shoulder discomfort (e.g. sore shoulder(s))

41/ 42: Office furniture (e.g. chair or desk) is *or* may be unsuitable

43 / 44: Back discomfort (e.g. sore back / stiff back)

45: Overall stiffness

- **Usefulness of Products and Reasons for Liking Products**

[Source: August Questionnaire Page 3]

- **Usefulness of Products**

Question 15. Of the software products / features that you use, please indicate how useful you find each

Frequency of responses (in percentage terms) are given below.

a) Usefulness of All-in-1:

Very Useful	58.5 %	Not Very Useful	0.0 %
Useful	32.1 %	Useless	0.0 %
Somewhat Useful	9.4 %		
Total	**100.0 %**	**Total**	**0.0 %**
Missing Responses	6.2 %		

b) Usefulness of database product (e.g. Access):

Very Useful	28.3 %	Not Very Useful	4.3 %
Useful	45.7 %	Useless	4.3 %
Somewhat Useful	17.4 %		
Total	**91.4 %**	**Total**	**8.6 %**
Missing Responses	59.3 %		

c) Usefulness of Desktop Publishing product:

Very Useful	39.3 %	Not Very Useful	7.1 %
Useful	25.0 %	Useless	10.7 %
Somewhat Useful	17.9 %		
Total	**82.2 %**	**Total**	**17.8 %**
Missing Responses	75.3 %		

d) Usefulness of word processing feature within All-in-1:

Very Useful	46.2 %	Not Very Useful	7.5 %
Useful	31.1 %	Useless	5.7 %
Somewhat Useful	9.4 %		
Total	**86.7 %**	**Total**	**13.2 %**
Missing Responses	6.2 %		

e) Usefulness of word processing product on a PC (e.g. "Word"):

Very Useful	55.4 %	Not Very Useful	1.5 %
Useful	30.8 %	Useless	3.1 %
Somewhat Useful	9.2 %		
Total	**95.4 %**	**Total**	**4.6 %**
Missing Responses	42.5 %		

f) Usefulness of spreadsheet product (e.g. Excel, Lotus 1-2-3):

Very Useful	70.4 %	Not Very Useful	0.0 %
Useful	18.5 %	Useless	3.7 %
Somewhat Useful	7.4 %		
Total	**96.3 %**	**Total**	3.7 %
Missing Responses	52.2 %		

g) **Usefulness of Electronic Mail:**

Very Useful	67.6 %	Not Very Useful	0.9 %
Useful	27.0 %	Useless	0.0 %
Somewhat Useful	4.5 %		
Total	**99.1 %**	**Total**	**0.9 %**
Missing Responses	1.8 %		

h) **Usefulness of Microsoft Paintbrush:**

Very Useful	5.3 %	Not Very Useful	28.9 %
Useful	21.1 %	Useless	28.9 %
Somewhat Useful	15.8 %		
Total	**42.2 %**	**Total**	**57.8 %**
Missing Responses	66.3 %		

j) **Usefulness of Microsoft PowerPoint:**

Very Useful	45.7 %	Not Very Useful	8.7 %
Useful	30.4 %	Useless	8.7 %
Somewhat Useful	6.5 %		
Total	**82.6 %**	**Total**	**17.4 %**
Missing Responses	59.2 %		

The following is a selection of some of the **other** products chosen by Respondents in response to question lines **j)** to **m)** of Question 15 of the questionnaire.

- **Usefulness of MOCCS:**

Very Useful	50.0 %	Not Very Useful	7.1 %
Useful	35.7 %	Useless	3.6 %
Somewhat Useful	3.6 %		
Total	**89.3 %**	**Total ....**	**10.7 %**
Missing Responses	75.2 %		

- **Usefulness of MMIS:**

Very Useful	33.3 %	Not Very Useful	0.0 %
Useful	53.3 %	Useless	6.7 %
Somewhat Useful	6.7 %		
Total	**93.3 %**	**Total ....**	**6.7 %**
Missing Responses	86.7 %		

- **Usefulness of MMS:**

Very Useful	33.3 %	Not Very Useful	0.0 %
Useful	33.3 %	Useless	33.3 %
Somewhat Useful	0.0 %		
Total	**66.6 %**	**Total ....**	**33.3 %**
Missing Responses	97.4 %		

- **Usefulness of PMIS**:

Very Useful	65.0 %	Not Very Useful	0.0 %
Useful	30.0 %	Useless	0.0 %
Somewhat Useful	5.0 %		
Total	**100.0 %**	**Total**	**0.0 %**
Missing Responses	82.3 %		

- **Usefulness of POAP:**

Very Useful	18.8 %	Not Very Useful	12.5 %
Useful	56.3 %	Useless	0.0 %
Somewhat Useful	12.5 %		
Total	**87.6%**	**Total**	**12.5 %**
Missing Responses:	85.8 %		

Commentary:

- 6.2 % of Respondents did not answer either the question line relating to All-in-1 or the question line relating to the WP feature within All-in-1. This is interesting as these Respondents have access to All-in-1: it should be taken into account that some negative comment was directed at All-in-1 in the open-ended questions.
- the level of usefulness attributed to E-mail is high. The total of those who did not answer the question line concerning E-mail is very low. Only **one** Respondent does **not** use E-mail (as indicated by written comment of returned questionnaire).
- written comments on completed questionnaires indicated that **six** Respondents did **not** use spreadsheets.
- **Four** Respondents indicated by written comments on completed questionnaires that **they did not use PowerPoint**. This product also produced a high level of Missing Responses - it is a PC-based product, which helps explain the low response.
- there is a high level of "Not Very Useful and "Useless" for **Microsoft Paintbrush**, which is a marginal product for many people who do not use, or seemingly need, its limited graphics abilities. Many Respondents (66.3%) did not answer this question.
- although database products are claimed to be potentially useful, a high number (59.3%) of Respondents did not answer Q.15 b) on database products. Perhaps they were influenced by:-
  - the fact that Microsoft (MS) Access is not "bundled" (supplied) with the standard MS Office suite provided for the average ESB PC user - though it is supplied with MS Professional Office suite, which users can request - it costs more, however;
  - the difficulty of learning to use a database. It may be the case that WP products are viewed as easier to use, more approachable, because a form of "writing" is involved - even non-typists can "have a go" at them, whereas even the word "database" seems synonymous with complexity;
  - the possibility that some people may not have been educated about the uses for a database product.

Table 24: ***Correlating*** **Job Description** ***with*** **Response to Q.15 a) All-in-1**

Job Description	VU	U	SU	Total Useful	NV	UL	Total Not Very Useful or Useless
Manager (n-e)	3	1	0	4	0	0	0
Manager (e)	3	2	0	5	0	0	0
Supervisory	2	1	0	3	0	0	0
Administrative	4	1	0	5	0	0	0
Clerical	16	9	0	25	0	0	0
Secretarial	3	2	0	5	0	0	0
Technical	7	5	4	16	0	0	0
Engineer	4	4	4	12	0	0	0
Profes/Specialist	20	9	2	31	0	0	0
Total	**62**	**34**	**10**	**106**	**0**	**0**	**0**

Notes on this Table can be found on the following page.

Note 1:

Abbreviations used in Table 24 are as follows:

VU = VERY USEFUL; **U** = USEFUL; **SU** = SOMEWHAT USEFUL;

NV = NOT VERY USEFUL; **UL** = USELESS

Note 2:

There were 7 Respondents who did not answer Question 15 a) concerning All-in-1.

Table 25: ***Correlating*** **Job Descriptions** ***with*** **Total no. of Respondents who described certain software products as "VERY USEFUL"; "USEFUL"; and "SOMEWHAT USEFUL" combined**

Job Description	All-in-1	Database	DTP	WP in All-in-1	WP on a PC
Manager (n-e)	4	0	0	3	2
Manager (e)	5	1	0	4	2
Supervisory	3	1	1	1	2
Administrative	5	1	1	5	1
Clerical	25	14	3	26	18
Secretarial	5	2	2	5	4
Technical	16	8	6	14	10
Engineer	12	4	2	7	7
Profes/Specialist	31	11	8	26	16
Total	**106**	**42**	**23**	**91**	**62**

A Commentary on this Table can be found on the following page.

Commentary:

It can be seen from the column for the WP product within All-in-1 that 91 out of the 101 valid responses found it useful to some degree, compared with 62 who found the WP feature on their PC useful to some degree. In part this probably reflects the higher number of Respondents who have access to All-in-1 than have access to a PC.

Table 26: *Correlating* **Job Descriptions** *with* **Total no. of Respondents who described certain software products as "VERY USEFUL"; "USEFUL"; and "SOMEWHAT USEFUL" <u>combined</u> (other Products)**

Job Description	Spreadsheet	E-Mail	Paintbrush	PowerPoint
Manager (n-e)	1	4	0	1
Manager (e)	1	5	0	1
Supervisory	2	3	0	1
Administrative	2	6	1	1
Clerical	13	26	2	8
Secretarial	2	5	0	3
Technical	11	16	5	9
Engineer	8	13	2	4
Profes/Specialist	12	31	6	10
Total	**52**	**109**	**16**	**38**

Note concerning the usefulness of other products:

Concerning the products **MMIS**, **MOCCS**, **PMIS** and **POAP**, those of a *Clerical* job description found them most useful, followed by those of a *Professional / Specialist* description.

Products most used by Respondents

Question 16. ***Please name the software product(s) and feature(s) which you use most during your working day;***

indicate approximately how many hours a day you would use it / them;

and why you like using it / them

Table 27: Some Products most used by Respondents

Product	No. of Respondents
All-in-1:	75
WP in All-in-1:	19
Word for Windows:	37
Other WP product:	3
Aldus PageMaker DTP:	9
Electronic Mail in All-in-1:	23
Microsoft Excel spreadsheet product:	31
Lotus 1-2-3:	12
Harvard Graphics:	10
Other graphics products:	4
MMS:	2
MMIS:	10
MOCCS:	21
PIRS:	4
POAP:	9
PMIS:	22

Commentary on results for Question 16:

Reasons given for liking the Product:

As this was an open-ended question, it was decided to codify the responses according to an arbitrary coding system. Starting with a code value of **8**, each "reason" was given a code. Where a reason given by a Respondent appeared similar to that given by another Respondent, the same code was used for the second Respondent.

For example, a comment along the lines of "*the product is user-friendly*" was coded as **22**. If a product was "*flexible and user-friendly*", it was coded as **13**. Since some Respondents expressed some reservations about products they liked, Code 87 was used when a Respondent expressed one or more critical comments about the product although liking it. Where the Respondent's response contained **more than** one reason for liking a product, the reasons were broken down into two or more separate "reasons". Each reason was then separately coded.

A full list of Codes used for analysing these reasons is given in **Appendix C**.

Uncodable responses were coded as 98; missing responses were coded as 99.

Selection of Respondents' comments relating to Products LIKED

[Source: August Questionnaire Page 3]

Note:

To retain the flavour of Respondents' comments, the grammar and punctuation of the original statements have been left largely unchanged. Chain brackets { } have been introduced to separate parts of a statement to improve clarity; to include this researcher's comments; and/or to save space. Respondents' actual comments are italicised between quotation marks.
Other text in unbolded typeface has been added by this researcher to interpret/explain or to provide a commentary on the statements. The boldface Code, usually enclosed in square brackets, such as **[R9]**, refers to an individual code number assigned to Respondents.
The prefix **R** indicates a Respondent to the August questionnaire.

All-in-1

"*Can get mail to and from others in most of ESB quickly*" **[R9]**

"*E-Mail keep* {sic} *people up-to-date*{}*easy to contact users*" **[R11]**

"*Gives very clear professional typing. Always have a back up copy*" **[R19]**

"*Time management. Telephone Directory look-up. Word Processing & Electronic Mail all make for a paper free office (almost) for me.*" **[R21]**

"*Lots of useful features*{}*easy access*" **[R23]**

"*I dont* {sic} *particularly like using it*" **[R27]**

Concerning why he likes using it, **R32**'s response "*It's on my desk. Other than that it's a terrible product* shows he uses it because of its presence on his desktop, not because of its qualities.

"*Provides easy method of carrying on work*" **[R34]**

R35 finds it very helpful for communication.

"*A good product for Word Processing and Electronic Mail / Communications.*" **[R36]**

"*Quick transfer of information*" **[R39]**

R45 cites "*Convenience - But I would prefer to see on-screen menu (like Works)*" {Works is a Windows-based product}

"*Easy to use. Plenty Storage Space. Speed of Communication + record of same. Improves presentation quality*" **[R47]**

"*The edit feature saves time + effort*" **[R51]**

"*Use of electronic mail. Also use it for straightforward typing of text to download into graphic package.*" **[R52]**

R58 uses "*All-in-1 (WP and E. Mail)*" stating "*System is easily accessible + flexible*".

"*Very efficient*" **[R67]**

"*Receiving and sending messages {} Filing information*" **[R70]**

"Electronic mail, shared drawers, phone no.s {} I do all my work thru All-in-1 - would be lost without it!"

[**R78**, part of whose job description reads "*involved in IT Training*"; note that a "shared drawer" allows several users - possibly hundreds - to look into the same set of electronic files]

R80 uses All-in-1, saying he likes using it "*Because its* {sic} *a quick and easy way of writing / communicating various messages around the board* {i.e. Electricity Supply Board} *as well as outside.*"

"*I need to use it as people send me mail.*" says **R95**, a 34 year-old Professional Engineer. He feels it is a useful way of "*contacting people who are not at their desks when I ring.*"

R96 considers that All-in-1 fulfils *"needs of most of my tasks."*

"*Quick + efficient*" **[R99]**

R100 uses All-in-1 - WP / E Mail for approximately 2 hours a day; she likes using it because: "*Ease of access - terminal on my desk - WP / E Mail features are easy to use. Makes communication easier. Large number of ESB (many of my internal customers) have All-in-1 accounts.* {She also mentions the Corporate Personnel / Corporate Directory features, which provide on-screen details about staff, such as their location, telephone number and the like.

"*Very useful comms. tool. Simple to circulate good-quality reports, etc.*"

[R103]

"Very adaptable, user-friendly. Good facility of transferring documents from one account to another."

[**R107**, who uses it between 3 and 4 hours (approximately) a day]

R109, an "Admin. Officer", gives a purely utilitarian reason: "*Correspondence - answering letters etc.*"

"Simple / effective." **[R112]**

WP (All-in-1):

"meets my needs" **[R24]**

"Do not particularly like it but stuck with it for using on All-in1 Mail system. Cumbersome. Would much prefer Word for Windows." **[R91]**

Electronic Mail:

Electronic mail *"meets my needs"*

[**R24** - who states the same for WP on All-in-1]

R45 cites *"convenience + linkage to All-in-1 files."*

"Quick" **[R49]**

"Messages are relayed quickly" **[R51]**

"Saves time" **[R57]**

R87 gives a one-word reason: *"Necessity"*.

R91 likes using All-in-1 Mail: *"Convenience of mailing reports to any location within ESB, instantly and reading own mail in any other location"*.

R99 uses electronic mail for approximately 1 hour a day; it *"cuts down on PAPERWORK"*.

All-in-1 Electronic Mail:

"An established communications medium - too much rubbish on it. - electioneering etc!" - these are the mixed sentiments of **R14**.

R25 cites its user-friendliness and speed.

"ease of communication." **[R59]**

Word Processing products:-

Microsoft Word for Windows:

"*Very versatile*" **[R9]**

"*Flexible = easy to use*" **[R11]**.

"*Very Flexible*" **[R12]**

R16, whose work relates to safety in a power station, writes: "*Easy to use, understand, produce results. What you see is what you get.*"

R21 says of All-in-1 "*I'm only learning, but I can see its advantages, again in presentation quality, as evidenced by your questionnaire.*"

"*Presentations look v. well*" **[R24]**

R32 considers it a "*powerful*" package {} "*will do anything. Well produced.*"

"*Ease of use - availability of options*" [**R44**, a 38 year-old manager]

"*Fax, report, tender preparation made easy and master copy can be copied & modified as required. Finished report can be well presented.*" **[R46]**

"*Virtually all my written work is done straight onto it.*" **[R54]**

Word is used by **R56**'s Secretary "*for typing reports {} minutes etc.*"

"*Beats Decmate*" {Decmate is an alternative product} **[R61]**

R71 considers Word to be "'*OK*".

R77 asserts that Word is the "*best word processing package I know. It enables 'desk top publishing' - standard output to be produced*".

"*Very versatile WP product*"{} *universally used within Power Station*", reports **R88**, a Maintenance Superintendent in a power station - it appears the ubiquity of this product is a notable feature for the Respondent.

"*Does good Presentations for Training*" states **R96**, part of whose job description is "Training Officer".

"*Easy to use & allows reports etc to be written up quickly*" **[R110]**

WordPerfect

Concerning why she likes using this, **R31** has "no *choice - It's my job.*"

WPS - Plus / DOS

R67, a 28 year-old Clerical Officer, finds this to be "*very efficient*".

Desktop Publishing product:

Aldus PageMaker

"Extremely versatile and can be used to create any type of document - and almost all other packages can be imported into it." **[R29]**

In response to Question 16 b.1) Why do you like using it?, **R48** - whose work involves graphics, DTP and creating presentations - answered:

"Not a matter of liking to but having to"

R71 likes using this Product.

Microsoft Excel spreadsheet product

"*Useful for putting together spreadsheets*" **[R2]**

"*Very powerful*" **[R9]**

Excel is flexible and easy to use, implies **R11**.

R16's reasons for liking Excel are the same as those he gave for liking Word: "*Easy to use, understand, produce results. what you see is what you get.*"

R32 considers Excel a "*powerful*" package {} "*will do anything. Well produced.*" {This Respondent stated the same for Word.}

"*Ease of use - information display facilities*" **[R44]**

R54 says of Excel: "*Very easy and helpful for organising figures and clients*"

"*Very flexible. Can do just about anything required of it.*" **[R55]**

"*Useful, easy to use, powerful.*" **[R59]**

"*It is a powerful analytical tool*" according to **R77**, who appears to have a job requiring the use of analysis. He says Excel "*is also the foundation for 'add-in' software*" which they purchased.

"*Once a system has been set-up, an enormous amount of time can be saved.*" **[R83]**

R86, an engineer, states his reasons for liking Excel thus: "*Performs complicated calculations and provides printed output. Very flexible & user friendly.*"

R88 implies that Excel is a very versatile product, saying it is universally used within the power station where this Respondent works.

R91 states that Excel is "*User friendly. Useful for my own work.*"

"*Versatility - it can do almost anything you require.*" **[R106]**

"*Easy to use and excellent for tabulating results, making schedules etc*" **[R110]**

Lotus 1-2-3

"*Great tool for calculations etc.*" **[R25]**

"*From previous jobs I have acquired reasonable skill and familiarity. Great satisfaction in solving problems with Lotus 123.*" **[R27]**

"*Ease of use, ability to alter spreadsheets speedily + ease of printing with WYSIWYG.*" {see Glossary} **[R28]**

"*User friendly - Quick.*" **[R40]**

"*Flexible, quick*" **[R49]**

R47 cites Lotus and the WYSIWYG feature: "*Easy to get going using the PC. Gives Professional looking spreadsheets / reports*".

Smart

"Very easy to use." **[R55]**

"Easy to use" **[R66]**

Microsoft Access database product

"Package easy to use and query data." **[R102]**

Oracle RDBS (relational database system) "SQL"

"SQL is a pseudo language which increases access ability to database" **[R97]**

Presentation software / Graphics software

Microsoft PowerPoint

R16 indicated his reasons for liking PowerPoint were the same as for liking Word: "*Easy to use, understand, produce results. What you see is what you get.*"

"*Very versatile. Produces a wide range of slides that look very professional. Can produce very eye catching notices.*" **[R19]**

"*' The medium is the message' - Professional Presentations using this product help my work greatly.*" **[R21]**

"*It is a good package*" states **R26**, whose work involves designing training courses and material; its "*main advantage is that it can be used as a vehicle for importing and exporting graphics between packages that would otherwise be impossible*"

"*Painless production of summaries and presentations*" **[R54]**

PowerPoint is used by **R56**'s Secretary "*for me*".

"*Great variety of colour. Good choice of graphics etc.*" **[R52]**

"*I find it excellent for making presentations*" **[R77]**

"*Presentations for courses, slideshows etc. Easy to use.*" **[R78]**

Harvard Graphics:

"Presentations are easily assembled." **[R28]**

"Reasonably versatile." [**R40**, a clerical employee]

"Versatile system. You can create within system and store for further use."

[**R76**, who uses this for approximately half-an-hour a day.]

Micrografx Designer

"Excellent drawing package." **[R29]**

CorelDraw!

R71 likes using this drawing package.

Office suite: Microsoft Office

"Versatile and elements can be moved within different applications." **[R76]**

R80 also selects **Microsoft Office** saying *"it makes my job easier, its* {sic} *an interesting package - challenge to produce effective material"*.

"- products - easy to use, efficient. Macros - challenge" **[R102]**

Windows:

"Use the file manager for tidying up C: Drive {} copying files etc." **[R78]**

Some Other Products and Systems

MOCCS

"*Gives most information I need at the touch of a button. Avoids many phone calls*"

[R1]

"*Instant information*" **[R25]**

R45 states elsewhere on Page 3 that MOCCS is "*not user friendly*".

"*Efficient*" **[R57]**

R62 nominates "*All-in-1 / MOCCS* " stating "*very useful database & easy enough to use when you become familiar*"

R63 says of MOCCS "*useful reports - good management accounting information*".

R70 uses MOCCS "*for budgets*".

R99, a budget officer, uses MOCCS for approximately 2 to 3 hours a day:

"*easy access to data*".

"*Easy access to costing*" **[R109]**

MMIS

Indicating why he likes using it, **R32**'s response "*It's on my desk. Could be way better*" is unenthusiastic.

"*good information*" **[R59]**

At times Respondents nominated a product they liked using, without stating a reason for liking it. This was the case with **R74**, who nominated MMIS.

"*I need to use it.*" **[R95]**

MMS

"*Useful tool for getting safety jobs to the attention of Supervisors*" says **R23** who is a Safety Specialist.

PMIS

"Fully adaptable and flexible. Can demand reports to suit need." **[R15]**

"Information is always up-to-date. Reports are produced quickly." **[R19]**

"Necessary for changing Payroll details etc."

[R20, a clerical employee, temporarily supervising "a busy Payroll office"]

"Enables you to retrieve data{}useful for filling in accident form{}

[R23, a Safety Specialist]

"I dont {sic} particularly like using it."

[R27 - who made the same comment about All-in-1]

R45 states "*Convenience*", but indicates that PMIS is not user friendly.

"By and large it provides a good Database." **[R58]**

POAP

"Fast, easy access to accurate information, ease of processing" **[R63]**

"Many useful features relating to the job in question." **[R74]**

"Easy access to suppliers" **[R109]**

Walker Accounts Payable / Purchase Order System

R67 finds this to be "*very informative and easy to use.*"

PIRS

"*Necessary for Payroll Rules and Regulations.*" **[R20]**

"*Good for checking up on Procedural queries / issues etc.*" **[R58]**

IBM - Payroll Screens:

"*Necessary for information*" **[R20]**

IBM

R72 uses this to "*Validate Fault Reports*"

Customer System:

R107 uses this for about 30 minutes a day; she does not like using it: "*it's a case of necessity - it would be easier if I had more cause to use it and could familiarise myself better*".

GFax:

"*Very time saving*" **[R53]**

PSSO:

R8, an engineer, likes the product PSSO (a Landis & Gyr / in-house product) because "*custom designs allows* {sic} *for a wide variety of data to be displayed on 1 screen.*"

{But note his critical comment under Products Disliked.}

GD2:

R39, a manager, nominates a product called **GD2**:

"*Keeps me up to date quickly on the state of the ESB system*".

R56, whose job is in the power system operation area, uses **GD2**:

"*Real time information on what is happening on system + access to archival data etc.*"

R86, a shift engineer, uses **GD2** for load comparison and system data. The engineer states:

"*Access to info very fast, keystroke requirements short & to the point.*"

This Respondent also uses the S.C.A.D.A. (Supervisory Control and Data Acquisition) system as it is "*essential to the job.*"

CMMS:

R76 uses **CMMS** (Computerised Maintenance Management System): "*directly relates to work*".

R79 is a Technologist who uses **CMMS** because he has to use it for his job.

R39 nominates a product called **GPRS**:

"*Good technical information at your fingertips*".

"*Software comprising system control applications*" is nominated by a control centre engineer, **R75**, who has "*to use them to do what is required*".

R80 uses ***"Focus / SQL"*** - he states "*constant challenge - learning programming language to produce the end result required.*"

R35 nominates Datatrieve: "*Essential for use with MMIS*".

R36, who works in an I T - related activity, nominates Cobol Workbench:

"*A good product for program development and testing*".

Speaking of a product called Compass, **R55** stated that he **disliked** it: "*Very difficult to use - Cannot rely on results without further analysis.*"

R91 finds **LIMS** (Laboratory Information Management System) to be **useless** (ticking this box in the questionnaire); this Respondent however found the **G Fax** product to be **very useful**, and the **group conferencing** facility to be **useful**.
{Group conferencing is a computer-mediated conferencing system that allows users to conduct on-line conferences or meetings, so as to discuss a topic or range of topics. It is claimed to be an easy-to-use method of sharing information and ideas between people.}

R101 uses a product called **IDEA** for 6 hours a day: she likes using it for "*manipulating data for analysis* {} *user friendly & easy to learn.*"

R92 finds **SPSS** to be an "*Excellent package ! Allows the user to cross tab information which s/he enters. Allows the user to draw more conclusion* {sic} + *assess data accurately.*"

Word Processing and Spreadsheet Products

[Source: August Questionnaire Page 4]

- **Word Processing**

Question 17a. ***Regarding the word processing product which you use most often, please indicate the extent to which you AGREE / DISAGREE with the following statements:***

a) It was **easy** to become skilful in using it:

25.5 % Strongly Agreed.		2.0 % Strongly Disagreed.	
55.1 % Agreed.		16.3 % Disagreed.	
80.6 % were **Agreeing in Total.**		**18.3 %** were **Disagreeing in Total.**	
Don't Know:	1.0 %	Missing Responses:	13.3 %
Standard Deviation:	0.773		

b) It was **fairly difficult** to become skilful in using it:

17.2 % Strongly Agreed.		36..6 % Strongly Disagreed.	
41.9 % Agreed.		0.0 % Disagreed.	
59.1 % were **Agreeing in Total.**		**36.6 %** were **Disagreeing in Total.**	
Don't Know:	4.3 %	Missing Responses:	17.7 %
Standard Deviation:	0.779		

c) It was **extremely difficult** to become skilful in using:

0.0 % Strongly Agreed:		69.9 % Strongly Disagreed.	
1.1 % Agreed:		23.7 % Disagreed.	
1.1 % were **Agreeing in Total.**		**93.6 %** were **Disagreeing in Total.**	
Don't Know:	5.4 %	Missing Responses:	17.7 %
Standard Deviation:	0.543		

d) I **still dislike its difficulty** when I am using it:

4.4 % Strongly Agreed.	49.5 % Strongly Disagreed.
8.8 % Agreed.	33.0 % Disagreed.
13.2 % were **Agreeing in Total.**	**82.5 %** were **Disagreeing in Total.**
Don't Know: 4.4 %	Missing Responses: 19.5 %
Standard Deviation: 0.882	

e) I would like **more training** in this product so as to get the most benefit from it:

20.4 % Strongly Agreed.	15.1 % Strongly Disagreed.
44.1 % Agreed.	18.3 % Disagreed.
64.5 % were **Agreeing in Total.**	**33.4 %** were **Disagreeing in Total.**
Don't Know: 2.2 %	Missing Responses: 17.7 %
Standard Deviation: 1.037	

f) I find that the **"spell checker"** feature is essential:

33.3% Strongly Agreed.	7.1 % Strongly Disagreed.
32.3 % Agreed.	20.2 % Disagreed.
65.6 % were **Agreeing in Total.**	**27.3 %** were **Disagreeing in Total.**
Don't Know: 7.1 %	Missing Responses: 12.4 %
Standard Deviation: 1.191	

g) I find that the **"grammar checker"** feature is essential:

8.8 % Strongly Agreed.	12.1 % Strongly Disagreed.
16.5 % Agreed.	29.7 % Disagreed.
25.3 % were **Agreeing in Total.**	**41.8 %** were **Disagreeing in Total.**
Don't Know: 33.0 %	Missing Responses: 19.5 %
Standard Deviation: 1.335	

- **Spreadsheet**

Question 17b. ***Regarding the spreadsheet package which you use most often, please indicate the extent to which you AGREE / DISAGREE with the following statements:***

a) It was **easy** to become skilful in using it:

11.5 % Strongly Agreed.		4.9 % Strongly Disagreed.	
45.9 % Agreed.		23.0 % Disagreed.	
57.4 % were **Agreeing in Total.**		**27.9 %** were **Disagreeing in Total.**	
Don't Know:	14.8 %	Missing Responses:	46.0 %
Standard Deviation:	1.209		

b) It was **fairly difficult** to become skilful in using it:

1.6 % Strongly Agreed.		13.1 % Strongly Disagreed.	
23.0 % Agreed.		47.5 % Disagreed.	
24.6 % were **Agreeing in Total.**		**60.6 %** were **Disagreeing in Total.**	
Don't Know:	14.8%	Missing Responses:	46.0 %
Standard Deviation:	1.003		

c) It was **extremely difficult** to become skilful in using it:

1.7 % Strongly Agreed.		44.1 % Strongly Disagreed.	
3.4 % Agreed.		33.9 % Disagreed.	
5.1 % were **Agreeing in Total.**		**78.0 %** were **Disagreeing in Total.**	
Don't Know:	16.9 %	Missing Responses:	47.7 %
Standard Deviation:	0.852		

d) I **still dislike its difficulty** when I am using it:

1.7 % Strongly Agreed.		20.7 % Strongly Disagreed.	
10.3 % Agreed.		50.0 % Disagreed.	
12.0 % were **Agreeing in Total**.		**70.7 %** were **Disagreeing in Total**.	
Don't Know:	17.2 %	Missing Responses:	48.6 %
Standard Deviation:	0.956		

e) I would like **more training** in this product so as to get the most benefit from it:

29.5 % Strongly Agreed.		4.9 % Strongly Disagreed.	
34.4 % Agreed.		16.4 % Disagreed.	
63.9 % were **Agreeing in Total**.		**21.3 %** were **Disagreeing in Total**.	
Don't Know:	14.8 %	Missing Responses:	46.0 %
Standard Deviation:	1.359		

f) I find that the **"spell checker"** feature is essential:

7.3 % Strongly Agreed.		10.9 % Strongly Disagreed.	
16.4 % Agreed:		25.5 % Disagreed.	
23.7% were **Agreeing in Total**.		**36.4 %** were **Disagreeing in Total**.	
Don't Know:	40.0 %	Missing Responses:	51.0 %
Standard Deviation:	1.355		

g) I find that the **"automatic chart creation"** feature is essential:

19.3 % Strongly Agreed.	1.8 % Strongly Disagreed:
22.8 % Agreed.	12.3 % Disagreed:
42.1% were **Agreeing in Total.**	**14.1 %** were **Disagreeing in Total.**
Don't Know: 43.9 %	Missing Responses: 49.5 %
Standard Deviation: 1.679	

Commentary:

Seventeen Respondents indicated by means of written comments on the questionnaire that **they do not use spreadsheets**, which partly accounts for the level of Missing Responses.

42 % of Respondents agreed that they found the automatic chart creation feature to be essential - although about 44 % answered "Don't Know".

Analysis of August Questionnaire Page 5:

Software disliked / involvement in software design / ease or difficulty

Question 18. ***If there is a software product that you very much dislike using at work, please indicate why you dislike using it:***

Table 28: Some Products disliked by Respondents

Product	No. of Respondents
All-in-1:	6
WP in All-in-1:	4
Telephone Directory (All-in-1 feature):	1
Electronic Mail:	1
Word for Windows:	1
Access:	1
Aldus PageMaker:	1
Harvard Graphics:	1
PMIS:	1
MOCCS:	2
POAP:	3

Commentary on results for Question 18 - reasons given by Respondents for disliking Product:

As this was an open-ended question, a similar procedure to that performed for Question 16 on questionnaire Page 3 (Products most used by Respondents) was carried out.

For example, Respondent **R28** identified *Smart* as a product which he disliked using, giving as a reason that it was a "*duplication (or similar to) Lotus but the keys are different*".

This was taken as meaning the Respondent used different keystrokes (see Glossary) to operate Smart and Lotus spreadsheets. This comment did not arise in any other questionnaire, so it was separately coded as "58".

Where a response contained more than one reason for disliking the Product, each reason was separately coded.

A full list of Codes used for analysing these reasons is given in **Appendix D**.

Uncodable responses were coded as 98; missing responses were coded as 99.

Grouping the resulting Codes allows some generalisations to be made:

- **eight** Respondents found the Product **not to be user-friendly** *or* **to be very user-unfriendly** *or* **to be difficult to use**;

- **five** Respondents experienced negative feelings because the Product **is inferior to a rival product** *or* **is not an up-to-date version** of the Product;

- **five** Respondents were **critical of the keystrokes** used with the Product;

- **four** Respondents were **critical of the design or operation** of the Product;

- **four** Respondents felt the Product **was not fully satisfactory** *or* that the Product **lacked features**;

- **four** Respondents found the Product **to be slow** *or* **slow at times** *or* **very slow**;

- **three** Respondents felt the Product **was badly-designed**;

- **two** Respondents felt the Product **had inferior WP facilities**;

- **two** Respondents **criticised aspects of the Product's menu**.

Some Respondents made more than one critical comment about a Product.

The fact that only **32** Respondents nominated a Product which they disliked and the disparity between the Products nominated means only limited conclusions were drawn.

Selection of comments relating to Products DISLIKED

[Source: August Questionnaire Page 5]

All-in- 1

R32, a 24 year old employee who holds an engineering degree, lists his criticisms: "*It is slow, cumbersome, no useful features, no WYSIWYG* {see Glossary}. *No Print Preview* {he refers to a feature found on Word for Windows which provides a full page view of how each page will appear when it is printed out}. *Keyboard is not as ergonomically laid out as a standard PC keyboard - easy to press wrong keys"* {this reminds us of the advice mentioned earlier in the study about how designers should assign keys}.

"*Difficulty of use + lack of features*" **[R44]**

"*No good user manual available; commands difficult to remember*" **[R71]**

R92 dislikes All-in-one; this Respondent referred back to negative comments given in response to Question 16 (Products most used) and which are reproduced below:

"*I dont {sic} like using the All in one. The only features are bold & underline. They are too limiting. There is no word count facility which should be essential. The Spell Check is too time consuming as it checks words like ESB, Salmara, hydro + features like (i) + (ii).*

{Note: the Respondent appears to be unaware that All-in-1 **does allow** words to be **added** to the Product's built-in dictionary, so that these **would be** ignored during spell checking.}

I would like a print preview viewing facility on the All-in-one {} it would save me printing out constantly & would save a lot of paper for the company! "

R97 dislikes the "All-in-1 system in general" because "*it is very very* {Respondent's repetition} *unfriendly to use - compared to interactive environments such as the Microsoft Office package. All-in-1 is very much outdated and countless man-hours lost through frustration*"

Word Processing Product: Microsoft Word Version 6

"*It is extremely slow and when you insert graphics and/or equations into a document it can take up to 40 minutes to save it and it also tends to cause the computer to 'crash'* reports **R29**, adding that the product needs *"a lot"* of memory - *"8Mb RAM + 486 computer not enough"*.

Desktop Publishing product: Aldus PageMaker

"*The training is inadequate*" **[R19]**

Harvard Graphics:

"*I dislike drawing, don't find it very flexible*"

[**R59**, who adds a comment on Page 10 of the questionnaire concerning "Graphics": if she had **CorelDraw!** (an alternative graphics product) instead of Harvard Graphics Version 3, she would be "*happy*"]

"*It is not user friendly and is extremely slow.*" **[R110]**

Microsoft Paintbrush:

"Very limited application." **[R76]**

Smart:

"It is a duplication of (or similar to) Lotus but the keys are different." **[R28]**

Spreadsheets are nominated by **R80**, who acts as a Secretary, as the software product she very much dislikes using: *"Possibly because I have not had much experience on them and I find it difficult to use - however like most things - the more practice the more familiar you become & the easier the system gets."*

MOCCS and POAP:

"While I don't use POAP any more - when I did I hated it - screen was too cramped and layout was awful - MOCCS is not so bad but both are not very user-friendly." **[R11]**

PMIS:

"*Keys do not mimic other VAX systems.*"

[**R78**, who has been using a computer at work for 10 years]

POAP:

"*There seem to be exceptions to every rule and it is difficult to become familiar with.*"

[R47]

"*Menu system is difficult. I need manual beside me.*" **[R95]**

Other products

PSSO

R8 who spoke positively about this product under Products Liked, also lists it under products disliked: he states "*certain pictures* {presumably screen images] *take too long to build.*"

R55 disliked a product called Compass: "*Terms of reference differ greatly from the norm. (eg definitions are from USA)*"

R24's office had just got a PC six weeks before completing the questionnaire - she had not "*become efficient or familiar*" with any packages yet.

R91 dislikes using LIMS (Laboratory Information Management System) because "*very user unfriendly. with odd key assignments {} could never get the hang of it.*"

Commentary:

Some generalisations begin to emerge:

- people seem to reserve their criticism for products that appear difficult or frustrating to use;
- All-in-1 received some negative comment, for example, in relation to its WP feature;
- non-standard key assignments or keyboard layouts cause confusion.

Involvement in software design

[Source: August Questionnaire Page 5]

Question 19: ***With regard to the software products that you use each day at work, please indicate how much you would, or would not, like to be involved in designing these:***

Table 29: *Correlating* **Question 19 - a)** I would like **some more involvement** in designing these; *with* **Job Description of Respondents**

Number of Respondents who:-

Job Description	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
Manager (n-e):	0	0	1	1	0
Manager (e):	0	2	1	0	0
Supervisory:	0	2	1	0	1
Administrative:	1	3	0	0	1
Clerical:	6	10	5	1	0
Secretarial:	0	1	1	1	0
Technical:	3	8	2	1	1
Engineer:	2	4	4	0	3
Professional/Specialist:	4	11	4	2	4
Total:	***16***	***41***	***19***	***6***	***10***

Total No. of Missing Responses: **21**

Table 30: *Correlating* **Question 19 - b)** I would like **much more involvement** in designing these; *with* **Job Description of Respondents**

	Number of Respondents who:-				
Job Description	**Strongly Agree**	**Agree**	**Strongly Disagree**	**Disagree**	**Don't Know**
Manager (n-e):	0	0	0	2	0
Manager (e):	0	1	2	0	0
Supervisory:	0	1	1	0	1
Administrative:	0	0	3	0	1
Clerical:	5	9	7	2	0
Secretarial:	0	0	2	1	0
Technical:	3	0	7	2	2
Engineer:	2	0	7	1	3
Professional/Specialist:	3	6	8	4	5
Total:	***13***	***17***	***37***	***12***	***12***

Total No. of Missing Responses: 22

Table 31: *Correlating* **Question 19 - c)** I would prefer to have **no involvement** in designing these; *with* **Job Description of Respondents**

Job Description	*Number of Respondents who:-* **Strongly Agree**	**Agree**	**Strongly Disagree**	**Disagree**	**Don't Know**
Manager (n-e):	1	1	0	0	0
Manager (e):	0	1	1	1	0
Supervisory:	1	1	0	1	0
Administrative:	0	1	1	1	1
Clerical:	2	5	6	10	0
Secretarial:	1	1	1	0	0
Technical:	1	2	8	3	0
Engineer:	0	4	2	3	4
Professional/Specialist:	1	4	9	5	5
Total:	***7***	***20***	***28***	***24***	***10***

Total No. of Missing Responses: 24

Table 32: *Correlating* **Question 19 - a)** I would like **some more involvement** in designing these; *with* **Age Group of Respondents**

Number of Respondents who:-

Age Group	**Strongly Agree**	**Agree**	**Strongly Disagree**	**Disagree**	**Don't Know**
20-24:	3	3	2	1	0
25-29:	2	6	3	1	0
30-34:	6	14	3	1	3
35-39:	1	5	3	1	3
40-49:	4	9	4	2	1
50-59:	0	2	3	0	3
60 and over:	0	2	1	0	0
Total:	***16***	***41***	***19***	***6***	***10***
Percentage:	**17.4**	**44.6**	**20.7**	**6.5**	**10.9**

Total No. of Missing Responses: 21

	Value	**Approximate Significance**
Pearson's *r*	**. 20017**	**. 05573**
Spearman Correlation	**. 20159**	**. 05398**

Table 33: *Correlating* **Question 19 - b)** I would like **much more involvement** in designing these; *with* **Age Group of Respondents**

Number of Respondents who:-

Age Group	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
20-24:	2	2	3	2	0
25-29:	3	1	8	1	0
30-34:	4	7	9	3	5
35-39:	1	3	2	3	3
40-49:	3	3	9	2	1
50-59:	0	1	3	1	3
60 and over:	0	0	3	0	0
Total:	*13*	*17*	*37*	*12*	*12*
Percentage:	**14.3**	**18.7**	**40.7**	**13.2**	**13.2**

Total No. of Missing Responses: 22

	Value	Approximate Significance
Pearson's *r*	. 18334	. 08193
Spearman's Correlation	. 17184	. 10337

Table 34: *Correlating* **Question 19 - c)** I would prefer to have **no involvement** in designing these; *with* **Age Group of Respondents**

Number of Respondents who:-

Age Group	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
20-24:	1	1	3	3	1
25-29:	1	3	5	3	0
30-34:	0	5	8	11	4
35-39:	0	2	4	3	3
40-49:	2	6	6	4	0
50-59:	3	2	0	0	2
60 and over:	0	1	2	0	0
Total:	*7*	*20*	*28*	*24*	*10*
Percentage:	7.9	22.5	31.5	26.9	11.2

Total No. of Missing Responses: 24

		Value	Approximate Significance
Pearson's *r*	minus	. 19649	. 06497
Spearman Correlation	minus	. 17630	. 9840

Table 35: *Correlating* **Question 19- a)** I would like **some more involvement** in designing these; *with* **Sex of Respondent**

Response of Respondent to Question 19 - a)		Female	Male
Strongly Agreed	....	12	4
Agreed	....	18	23
Disagreed	....	8	11
Strongly Disagreed	....	3	3
Don't Know	....	3	7
Total	....	*44*	*48*

Total No. of Missing Responses: **21**

	Value	Approximate Significance
Pearson's *r*	. 19487	. 06268
Spearman Correlation	. 20862	. 04597

Chi Square	Value	Degrees of Freedom	Significance
Pearson	6 . 52186	4	. 16342

Table 36: *Correlating* **Question 19 - b)** I would like **much more involvement** in designing these; *with* **Sex of Respondent**

Response of Respondent to Question 19 - b)	**Female**	**Male**
Strongly Agreed	9	5
Agreed	12	5
Disagreed	14	23
Strongly Disagreed	6	6
Don't Know	4	8
Total	*45*	*47*

Total No. of Missing Responses: 21

	Value	**Approximate Significance**
Pearson's *r*	. 21044	. 04406
Spearman Correlation	. 21844	. 03645

Chi Square	**Value**	**Degrees of Freedom**	**Significance**
Pearson	7 . 50780	4	. 11137

Table 37: *Correlating* **Question 19- c)** I would prefer to have **no involvement** in designing these; *with* **Sex of Respondent**

Response of Respondent to Question 19 - c)	**Female**	**Male**
Strongly Agreed	3	4
Agreed	7	13
Disagreed	14	14
Strongly Disagreed	14	10
Don't Know	5	5
Total	*43*	*46*

Total No. of Missing Responses: **24**

		Value	**Approximate Significance**
Pearson's *r*	**minus**	**. 12426**	**. 24595**
Spearman Correlation	**minus**	**. 13388**	**. 21101**

Chi Square	**Value**	**Degrees of Freedom**	**Significance**
Pearson	**2 . 51125**	**4**	**. 64262**

Commentary:

R32 indicated, by means of a note written on the returned questionnaire, that he would like involvement in designing **in-house** software products.

R80, who acts as a Secretary, is "*more interested in using this tool, than knowing how to make it.*"

Ease / difficulty of certain procedures

[Source: August Questionnaire Page 5]

Question 20. ***Please indicate how easy / how difficult you find the following procedures***

- **Data management**

a) Making backup copies of disks:

42.0 % find this procedure Very Easy.		3.0 % find this procedure Very Difficult.	
28.0 % find this procedure Fairly Easy.		11.0 % find this procedure Difficult.	
Don't Know:	16.0 %	Missing Responses:	11.5 %
Standard Deviation:	1.434		

b) Recovering data that you have deleted in error:

13.9 % find this procedure Very Easy.		14.9 % find this procedure Very Difficult.	
23.8 % find this procedure Fairly Easy.		24.8 % find this procedure Difficult.	
Don't Know:	22.8 %	Missing Responses:	10.7 %
Standard Deviation:	1.365		

- **Word processing product:**

c) Changing the **tab** settings **on your word processing product**:

40.8 % find this procedure Very Easy.		2.9 % find this procedure Very Difficult.	
29.1 % find this procedure Fairly Easy.		19.4 % find this procedure Difficult.	
Don't Know:	7.8 %	Missing Responses:	8.9 %
Standard Deviation:	1.194		

d) Changing between different **fonts on your word processing product**:

39.2 % find this procedure Very Easy.		4.9 % find this procedure Very Difficult.	
30.4 % find this procedure Fairly Easy.		9.8 % find this procedure Difficult.	
Don't Know:	15.7 %	Missing Responses:	9.8 %
Standard Deviation:	1.429		

e) Using the **"cut and paste"** feature on **your word processing product**:

57.8 % find this procedure Very Easy.		1.0 % find this procedure Very Difficult.	
23.5 % find this procedure Fairly Easy.		8.8 % find this procedure Difficult.	
Don't Know:	8.8 %	Missing Responses:	9.8 %
Standard Deviation:	1.213		

f) Using the **"spell checker"** feature on **your word processing product**:

66.7 % find this procedure Very Easy.		1.0 % find this procedure Very Difficult.	
22.5 % find this procedure Fairly Easy.		2.0 % find this procedure Difficult.	
Don't Know:	7.8 %	Missing Responses:	9.8 %
Standard Deviation:	1.136		

g) Using the "**grammar checker**" feature on **your word processing product**:

39.1 % find this procedure Very Easy.		2.2 % find this procedure Very Difficult.	
14.1 % find this procedure Fairly Easy.		3.3 % find this procedure Difficult.	
Don't Know:	41.3 %	Missing Responses:	18.5 %
Standard Deviation:	1.847		

- **Spreadsheet product**

h) Getting a **spreadsheet** to appear **exactly** the way you want it to appear:

14.6 % find this procedure Very Easy.	4.9 % find this procedure Very Difficult.
36.6 % find this procedure Fairly Easy.	13.4 % find this procedure Difficult.
Don't Know: 30.5 %	Missing Responses: 27.4 %
Standard Deviation: 1.499	

i) Avoiding mistakes in **entering numbers** on your **spreadsheet**:

9.9 % find this procedure Very Easy.	1.2 % find this procedure Very Difficult.
43.2 % find this procedure Fairly Easy.	14.8 % find this procedure Difficult.
Don't Know: 30.9 %	Missing Responses: 28.3 %
Standard Deviation: 1.449	

j) Making sure all your **formulae** are correctly entered on your **spreadsheet**:

7.4 % find this procedure Very Easy.	2.5 % find this procedure Very Difficult.
43.2 % find this procedure Fairly Easy.	17.3 % find this procedure Difficult.
Don't Know: 29.6 %	Missing Responses: 28.3 %
Standard Deviation: 1.400	

k) **Linking data** from one **spreadsheet** to another **spreadsheet**:

3.7 % find this procedure Very Easy.	9.9 % find this procedure Very Difficult.
22.2 % find this procedure Fairly Easy.	23.5 % find this procedure Difficult.
Don't Know: 40.7 %	Missing Responses: 28.3 %
Standard Deviation: 1.319	

General attitudes towards aspects of information technology

[Source: August Questionnaire Page 6]

Question 21: ***Please indicate the extent to which you AGREE / DISAGREE with the following statements***

- **Terminal and keyboard**

a) My computer terminal takes up **too much room** on my desk:

7.2 % Strongly Agreed.		16.2 % Strongly Disagreed.	
27.9 % Agreed.		47.7 % Disagreed.	
35.1 % were **Agreeing in Total**.		**63.9 %** were **Disagreeing in Total.**	
Don't Know:	0.9%	Missing Responses:	1.8 %
Standard Deviation:	0.844		

b) There are too many **different colours** on my computer screen:

0.9 % Strongly Agreed.		31.5 % Strongly Disagreed.	
2.8 % Agreed.		60.2 % Disagreed.	
3.7 % were **Agreeing in Total.**		**91.7 %** were **Disagreeing in Total.**	
Don't Know:	4.6 %	Missing Responses:	4.4 %
Standard Deviation:	0.662		

c) I should be able to **change** the different colours of different features on my computer screen **any way that I like**:

14.9 % Strongly Agreed.		5.9 % Strongly Disagreed.	
57.4 % Agreed.		10.9 % Disagreed.	
72.3 % were **Agreeing in Total.**		**16.8 %** were **Disagreeing in Total.**	
Don't Know:	10.9 %	Missing Responses:	10.7 %
Standard Deviation:	1.150		

d) My keyboard takes up too much room on my desk:

7.2 % Strongly Agreed		14.4 % Strongly Disagreed	
25.2 % Agreed:		51.4 % Disagreed	
32.4 % were **Agreeing in Total**		**65.8 %** were **Disagreeing in Total.**	
Don't Know:	1.8 %	Missing Responses:	1.8%
Standard Deviation:	0.846		

e) My keyboard is difficult to use:

0.9 % Strongly Agreed.		30.4 % Strongly Disagreed.	
8.0 % Agreed.		59.8 % Disagreed.	
8.9 % were **Agreeing in Total.**		**90.2 %** were **Disagreeing in Total.**	
Don't Know:	0.9 %	Missing Responses:	0.9 %
Standard Deviation:	0.640		

f) I am often confused by the **Function Keys**:

4.5 % Strongly Agreed.		17.1 % Strongly Disagreed.	
23.4 % Agreed.		54.1 % Disagreed.	
27.9 % were **Agreeing in Total.**		**71.2 %** were **Disagreeing in Total.**	
Don't Know:	0.9 %	Missing Responses:	1.8 %
Standard Deviation:	0.780		

Commentary:

R32 makes an additional note that on the DEC terminal, "*every application uses different keys*".

Human factors and information technology [National Electronics Council 1983] discusses the difficulties presented when Function Keys have a non-standard layout.

- **Learning, skills and training**

g) There are **too many keys** on my keyboard for me to learn what they do:

2.7 % Strongly Agreed.		23.2 % Strongly Disagreed.	
10.7 % Agreed.		62.5 % Disagreed.	
13.4 % were **Agreeing in Total.**		**85.7 %** were **Disagreeing in Total.**	
Don't Know:	0.9 %	Missing Responses:	0.9 %
Standard Deviation:	0.692		

h) I am **pleased** with my ability to type quickly and accurately:

22.3 % Strongly Agreed.		11.6 % Strongly Disagreed.	
36.6 % Agreed.		28.6 % Disagreed.	
58.9 % were **Agreeing in Total.**		**40.2 %** were **Disagreeing in Total.**	
Don't Know:	0.9 %	Missing Responses:	0.9 %
Standard Deviation:	0.979		

i) I am often **frustrated** at my poor typing skills:

8.0 % Strongly Agreed.		29.5 % Strongly Disagreed.	
19.6 % Agreed.		41.1 % Disagreed.	
27.6 % were **Agreeing in Total.**		**70.6 %** were **Disagreeing in Total.**	
Don't Know:	1.8 %	Missing Responses:	0.9 %
Standard Deviation:	0.944		

j) I needed **a lot of training** to become proficient in using my computer:

7.2 % Strongly Agreed.		19.8 % Strongly Disagreed.	
17.1 % Agreed.		50.5 % Disagreed.	
24.3 % were **Agreeing in Total**.		**70.3 %** were **Disagreeing in Total**.	
Don't Know:	5.4 %	Missing Responses:	3.5 %
Standard Deviation:	0.939		

....

k) I became proficient in using my computer after only a **short period** of training:

9.2% Strongly Agreed.		7.3 % Strongly Disagreed.	
54.1 % Agreed.		20.2 % Disagreed.	
63.3 % were **Agreeing in Total**.		**27.5 %** were **Disagreeing in Total**.	
Don't Know:	9.2 %	Missing Responses:	3.5 %
Standard Deviation:	1.068		

....

l) I need **much more training** to get the best out of my computer:

13.6 % Strongly Agreed.		7.3 % Strongly Disagreed.	
40.9 % Agreed.		29.1 % Disagreed.	
54.5 % were **Agreeing in Total**.		**36.4 %** were **Disagreeing in Total**.	
Don't Know:	8.2 %	Missing Responses:	1.8 %
Standard Deviation:	{not calculated}		

....

m) Each time I receive a new feature or upgrade on my computer, there are **too many things to learn at once:**

3.6 % Strongly Agreed.		9.1 % Strongly Disagreed.	
21.8 % Agreed.		54.5 % Disagreed.	
25.4 % were **Agreeing in Total.**		**63.6 %** were **Disagreeing in Total.**	
Don't Know:	10.9 %	Missing Responses:	2.7 %
Standard Deviation:	0.948		

Commentary:

R80 noted in the margin of her returned questionnaire "*some cases*".

n) The software training **manuals** are **not well-designed** enough to help me:

21.8 % Strongly Agreed.		7.3 % Strongly Disagreed.	
31.8 % Agreed.		25.5 % Disagreed.	
53.6 % were **Agreeing in Total.**		**32.8 %** were **Disagreeing in Total.**	
Don't Know:	13.6 %	Missing Responses:	2.7 %
Standard Deviation:	1.287		

Commentary:

R32 stated that the Microsoft manuals are "*very good*".

Again, **R80** noted in the margin of her returned questionnaire: "*some cases*".

- **Time saving**

o) I find the following features useful in saving me time:

o. 1) The **"cut and paste" feature on my software products**:

46.7 % Strongly Agreed.	1.0 % Strongly Disagreed.
35.2 % Agreed.	7.6 % Disagreed.
81.9 % were **Agreeing in Total.**	**8.6 %** were **Disagreeing in Total.**
Don't Know: 9.5 %	Missing Responses: 7.1 %
Standard Deviation: 1.202	

o. 2) The ability to **link** data between different **spreadsheets**:

13.3 % Strongly Agreed.	3.3 % Strongly Disagreed.
30.0 % Agreed.	4.4 % Disagreed.
43.3 % were **Agreeing in Total.**	**7.7 %** were **Disagreeing in Total.**
Don't Know: 48.9 %	Missing Responses: 20.3 %
Standard Deviation: 1.629	

o. 3) The ability to **link** data between a **spreadsheet and my word processing document**:

13.5 % Strongly Agreed.	3.4 % Strongly Disagreed.
27.0 % Agreed.	4.5 % Disagreed.
40.5 % were **Agreeing in Total.**	**7.9 %** were **Disagreeing in Total.**
Don't Know: 51.7 %	Missing Responses: 20.3 %
Standard Deviation: 1.631	

- **Data management**

p) I can **easily and quickly find** my files on the **Directory** of files:

38.3 % Strongly Agreed.		0.9 % Strongly Disagreed.	
42.1 % Agreed.		10.3 % Disagreed.	
80.4% were Agreeing in Total.		**11.2 % were Disagreeing in Total.**	
Don't Know:	8.4 %	Missing Responses:	5.3 %
Standard Deviation:	1.137		

- **Printing**

q) I seldom experience difficulties in getting my printer to **print out a document** for me:

23.1 % Strongly Agreed.		3.7 % Strongly Disagreed.	
60.2 % Agreed.		8.3 % Disagreed.	
83.3% were Agreeing in Total.		**12.0 % were Disagreeing in Total.**	
Don't Know:	4.6 %	Missing Responses:	4.4 %
Standard Deviation:	0.940		

Further impacts on Respondents' work

[Source: August Questionnaire Page 7]

Question 22: ***Please indicate the extent to which you agree / disagree with the following statements***

- **Features making work better, easier, more interesting**

a) I am always learning **new features** that my computer can provide:

13.5 % Strongly Agreed.		6.3 % Strongly Disagreed.	
51.4 % Agreed.		27.0 % Disagreed.	
64.9 % were **Agreeing in Total.**		**33.3 %** were **Disagreeing in Total.**	
Don't Know:	1.8 %	Missing Responses:	1.8 %
Standard Deviation:	0.853		

b) I am always finding new ways to do my work **better** by using my computer:

11.8 % Strongly Agreed.		5.4 % Strongly Disagreed.	
53.6 % Agreed.		5.5 % Disagreed.	
65.4 % were **Agreeing in Total.**		**27.3 %** were **Disagreeing in Total.**	
Don't Know:	1.8 %	Missing Responses:	32.8 %
Standard Deviation:	0.823		

c) I am **constantly** finding out new things my computer can do which make my work **easier to do**:

10.8 % Strongly Agreed.		4.5 % Strongly Disagreed.	
46.8 % Agreed.		36.0 % Disagreed.	
57.6 % were **Agreeing in Total.**		**40.5 %** were **Disagreeing in Total.**	
Don't Know:	1.8 %	Missing Responses:	1.8 %
Standard Deviation:	0.812		

d) I am **constantly** finding out new things my computer can do which make my work **more interesting**:

9.9 % Strongly Agreed.		4.5 % Strongly Disagreed.	
39.6 % Agreed.		43.2 % Disagreed.	
49.5 % were **Agreeing in Total.**		**47.7 %** were **Disagreeing in Total.**	
Don't Know:	2.7 %	Missing Responses:	1.8 %
Standard Deviation:	0.841		

e) I could **not** do my job so well without using a computer:

42.7 % Strongly Agreed.		1.8 % Strongly Disagreed.	
46.4 % Agreed.		9.1 % Disagreed.	
89.1 % were **Agreeing in Total.**		**10.9 %** were **Disagreeing in Total.**	
Don't Know:	0.0 %	Missing Responses:	2.7 %
Standard Deviation:	0.711		

Commentary:

This is a high level of agreement, including those who Strongly Agreed.

The question was answered by nearly all Respondents.

f) I could manage my job **very well** without using a computer:

0.9 % Strongly Agreed.		33.3 % Strongly Disagreed.	
13.0 % Agreed.		51.4 % Disagreed.	
13.9 % were **Agreeing in Total.**		**84.7 %** were **Disagreeing in Total.**	
Don't Know:	0.9 %	Missing Responses:	5.3 %
Standard Deviation:	0.710		

g) It would make **no difference** to my job whether I used a computer or not:

0.0 % Strongly Agreed.		51.4 % Strongly Disagreed.	
4.6 % Agreed.		41.3 % Disagreed.	
4.6 % were **Agreeing in Total.**		**92.7 %** were **Disagreeing in Total.**	
Don't Know:	2.8 %	Missing Responses:	3.5 %
Standard Deviation:	0.632		

- **Extent of use**

h) I use a computer **too much** during my day at work:

5.6 % Strongly Agreed.		15.9 % Strongly Disagreed.	
15.9 % Agreed.		58.9 % Disagreed.	
21.5 % were **Agreeing in Total.**		**74.8 %** were **Disagreeing in Total.**	
Don't Know:	3.7 %	Missing Responses:	5.3 %
Standard Deviation:	0.835		

***Commentary*:**

R80 ticked the "Agree" box, although writing "*but essential*" after the question.

....

i) I would like to use a computer **much more** in my work:

5.5 % Strongly Agreed.		9.2 % Strongly Disagreed.	
22.9 % Agreed.		56.0 % Disagreed.	
28.4 % were **Agreeing in Total.**		65.2 % were **Disagreeing in Total.**	
Don't Know:	6.4 %	Missing Responses:	3.5 %
Standard Deviation:	0.889		

....

- **Interest and boredom**

j) Using a computer has made my work **more interesting**:

14.4 % Strongly Agreed.		3.6 % Strongly Disagreed.	
59.5 % Agreed.		19.8 % Disagreed.	
73.9 % were **Agreeing in Total.**		**23.4 %** were **Disagreeing in Total.**	
Don't Know:	2.7 %	Missing Responses:	1.8 %
Standard Deviation:	0.832		

k) My work is **boring because I have to use a computer to do it**:

2.8 % Strongly Agreed.		35.8 % Strongly Disagreed.	
4.6 % Agreed.		56.0 % Disagreed.	
7.4 % were **Agreeing in Total.**		**91.8 %** were **Disagreeing in Total.**	
Don't Know:	0.9 %	Missing Responses:	3.5 %
Standard Deviation:	0.692		

- **Personal and career development**

l) I have met and overcome **new challenges** through working with my computer:

19.3 % Strongly Agreed.		1.8 % Strongly Disagreed.	
67.0 % Agreed.		9.2 % Disagreed.	
86.3 % were **Agreeing in Total.**		**11.0 %** were **Disagreeing in Total.**	
Don't Know:	2.8 %	Missing Responses:	3.5 %
Standard Deviation:	0.782		

m) My chances of being promoted have been **improved** because I work with a computer:

6.4 % Strongly Agreed.		20.2 % Strongly Disagreed.	
27.5 % Agreed.		33.9 % Disagreed.	
33.9 % were **Agreeing in Total.**		**54.1 %** were **Disagreeing in Total.**	
Don't Know:	11.9 %	Missing Responses:	3.6 %
Standard Deviation:	1.105		

n) I have developed more as a **person** through working with my computer:

4.5 % Strongly Agreed.		19.8 % Strongly Disagreed.	
27.9 % Agreed.		35.1 % Disagreed.	
32.4 % were **Agreeing in Total.**		**54.9 %** were **Disagreeing in Total.**	
Don't Know:	12.6 %	Missing Responses:	1.8 %
Standard Deviation:	1.080		

o) I have become a **better employee** through using my computer:

8.2 % Strongly Agreed.		10.9 % Strongly Disagreed.	
50.0 % Agreed.		23.6 % Disagreed.	
58.2 % were Agreeing in Total.		**34.5 % were Disagreeing in Total.**	
Don't Know:	7.3 %	Missing Responses:	2.7 %
Standard Deviation:	1.034		

p) I have become a **better manager** of staff by using my computer:

4.9 % Strongly Agreed.		13.6 % Strongly Disagreed.	
12.6 % Agreed.		37.9 % Disagreed.	
17.5 % were Agreeing in Total.		**51.5 % were Disagreeing in Total.**	
Don't Know:	31.1 %	Missing Responses:	8.8 %
Standard Deviation:	1.195		

q) My **relationships with my co-workers** have **improved** because I work with a computer:

4.6 % Strongly Agreed.		16.5 % Strongly Disagreed.	
22.0 % Agreed.		35.8 % Disagreed.	
26.6 % were Agreeing in Total.		**52.3 % were Disagreeing in Total.**	
Don't Know:	21.1 %	Missing Responses:	3.6 %
Standard Deviation:	1.162		

- **Corporate awareness**

r) If I did not have access to **electronic mail**, I would be **less aware** of what is **happening in ESB**:

28.8 % Strongly Agreed.		4.5 % Strongly Disagreed.	
49.5 % Agreed.		14.4 % Disagreed.	
78.3 % were **Agreeing in Total.**		**18.9 %** were **Disagreeing in Total.**	
Don't Know:	2.7 %	Missing Responses:	1.8 %
Standard Deviation:	0.929		

Further analysis

Table 38: *Correlating* **Question 22 - h)** I use a computer **too much** during my day at work

with **Job Description of Respondents**

	Number of Respondents who:-				
Job Description	**Strongly Agree**	**Agree**	**Strongly Disagree**	**Disagree**	**Don't Know**
Manager (n-e):	0	0	3	1	0
Manager (e):	0	0	3	1	0
Supervisory:	0	1	2	1	0
Administrative:	1	1	4	0	0
Clerical:	2	4	19	1	1
Secretarial:	0	2	2	0	0
Technical:	1	3	8	3	1
Engineer:	0	1	8	2	2
Professional/Specialist:	2	5	13	8	0
Total:	***6***	***17***	***62***	***17***	***4***
Percentage:	**5.6**	**16.0**	**58.5**	**16.0**	**3.8**
Missing Responses:	**7**				

Table 39: *Correlating* **Question 22 - l)** I have met and overcome **new challenges** through working with my computer; *with* **Age Group of Respondents**

Number of Respondents who:-

Age Group	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Don't Know**
20-24:	2	5	1	0	2
25-29:	3	10	1	0	0
30-34:	6	20	3	1	0
35-39:	3	11	0	0	0
40-49:	3	20	2	0	0
50-59:	2	6	3	1	0
60 and over:	2	0	0	0	1
Total:	***21***	***72***	***10***	***2***	***3***
Percentage:	**19.4**	**66.7**	**9.3**	**1.9**	**2.8**

Missing Responses: **5**

Table 40: *Correlating* **Question 22 - n)** I have **developed** more as a **person** through working with my computer;

with **Age Group of Respondents**

Number of Respondents who:-

Age Group	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
20-24:	1	3	3	2	1
25-29:	0	6	4	2	2
30-34:	2	8	12	4	5
35-39:	0	5	7	2	0
40-49:	1	4	9	6	5
50-59:	1	4	3	4	0
60 and over:	0	1	1	1	1
Total:	***5***	***31***	***39***	***21***	***14***
Percentage:	**4.5**	**28.2**	**35.5**	**19.1**	**12.7**

Missing Responses: **3**

Table 41: *Correlating* **Question 22 - o)** I have become a **better employee** through working with my computer; *with* **Age Group of Respondents**

Number of Respondents who:-

Age Group	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
20-24:	1	3	2	2	2
25-29:	0	8	4	1	1
30-34:	2	15	8	3	3
35-39:	2	8	3	1	0
40-49:	1	14	5	4	1
50-59:	2	6	3	0	1
60 and over:	1	1	1	0	0
Total:	*9*	*55*	*26*	*11*	*8*
Percentage:	**8.3**	**50.5**	**23.9**	**10.1**	**7.3**

Missing responses: **4**

Affect of computers on "Team Spirit"

[Source: August Questionnaire Page 8]

Question 23. ***Please indicate the extent to which you AGREE / DISAGREE with the following statements***

a) Computers have **destroyed** the sense of **"team spirit"** in my office:

0.0 % Strongly Agreed.		25.2 % Strongly Disagreed.	
1.8 % Agreed.		62.2 % Disagreed.	
1.8 % were **Agreeing in Total.**		**87.4 %** were **Disagreeing in Total.**	
Don't Know:	10.8 %	Missing Responses:	1.8 %
Standard Deviation:	0.710		

b) Computers have **harmed, but not destroyed** the sense of **"team spirit"** in my office:

0.0 % Strongly Agreed.		18.9 % Strongly Disagreed.	
5.4 % Agreed.		62.2 % Disagreed.	
5.4 % were **Agreeing in Total.**		**81.1 %** were **Disagreeing in Total.**	
Don't Know:	13.5 %	Missing Responses:	1.8 %
Standard Deviation:	0.791		

c) Computers have **improved** the sense of **"team spirit"** in my office:

2.7 % Strongly Agreed.		7.1 % Strongly Disagreed.	
26.8 % Agreed.		41.1 % Disagreed.	
29.5 % were **Agreeing in Total.**		**48.2 %** were **Disagreeing in Total.**	
Don't Know:	22.3 %	Missing Responses:	0.9 %
Standard Deviation:	1.146		

d) Computers have made **no difference** to the sense of **"team spirit"** in my office

11.8 % Strongly Agreed.		7.3 % Strongly Disagreed.	
44.5 % Agreed.		22.7 % Disagreed.	
56.3 % were **Agreeing in Total.**		**30.0 %** were **Disagreeing in Total.**	
Don't Know:	13.6 %	Missing Responses:	2.7 %
Standard Deviation:	1.198		

Further analysis

Table 42: *Correlating* **Question 23 - c)** Computers have **improved** the sense of **"team spirit"** in my office;

with **Sex of Respondent**

Response of Respondent to Question 23 - c)

Response of Respondent		Female	Male
Strongly Agreed	....	2	1
Agreed	....	8	22
Disagreed	....	23	23
Strongly Disagreed	....	5	3
Don't Know	....	14	11
Total	....	*52*	*60*

		Value	Approximate Significance
Pearson's *r*	minus	. 16931	. 07432
Spearman Correlation	minus	. 19320	. 04126

Chi Square	Value	Degrees of Freedom	Significance
Pearson	7.19193	4	. 12609

Table 43: *Correlating* **Question 22 - q) My relationships with my co-workers** have **improved** because I work with a computer;

with **Question 23 - c)** Computers have **improved** the sense of **"team spirit"** in my office

Note: **SA** = Strongly Agreed; **A** = Agreed; **D** = Disagreed; **SD** = Strongly Disagreed; **DK** = Don't Know

Response of Respondent to Question 22 - q)	Response of Respondent to Question 23 - c) SA	A	D	SD	DK
Strongly Agreed	0	3	0	0	2
Agreed	2	11	7	1	3
Disagreed	0	6	25	0	8
Strongly Disagreed	0	2	9	4	3
Don't Know	0	7	4	3	9

	Value	Approximate Significance
Pearson's *r*	. 24651	. 00977
Spearman Correlation	. 26853	. 00475

Chi Square	Value	Degrees of Freedom	Significance
Pearson	42.28186	16	. 00036

Table 44: *Correlating* **Question 23 -b)** Computers have **improved** the sense of **"team spirit"** in my office;

with **Job Description of Respondents**

	Number of Respondents who:-				
Job Description	**Strongly Agree**	**Agree**	**Strongly Disagree**	**Disagree**	**Don't Know**
Manager (n-e):	0	1	1	1	1
Manager (e):	1	0	2	0	2
Supervisory:	0	2	2	0	0
Administrative:	0	1	3	0	2
Clerical:	1	9	9	2	6
Secretarial:	0	1	0	0	3
Technical:	0	5	9	0	2
Engineer:	0	3	6	1	4
Professional/Specialist:	1	8	14	3	5
Total:	***3***	***30***	***46***	***7***	***25***

Job Performance Improvement
[Analysis of August Questionnaire Page 9]

Table 45: Level of Performance Improvement due to Items of Information Technology as reported by Respondents

Item	None	Low	Medium	High	Don't Know	Don't Use or Missing	Total
Printer	9	5	33	56	6	4	113
DTP Product	8	4	11	30	51	9	113
Graphics Package	4	8	15	47	34	5	113
Scheduling Product	22	25	14	10	35	7	113
Time Management Product / Option	24	29	9	6	39	6	113
Spreadsheet ("simple")	8	5	13	36	44	7	113
Spreadsheet ("accurate")	10	6	11	35	43	8	113
WP Product	6	11	35	46	11	4	113
E-Mail ("send")	2	3	11	72	3	2	113
E-Mail ("receive")	2	11	21	76	2	1	113
PC ("access")	5	9	12	57	25	5	113
PC ("control")	6	13	10	42	36	6	113
Push button Phone	11	17	23	56	5	1	113
Voicemail	10	8	5	36	49	5	113

The Commentary for the above Table is on the following page.

Commentary on Table 45:

i) **Question 24** called for Respondents to tick a box numbered according to the **extent** to which the items listed "improved" their performance of their job.

---

ii) **The following conventions were followed for Table 45:**

- Level of Improvement = **"None"** represents all those Respondents who ticked **box 0** (indicating **no** change in performance);

- Level of Improvement = **"Low"** represents all those Respondents who ticked **box 1** (indicating the Respondent experienced **very low** improvement in performance) ***combined with*** all those Respondents who ticked **box 2** (indicating the Respondent experienced **low** improvement in performance);

- Level of Improvement = **"Medium"** represents all those Respondents who ticked **box 3** (indicating the Respondent experienced **some** improvement in performance);

- Level of Improvement = **"High"** represents all those Respondents who ticked **box 4** (indicating the Respondent experienced **high** improvement in performance); ***combined with*** all those Respondents who ticked **box 5** (indicating the Respondent experienced **very high** improvement in performance);

- **"Don't Know"** represents those Respondents who ticked the box indicating that they had **no opinion** or that **the item did not apply in their case**;

- **"Don't Use or Missing"** represents those Respondents who indicated that they did not use the particular item or who gave no valid response.

Commentary on Table 45 (continued):

- **Spreadsheet ("simple")** represents **Q. 24 - f)** ".... because it makes carrying out routine calculations much simpler";
- **Spreadsheet ("accurate")** represents **Q. 24 - g)** ".... because it ensures that your calculations are accurate";
- **E-Mail ("send")** represents **Q.24 - i)** ".... because it is the **most efficient** way to send a message to your colleagues";
- **E-Mail ("receive")** represents **Q.24 - j)** ".... because it is the **most efficient** way to receive a message from your colleagues";
- **PC ("access")** represents **Q.24 - k)** ".... **having a PC on your desk**, because it gives you easier access to your data";
- **PC ("control")** represents **Q.24 - l)** ".... **having a PC on your desk**, because you can have **more control** over your software products".

---

iii) An oddity that emerges from this table is the figure of 45 Respondents who indicate some level of performance improvement which they attribute to using a Desktop Publishing (DTP) product - given that only 9 Respondents listed DTP as one of the three products they used most during their working day.

Some Respondents may be over-rating the performance improvement attributable to a product which, in fact, they do not use very often. Alternatively, the performance improvement attributable to DTP may be high in proportion to some other products.

Figure 5: Performance Improvement -

Printer / DTP / Graphics Product

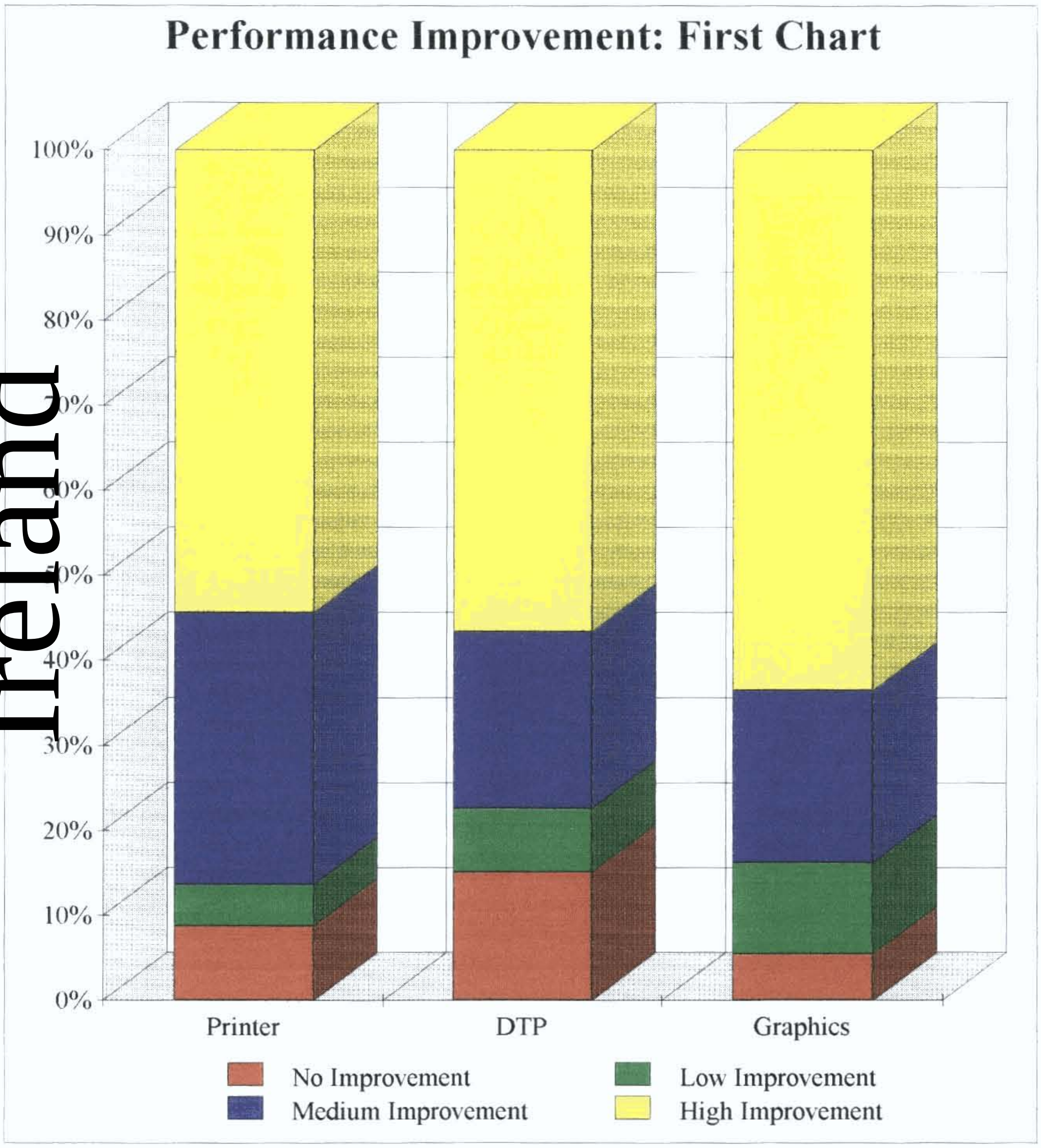


Figure 6: Performance Improvement - Scheduling Product / Time Management Product or Option

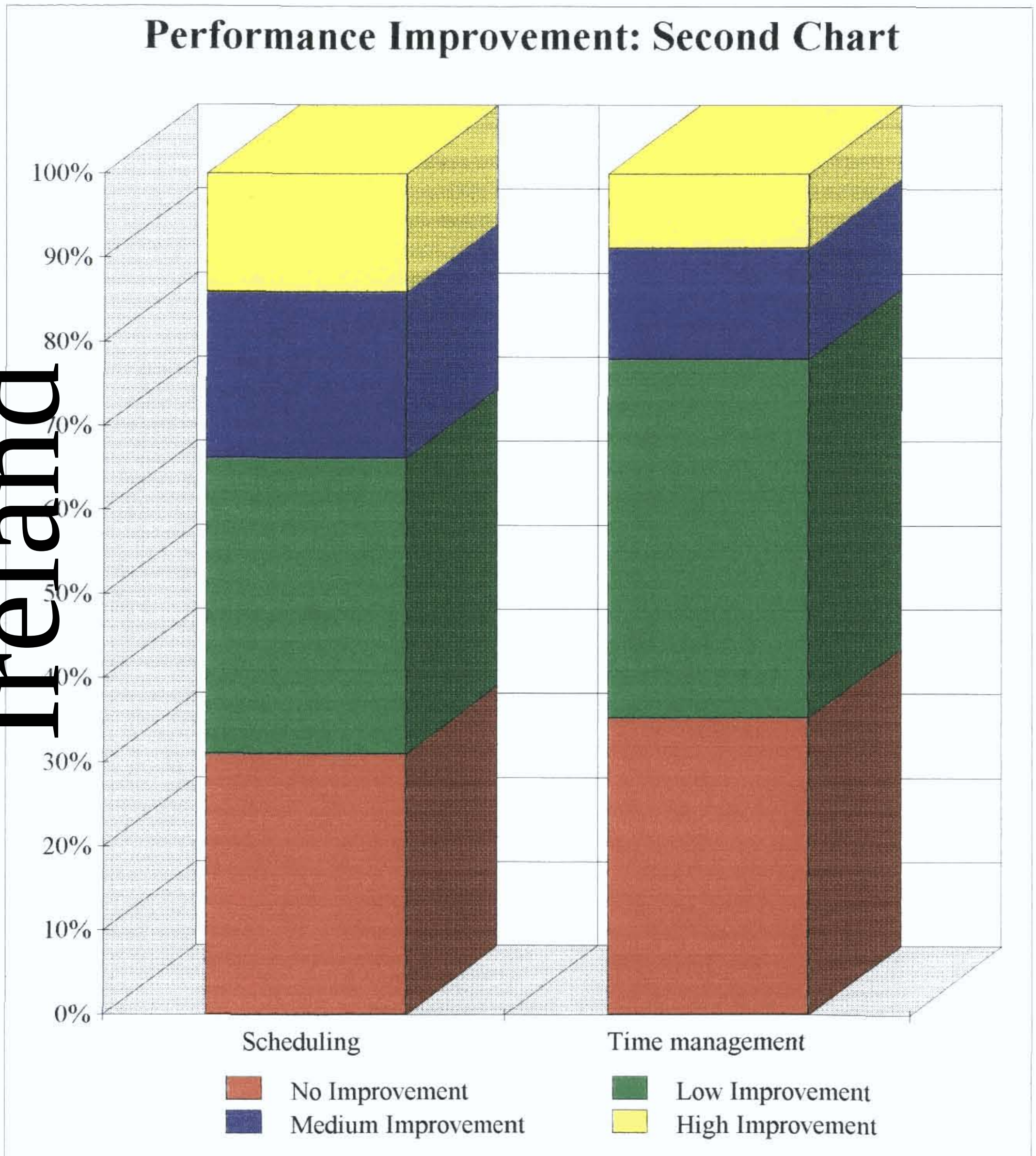


Figure 7: Performance Improvement -

Spreadsheet Product

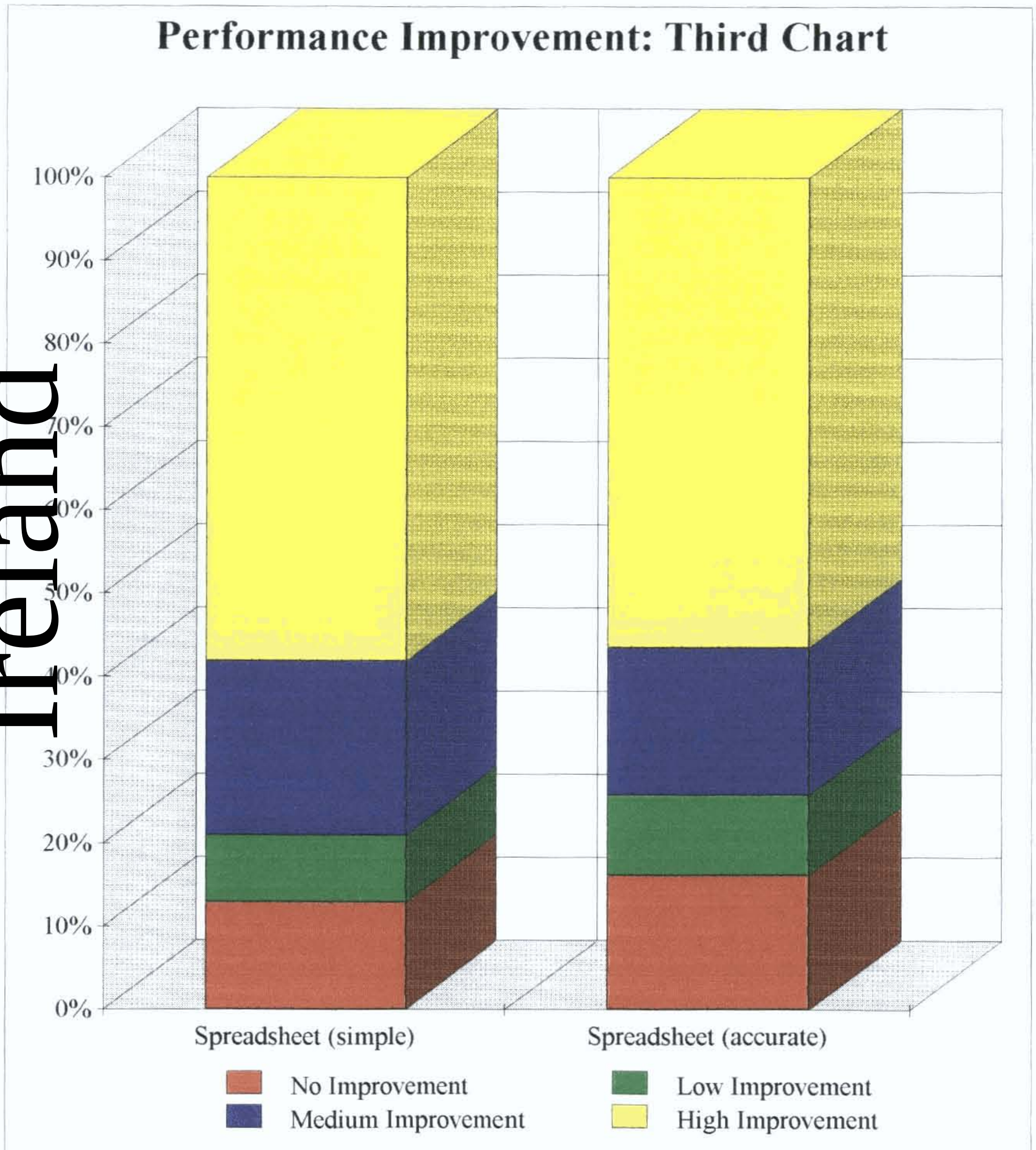


Figure 8: Performance Improvement - Word Processing Product / Electronic Mail

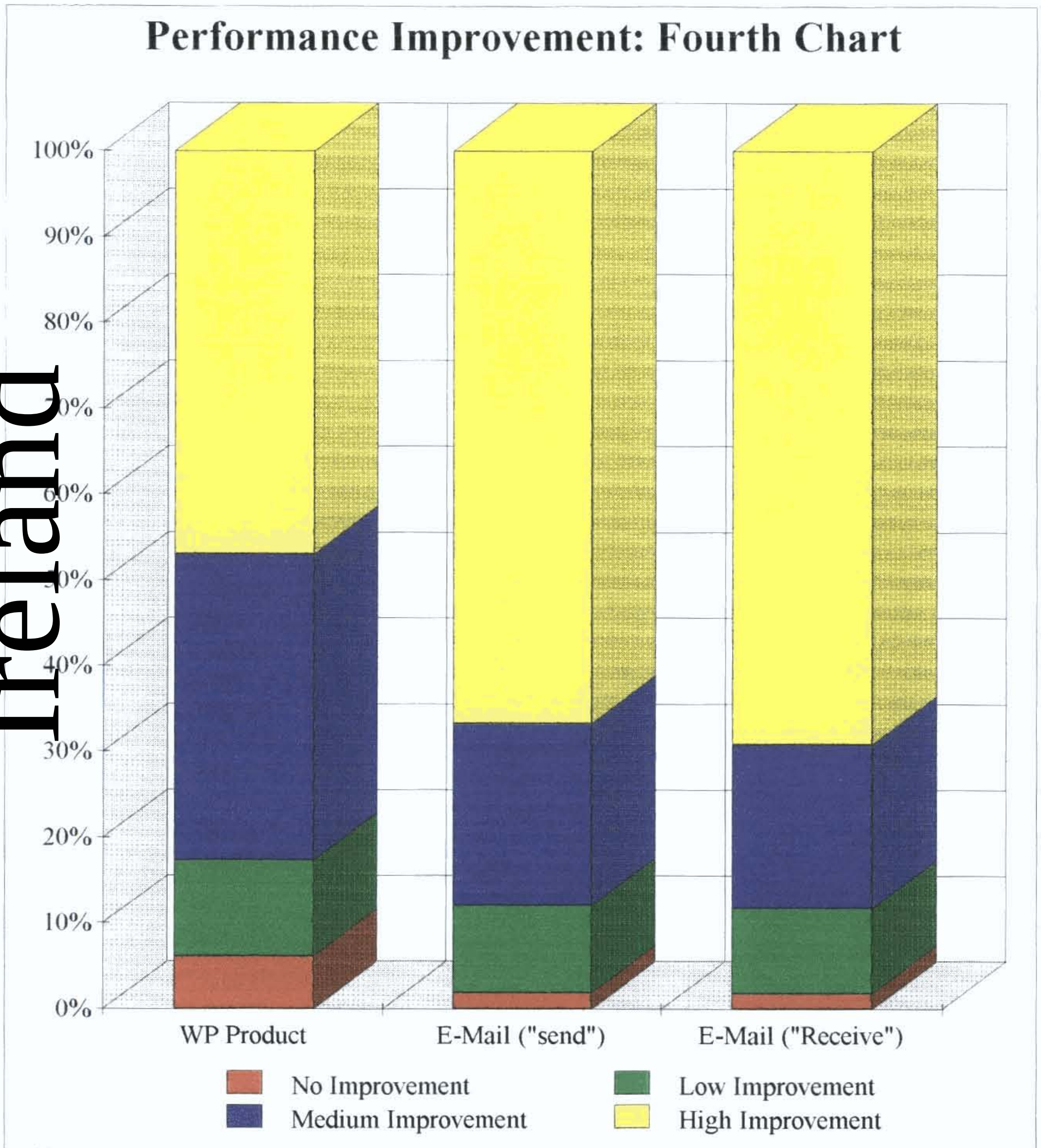


Figure 9: Performance Improvement -

PC

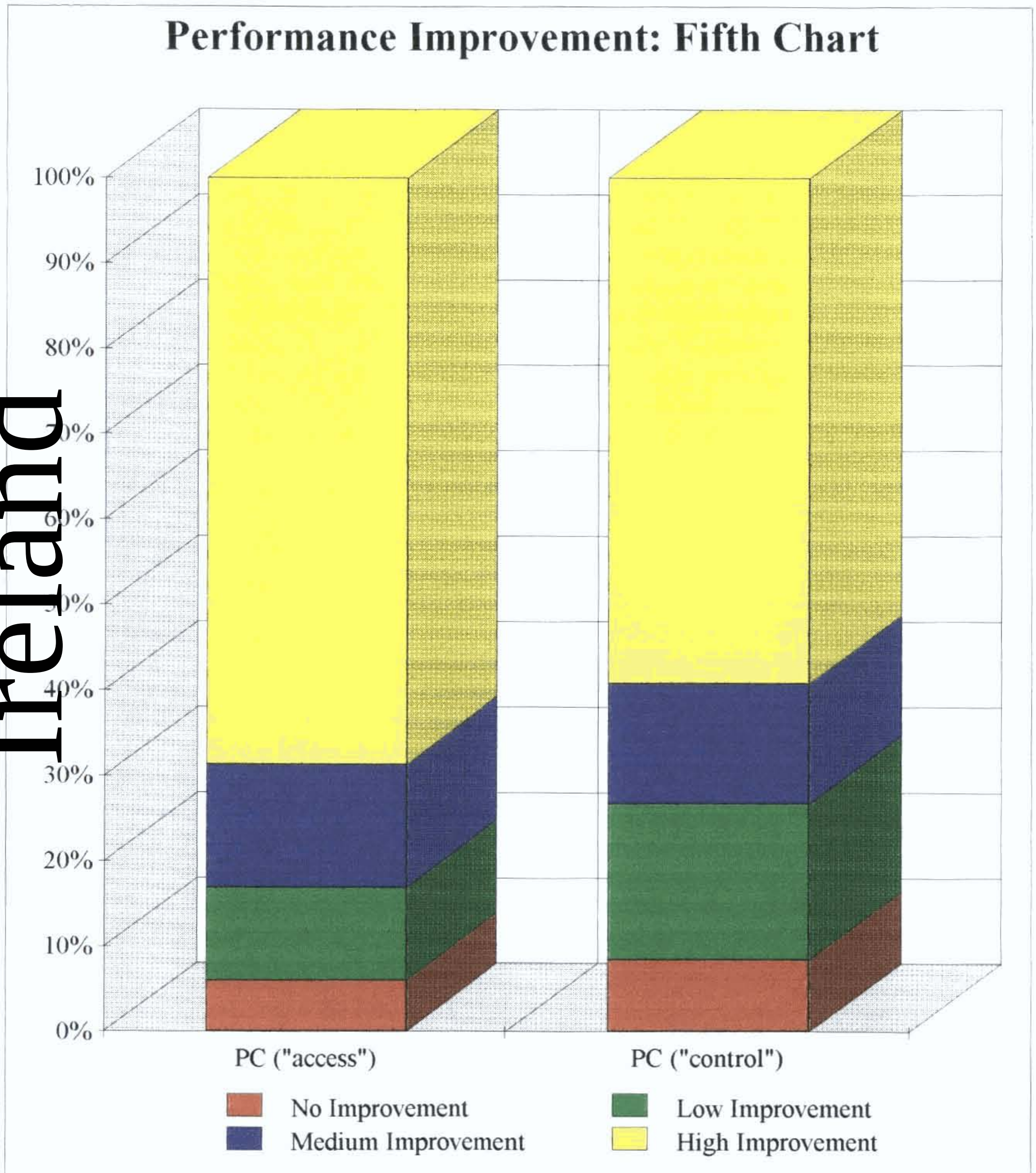
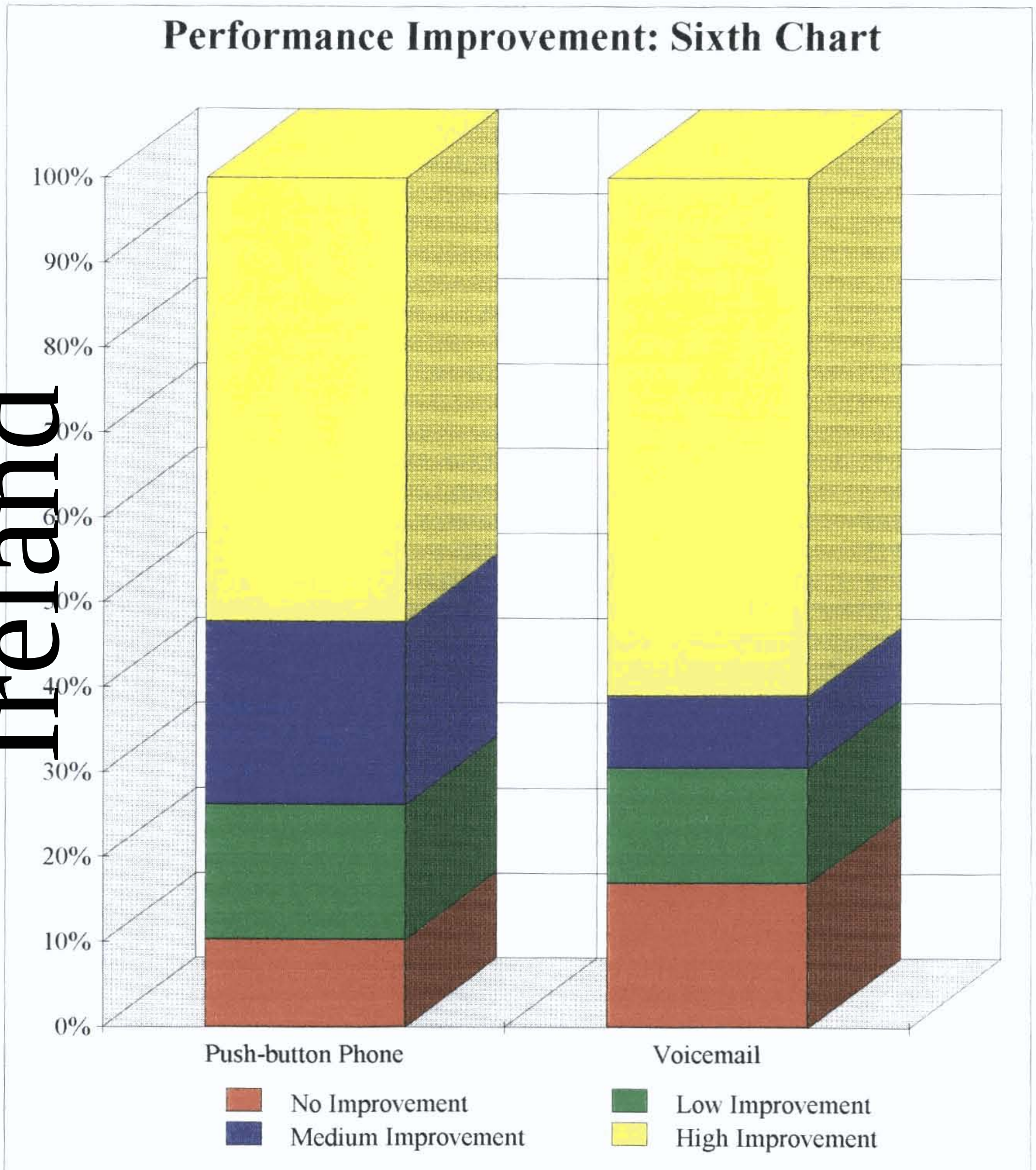


Figure 10: Performance Improvement - Push-button Phone / Voice Mail



Respondents' Comments relating to the effects of Information Technology

[Source: August Questionnaire Page 10]

Coding the responses

As this page called for open-ended responses, it was decided to analyse the responses by initially coding each response. A somewhat similar tack to that used in handling the Product "Likes" and Product "Dislikes" was followed.

The approach might be described as dichotomous. All comments were treated as revealing either **positive** or **negative attitude** towards the six topics: "computers in general"; "database products"; "electronic mail"; "using a PC"; "spreadsheet products"; and "word processing products".

As before, when a Respondent's sentence(s) combined two or more concepts, these were arbitrarily broken down to conform to the list of "Comment Codes": an example for "computers in general" is shown in **Appendix 5**.

In this way, comments could be grouped into general categories of attitude for analysis.

To retain the flavour of Respondents' comments, the grammar and punctuation of the original statements has been left largely unchanged in the pages that follow. Chain brackets { } have been introduced to separate parts of a statement to improve clarity and/or save space. Respondents' actual comments are italicised between quotation marks. Other text in unbolded typeface has been added by this researcher to interpret/explain or to provide a commentary on the statements. The boldface Code, often enclosed in square brackets, e.g. **[R1]**, **[RJ1]** refers to **R**espondents involved in our study.

R followed by a number indicates Respondents to the **August 1994** questionnaire.

RJ followed by a number indicates those who completed the **June 1995** document.

Summary of August Questionnaire Page 10 Comments

a) Computers in general

"*Improves the speed that information can be retrieved in some systems {} it is not easy to move from one screen to another.*" **[R1]**

"*good points : usually fast and efficient access to wide range of data which reduces uncertainty and stress. Bad points : Slow retrieval of data when urgently needed causes frustration and stress! Presentation of excess data causes inefficiency*"
[**R8**, who holds an engineering degree, and who monitors and controls an aspect of the power transmission system.]

"*Very beneficial*" **[R9]**

"*Without computers we could not operate as efficiently as we do*" **[R10]**

"*Computers make work more interesting and work appears very professional*"
[**R11**, whose job consists of many secretarial and administrative duties. "*Approximately 60 - 70 % of her time is spent* "on computer]

"*Computers have improved the Quality and Quantity of My Work: however the Training I received was (Zero). The Skill I and many other Staff have acquired has been through Investment of Their own time + money.*" **[R12]**

"*Have made work easier but have also increased the work load.*" feels **R19**, a clerical employee. She finds "*the amount of paper used with little thought for the environment*" is worrying, and has "*started a recycling regime in the office.*"

"Make work more interesting {} Good effect" **[R20]**

"MMIS System is super, and an irreplaceable asset at this stage! I suppose my impatience at my own mediocrity and relative slowness with computers, coming to them as I did at 46 years of age, has been, and is frustrating at times. Tired eyes and inadequate seating is a slight annoyance. However, the challenge, and pride in achievement, and the convenience and professionalism possible through using computers, far outweighs the bas effects."

[R21, who does project-type work]

"*Unfortunately, I am not familiar with PC package*{sic}" reports **R24**, but she hopes to do a computer course at night "*in order to become more efficient and familiar with the tools available*"

"Have improved my working life considerably." **[R25]**

"have taken the tedium out of office work"

[R27, who describes himself as an Admin. Supervisor]

"Speed access to information, allow for multiple access sites, allow for speedy alterations." **[R28]**

"Computers in general have greatly improved the quality of work I produce. However, high quality means a lot of time needed. Also, people not that familiar with computers, assume that they can do everything, which they cannot." **[R29]**

"Good effects - respect from colleagues who require assistance with computer problems."

[R32]

R33, whose job involves arranging payments to staff, describes computers in general as *"having reduced the amount of Routine / Manual / Boring work. Speeds up calculations."*

"Regulations in relation to the environment for computer operations, eg Lighting, ventilation, distances between user and screen, are not taken seriously enough by either management or staff."

[**R37**, a clerical employee, who indicates training received as "typing course, DOS, Lotus, Smart, W.P."]

"Necessary part of any office work. Also, integral to a technical job. Most technical work would be much more time-consuming (if not near impossible to ensure accuracy) without I.T." [**R38**, a 24 year-old Head Office engineer]

"Generally speed up information transfer" [**R39**, a manager]

"Good effects: Makes tedious tasks simple.
Harmful effects: Despite EC research, there is no doubt in my mind that VDU effects on eyesight are serious." [**R40**, a 26 year-old clerical employee]

"Computers have not had any harmful effects on me. They are accurate, efficient & speedy." [**R43**]

"Could not undertake current work volumes without adequate access. Therefore are essential." [**R44**, a manager]

"Very convenient for data management - has been of great assistance." [**R45**]

"Good effects, saves time, avoid re-typing of document for each different tender, report etc. Allows professional presentation of work, with no spelling mistakes and grammar as near correct as possible." **[R46**, whose job description includes "tendering"]

R47 says that if she spends a lot of time (a few hours consecutively) working on the terminal she gets a pain in her shoulder. *"On the plus side most things can be achieved far more quickly by using the terminal + PC."*

"Definitely a must in all offices nowadays. However I think the health and safety aspects should be looked at. We have a very small office with too much equipment - 2 colour printers, 2 b/w {black & white} *printers, 3 PCs, 1 VAX terminal, laminating machine"*

[R48, who describes herself as a clerical employee]

"Makes for long hours desk bound - less movement around building - stiffness after long time at screen" **[R50]**

"Computers, used as a tool, can only be beneficial - However, there is still a tendency for people to be encouraged to be more computer literate in that it will help them do their current job better. There is very little encouragement in general work areas for people to investigate for themselves."

[R53, a clerical employee, who has received formal training which includes Microsoft Access; Excel; DOS; Smart; All-in-1; and PowerPoint.]

"Have always been essential to my work, initially for technical problem solving, now for ease of production of good quality work output." **[R54**, who does engineering work]

R55 states: *"Enables very difficult jobs / tasks to be completed more quickly + easily. Could not do without them in the work place."*

"Computers are still very much underutilised in ESB." **[R57]**

"Information necessary for my job is more accessible." **[R58]**

"In general like using them - more efficient + accurate for WP than using secretaries. However probably cheaper to use C.O.'s than computers. Technically like using them."
[**R59**, who holds engineering qualifications and describes herself as "Professional" (Q. 7a)]

"Electronic Mail and Word Processing are of definite benefit."

[**R60**, a manager]

"Increased use by other categories of WP packages means clerical staff have had their jobs nicked! What work I have left is produced to greater effect on Word but also means more changes as some seem to think that al you need to do is press a button and the PC performs magical transformations!" **[R61]**

"Good effects - rapid access to information, more detailed information, allow for better answers to queries" **[R63]**

"In general very good but I am constantly irritated by 'user-unfriendly' behaviour - e.g. failure to print or respond to normal commands - and the need to be a real expert to solve these apparently avoidable problems." **[R66]**

R71 states *"created stress because of inadequate training"*.

"I use computers very little but I do get other people to do a fair bit of work for me on computers." [**R70**, a Mechanical Supervisor]

"My chair I feel is doing the most damage - although given the most up to date chair it doesn't suit my needs - the standard seat is too big for my needs. Also eye strain from *prolonged* *data input is hazardous."* **[R72]**

"The good effects of computers in general include the fact that as part of our job becomes computerised we become more efficient." **[R74]**

R75 feels computers in general *"are too often used to do the same thing electronically as was done previously by paper & pencil"* {} *"i.e. the features and abilities of the computer to do things more expeditiously or in a more effective way or in an entirely new way don't seem to be implemented with zeal."*

"Good tools, but can be mentally tiring. Useful for organisations, but can have a negative effect on employment."

[**R76**, a 43 year-old male, who has been using a computer at work for 4 years]

"I could not do my job without it. It gives me control over my work. I'm not depending on clerical support" **[R77]**

"Computers have progressed to the stage where nearly everybody in the organisation has had some contact with them. I think they are essential to maintain a competitive advantage in business. Quick and easy access to data helps managers make quick and speedy decisions in the running of our daily business, which ultimately affects our customers. System are {sic}*being constantly adapted and improved - menu driven, more user friendly i.e. mouse replacing keyboards etc. Bad effects - tiring, bad working conditions etc."*

[R80]

"Takes up too much time {} :More paper, (not less.)" **[R81**, a Mechanical Supervisor]

"Essential" is the one-word answer given by **R84**.

"Has made staff more efficient." **[R85]**

"Have greatly increased productivity & accuracy {} Have removed some of the tedium of work. Help keep me informed and up to date because product and facilities are always changing & improving. Very hard on back & neck areas of body." **[R86]**

R87, an engineering manager, is scathing:

"The standardisation between packages in All-in-One e.g. MOCCS - PMIS - etc.etc. is hopeless. Major work is required to harmonise all these - same commands etc".

"Unless method of logically storing E Mail it is sometimes hard to recall messages. this can also apply to other PC files" **[R88]**

"Good effects: made handling of data more reliable, & efficient. Taken out a lot of the tediousness of dealing with data, results & reports.

Harmful effects: finding that computers while making things easier have paved the way for increased workload." **[R91]**

"Computers can only have good effect on work performance + the quality of jobs. This opinion depends largely on whether a person is computer literate or not.

Computer literate people derive more benefits + see more value in computers {} they also tend to be more computer dependent." **[R92**, who is 25 years of age]

R93, who formerly worked in a technical information area, *"found Computer technology invaluable for that type of work."*

R94, a clerical employee, considers *"It has made obtaining reports / information etc."* more accessible *"and easier to retrieve"*.

"Accepted part of working life" **[R95]**

"Eliminates frustration of waiting for Secretary to type memo etc. Corrections or changes are easy. Good for writing Plant Operating Instructions." **[R96]**

"There is no doubt that computers are a great asset - but the software running on the ESB mainframe is ancient - the All-in-1 system must be the most un-interactive and frustrating system I have ever worked with - if it were possible to interface the All-in-1 system software with Microsoft Office it would solve all my problems." **[R97]**

"I think computers can lead to one doing things without thinking about them. You do not use your imagination and creativity."

[R98, a 34-year old clerical employee (budget officer)**]**

"Have definitely cut out routine boring jobs to a large extent such as the need for filing paper. Using eg {sic} *the Customer Database helped me to learn quickly what the 'Customer / Income' Junction of ESB was all about"* **[R101]**

"Speed up some aspects of technical work (good). May lead to more time spent on low-grade work (eg. {sic} *typing) (bad)."* **[R103]**

"*Greatly improved my ability to do my work quickly, efficiently and professionally. Also, hell of a lot easier to do rewrites and updates.*" **[R107]**

"*Too much time spent working on terminals*" **[R109]**

" *- Better Quality Report Preparation*

- Improved O / H {overhead} *slides.*" **[R112]**

"*I don't use computers much other than Landis & Gyr LS3200 and GD2*" **[R113]**

Commentary:

Liebenau and Backhouse [1990] say that "technology has an allure that is hard to resist" [: 116]. The image of technology is associated with efficiency and some of our Respondents plainly agree.

Liebenau and Backhouse believe that

- using technology to impose bureaucracy merely increases the least useful aspects of formal bureaucracy;
- information is not synonymous with data;
- one of the uses for "formalised systems" is as an "embodiment of knowledge".

b) Database Products, such as Access

"Don't use. Too much effort to learn new product for little use" **[R9]**

R15 places comments relating to **PMIS** in this section, describing it in these terms: *"Very good. very flexible as regards running User Defined report. Very good for Payroll work."*

"Excellent for information creation, filing, retrieval, greater professionalism in office management." **[R21]**

"No experience of Access" **[R25]**

"Useful for storing and sorting information." **[R27]**

"Allow information to be received as requested and not necessarily in a pre defined {sic} *report."* **[R28]**

"Access is a very powerful D.B. {} the latest version has addressed some of the more important defects of the previous version & data retrieval is not as cludgy as with Visual Basic"

[**R53** - Note that *cludgy*, or kludgy, is a pejorative slang term for information systems that operate in an inefficient manner]

"Not often needed, but very useful when required" **[R54]**

"I haven't had occasion to use one - I would like to learn." **[R77]**

"These products are necessary for accurate, well organised professional documents" **[R92]**

"No Knowledge" **[R96]**

"I have had no direct experience of a Database product but IDEA {a software product} *is very useful for analysing data"* **[R101]**

---

c) Electronic mail

"Improved my working life because instead of having to send out memo's to about 20 people I can send one message in the E.M.{electronic mail} *- also I can check if they got the memo"* **[R1]**

R8 views electronic mail as a *"good efficient means of communication."* But, he continues, *"Bad Points : Too much junk mail to delete."*

"Very useful" says **R9**, a chartered engineer, but he adds that not all power stations are directly accessible.

"Very useful for speed" **[R10]**

"Great way to keep up-to-date with changing times in ESB" **[R11]**

"Excellent for Payroll work, due to high amount of Confidential Memo's {sic}*which I'd be issuing,"* says **R15,** who is plainly satisfied with the security impact of E-mail.

"Printing of messages wastes paper" feels **R19,** a clerical employee.

"Being able to send and receive messages" **[R17]**

"Direct access to information as it happens. - good effect." **[R20]**

"Excellent, fast, efficient, & professional." **[R21]**

"Very useful tool for information and keeping up to date" **[R24]**

"Couldn't survive without electronic mail." **[R25]**

"Speedy delivery of information" **[R27]**

"Electronic filing ensures speedy retrieval." **[R28]**

"For the type of information I need to send or receive, Electronic Mail has a minimal use. Fax is more appropriate." **[R29]**

"People are not always available by phone so written messages can be left. 1 message can be sent to numerous people." **[R33]**

"Apart from 'junk mail', E-Mail remains the best method of internal communication" **[R38]**

"Can keep in touch much more easily" [**R39**, a manager]

"Invaluable method of communicating with diverse locations." **[R40]**

"Very pleased with this facility" **[R43]**

"Almost essential to me" [**R45**, whose job description is "Training"]

"Very quick way of communication with external locations especially where exact instructions are required." **[R46]**

"Speed! You can prove the recipient recd. {received} *the message and plenty of space for files. It makes life a lot easier."*

[R47, who describes herself as "Supervisor" on Page 1 of the questionnaire]

"Very useful, no complaints" **[R48]**

"Definite communications improvement enables job progress to proceed faster"

[R50]

R53 mentioned that one particular aspect of E-mail that impacted part of her work had seen a *"serious improvement"* - *"although it still has a way to go with traffic from some stations - some still feel the need to rely on the fax".*

"Very useful for keeping in touch with general developments in ESB, as well as facility to rapidly exchange work output with other Departments." **[R54]**

"Faster communication." states **R58**, adding *"E. Mail requires 1 small refinement"* {namely} *"where a message is created and not sent immediately - the date it was created is irrelevant & therefore should be superseded with the send date."* {The date appearing at the head of an E-mail memo is the date it was created by the sender, not the day it was actually sent by the sender, which could be some day(s) later.}

"good - speed of communications. cuts out admin. unit + mailing room which speeds things up." **[R59]**

"Distribution list is a handy feature....." **[R61]**

"Certainty of information transfer -security - speed" **[R63]**

"*Very useful*" **[R66]**

R70 finds it useful. "*No effect on me good or bad.*"

"*Speeded up work enormously {} eliminated a paper mountain, but slow to switch between PC application and E-mail*" {This Respondent, **R71**, is referring to the fact that E-mail within All-in-1 operates separately from PC applications.}

"*A quick + easy way to communicate effectively if properly used + managed*" **[R74]**

E-mail is a "*time waster*" feels **R75** {} "*too many messages of no relevance being sent to me.*"

"*Can be useful, if used properly. Is used for 'junk' mail too often.*" **[R76]**

R77 "*thinks it is good*" but he would rather a PC-based than a VAX-based system{in ESB All-in-1 electronic mail operates on the VAX system (see Glossary) for many users though it can be accessed by PC users.

"*The speed of delivery & guarantee that it has been delivered makes email my standard means of communication.*" **[R78]**

"*An efficient means of communicating internally - which avoids paper wastage{} unnecessary manual filing as well as postage.*" **[R80]**

R84 feels E-mail is "*essential*".

R85, a Technologist in a Head Office department, feels E-mail is "*Very useful to communicate with regional staff*" who spend little time in their office.

R86 thinks E-mail is "*great*" for advising and being advised "*as to what is happening & very fast way to update people.*"

R87 makes three comments about E-mail:

"*Requires standard layout -*

Should have a jotter - plain screen - no heading - {presumably this is for drafting E-mail messages}

Headings on memo should be simplified."

"*Find that this is one of the most important assets when used in conjunction with All-in-1 WP for circulating reports. It has removed largely the pressure of people chasing me for reports, results etc.*" **[R91]**

"*Absolutely essential !!! Voice mail advantages:*

(i) allows user / the worker to receive messages when away from desk and when too busy to ans {answer} *phone* {}

(ii) gives user option of sending quick short messages or longer detailed messages"

[R92]

"*In my present job E -Mail is very efficient to communicate with our Customers.*"

[**R93**, who is a Training Officer]

"*Less filing. Receiving mail immediately. Can recheck* {} *re edit immediately*" **[R94]**

"*Electronic mail is a very useful facility*". **[R95]**

"Excellent for Communications" **[R96]**

R97 finds electronic mail very useful: *"saves on paper / time"* in receiving - sending mail.

"Cuts down on phone & paper correspondence" **[R99]**

"I have only started using this recently and it is an efficient way of ensuring communication with E-Mail users at least." **[R101]**

"Clear communications possible with minimum delays (good). May de-personalise if used to 'replace' the phone (bad)." **[R103]**

{Note that the Respondent refers to the social impact here.}

"An efficient way of sending important mail, that won't get seen by a third party - also faster than postal system." **[R107]**

"Very useful for changing / amending documents." **[R109]**

"Increased efficiency / effectiveness" **[R112]**

Survey of Junk Mail

Some Respondents complained about "junk mail" they received via E-mail - such as messages concerning staff who were retiring. These messages were broadcast to every All-in-1 user, including users for whom the message held little relevance.

It was decided to conduct an survey of incoming screen messages to test the accuracy of this assertion.

From 10 March 1995 to 18 April 1995, all "broadcast" E-mail messages received on this researcher's terminal were logged (*broadcast* may be taken as meaning *messages sent to more than one person*).

The results of this researcher's log showed *inter alia* that, of **27** messages broadcast to every All-in-1 user, **15** *(55.5%)* concerned a staff member's retirement presentation.

d) Using a PC:

"Since I started using a P.C. I find that my eyes get very red and sore. The P.C. allows better presentation of reports and more flexibility." **[R1]**

While **R8** rarely uses a PC, he feels "*the good points*" outweigh the "*bad effects as long as one has sufficient knowledge of how to use the PC in order to avoid frustration / stress etc.*"

"Very useful" **[R9]**

"Not much experience. Just know what I have to know, to do a particular job. Would like to know a lot more about P.C. packages." **[R15**, who supervises a Payroll function]

"Very tiring. Long term health risks as yet unclear" **[R19]**

"Challenging,. rewarding & giving much greater professionalism to written & oral presentations." **[R21**, whose work includes training and communications projects]

"*No harmful effects envisaged*" is the comment from **R24**, whose office had received a PC six weeks before she completed the questionnaire.

"Excellent for calculations etc." **[R25]**

"has saved countless man hours in producing reports and analysis of information"

[R27]

"Allows errors to be corrected without having to re write {sic} *sections of work."*

[R28]

"In my experience 'Recommended Software' is never what it is made out to be. Having to use 'recommended' software usually causes more problems than it solves and makes using a PC more difficult" **[R29]**

"In a technical function this is vital for storing data + carrying out calculations."

[R38, an engineer**]**

"Quick and responsive. easy to arrange and store information." **[R40]**

"No ill effects, enjoy it most of the time" **[R43]**

"Biggest drawback has been the outdated computer & its ability to handle modern packages. There should be a scheme for up-grading or exchanging older computers." **[R45]**

"Using a PC has changed my ideas on how some in-house "packages" that have been used without question, actually function to requirements." **[R53]**

"Very significantly improves working methods" **[R54]**

"Good in the main - some small problems. Screen very tiring on eyes", says **R61**, adding that the mouse causes *"pain / discomfort in hand - have become ambidextrous with mouse!"*

"Should be used more - like the flexibilities

ie {sic} *if you want to send a memo with picture demonstrating it to a no. of people, must use Hard Copy as WP on A1* {All-in-1} *can't cope"*

[**R59**, who is referring to the fact that, unlike PC-based applications, All-in-1 cannot be used for sending elaborate graphics; therefore hard copy (e.g. paper) must be used instead]

"Versatile - adaptable to a variety of tasks" **[R63]**

"OK but I think that more emphasis should be placed on training and instruction in the use of computers. Obtaining skills in computing seem {sic} *to be largely related to the amount of time spent with computers at home."* **[R66]**

"Very difficult {} *find it hard to keep computing skills up-to-date."*

[**R71**, who is 34 years old]

"Roll on voice control of the PC !" proclaims **R75**.

"With good software and the right 'size' brain is very good and versatile" **[R76]**

"I am not aware of 'harmful effects'. The 'good effects' all relate to ability to perform, produce reliable accurate work, which looks well and helps me make my point. The knock-on effect, I hope, is better career prospects."

[**R77**, a 35-year old holding a job that requires financial and engineering skills and "*more general strategy development abilities*"]

"There are various packages designed which can be easily adapted to help you do your job more efficiently. I see the PC as a necessity in an organisation of this size." **[R80]**

"Good, I think." **[R84]**

"Very seldom use it in present job" says **R85**, a technologist.

R86, a shift engineer, responds thus: *"Gives greater control of data & less risk of erasure or contamination."* {presumably erasure/contamination of data}

"Good Effects:- kept me up to date with technology.
Harmful effects:- find I sometimes spend too much time or lose track of time when using them." **[R91]**

"Very good for specialised applications like special engineering software" **[R95]**

---

*"I require training, not being a computer "Baby" I find I need lots of support to use a P.C. So far I only make minimal use of P.C. I have received **no** training on P.C."*

[R96]

"Very useful with modern software available today. One of the biggest problems I find is for example transferring data from the All-in-1 system to the new Microsoft Office system, local area networks are far more attractive now anyway than the All-in-1 (and relatives!) {......} we have now." **[R97**, who regards All-in-1 as a dinosaur.]
{It should be noted that a feature called **PCT** (PC Transfer) *has* been incorporated into All-in-1, which is intended to facilitate the *conversion* of PC files into files usable on All-in-1, and vice versa. However, one difficulty lies in **preserving the exact format** - underlined text, for example - of the original file being transferred.}

"I have not had much experience in using a PC" **[R101]**

"Have encountered the idea that PC's are an instant solution to all problems (on the part of 'managers') - more needless pressure (bad)." **[R103]**

---

e) Spreadsheet products

"*Extremely useful*" **[R9]**

"*Don't know anything about these*" [**R15**, who supervises a Payroll function]

"*Not a lot of experience with these, but again increased professionalism*"

[**R21** - note his previous references to professionalism]

"*Good effect.*"**[R25]**

In his response to this section, **R27** refers to his response concerning PCs, in which he feels the PC "*has saved countless man hours in producing reports and analysis of information*"; presumably he feels spreadsheets have been similarly helpful.

"*Building large spreadsheets for forecasting events which allow sensitivity analysis at the touch of a button.*"

[**R28**, who does project work covering the customer area of the business]

R38 indicates the same response for this as for PC response previously: that in a technical function spreadsheet products are vital for storing data and carrying out calculations.

R40, a clerical employee, feels spreadsheet products to be an "*ideal method*" of controlling "*large amounts of numeric data. eg. Budgets, Accounts etc.*"

"*Initially frustrating, more training required*"

[**R43**, a female clerical employee with 20 years service, whose work includes providing information relating to budgets]

"I find these very useful for reports. Especially with WYSIWYG {see Glossary} *you can illustrate information very clearly."* **[R47]**

"Beneficial in compilation of stats {statistics} *- with the latest Microsoft products I enjoy the scope for presenting "dull" data well. (eg* {sic} *compare Smart spreadsheet to Excel)."* **[R53]**

"Essential for working with any sets of data" **[R54]**

"Good {} no bad effects." **[R59]**

"Useful for repetitive tasks, e.g. weekly overtime report - Allows good presentation of data and facilitates use of formulae - ease of calculation" **[R63]**

"Very useful" **[R66]**

"Use this service very little. No effect good or bad." **[R70]**

"It's the work-horse I rely on." **[R77]**

"Useful products." **[R76]**

R80 is *"not as familiar with the spreadsheet as say the Database or WP etc., however I feel that this also is a necessity especially when performing calculations or storing formulas which help you in your daily job."*

"Do not use in present job" **[R85, a Technologist in an engineering department]**

"Excel has taken most of the tedium of dealing with large amounts of data & results, cannot think of any harmful effects." **[R91]**

"Don't Know - No Training" **[R96]**

"Have used Smart to some degree but the job it was set up to facilitate could probably be done on a better software package?" **[R101]**

---

f) Word Processing products

"Very useful" **[R9]**

"Makes life a lot easier" **[R11]**

R14, a manager, responds to the section on WP thus: *"The only thing I am interested in."*

"Use All-in-1 word processing package only. Not a lot of use. - Very Basic use."

[R15]

"Will eventually do away with clerical jobs. With a bit of practice anyone can use a W.P." [**R19**, a clerical employee]

"Much better than using a Typewriter - good effect"

[**R20**, a clerical employee, temporarily supervising "a busy Payroll office"]

"Revolutionary change in document creation, filing & retrieval. Frustration too though due to a lack of 'advanced' computer skills" is the opinion of **R21**.

"Excellent effect - couldn't go back to the typewriter." [**R25**, a clerical employee]

"The main WP package I use - when I am not using Aldus Pagemaker - is Microsoft Word V.6. {Version 6} *which has limited compatibility with other packages."* **[R29]**

"As non-clerical staff - they are useful only because I can type! Otherwise, I would have no real need for them." [**R38**, an engineer]

"*Easier to transfer information*" rather than having to work through a typing pool, is the comment of **R39**, a manager.

"*Main advantage is storing documents. Presentation is also a selling point.*"

[**R40**, a 26 year-old female clerical employee]

"*This has a positive effect on my working life*" responds **R43**, a female clerical employee with 20 years service.

"*The All-in-1 WP lacks the features that give that "impressive" finish to documents. Or is it the associated printers?*" [**R45**, who describes his job as "Training"]

"*Excellent tools especially where precise & clear data is to be transmitted ex. ESB and where quality of presentation is as important as the material contained in the file.*"
[**R46**, part of whose job description is "communications with suppliers, manufacturers etc."]

"*I enjoy using All in One. Its so much easier than getting a letter typed. You can alter it so easily without trips to typists and waiting then till they have time to do it which can be very stressful if you have a deadline.*" **[R47]**

"*More control over own output. Less delays for short reports and meeting minutes.*"

[R50]

"*The only sensible way to produce written documentation*" **[R54]**

"*The copy attachment and edit facility is very good.*" **[R58]**

"*Word: Pretty good: tables handy: easy to use several different font / style / size etc.*" within the same WP document, feels **R61**, who describes her job as "*Clerical Admin. / Typing / General Dogsbody*". She adds: "*However, often after we've already typed in Word we're asked to send it on E-Mail & transfer doesn't accept "Word" commands such as bld* {bold}. *cntre* {centre}. *u-line* {underline} *tables, graphs etc..... for VT users.*" {VT terminals are not PC-type screens. The incompatibility of different WP products used in ESB raises its head here.}

"*Very useful*" **[R66]**

"*I find that because very fancy layout / graphics is now possible that a lot of time is wasted doing unnecessary elaborate layouts and colour work.*" **[R71]**

"*Extremely useful when dealing with documentation*"

[**R74**, a Clerical Officer, whose "job covers a wide range of duties".]

"*Very useful products.*" **[R76]**

"*I would like to improve my typing speed*" says **R77**, who Strongly Agreed on Page 6 of the August questionnaire that he is often frustrated at his poor typing skills. On that same page, he wrote this comment: "*I'm still a 'one-finger' typist albeit reasonably fast. Only a problem when transcribing, not composing.*" On page 7 of the questionnaire, referring to the computer, he commented: "*I use it most of the time; I never write long-hand anymore*".

"*I do find you are less inclined to organise your thoughts when using WP / Email - before you start to type. It is so much easier to re-arrange them on the screen after putting them down first.*" **[R78]**

"*Word Processors have replaced the typewrite*r" and in doing so have made typing less cumbersome, *"more interesting and extremely more efficient."* So says **R80**, whose job includes typing.

R86 feels word processing products:

- improve *"quality of minutes, reports, letter {sic} E-Mail messages etc."*
- *improve "productivity greatly despite slower typing" rate of individual user.*

He finds *"a big negative in that too many unnecessary tasks requiring reports are allocated to staff because of the ease in producing documents."*

R95 feels the All-in-1 word processor is useful.

"Don't Know - No Training" **[R96]**

R97 states: "*Whoever designed (WP) All-in-1 must be acredited* {sic} *with the loss of more man-hours (or should that be person-hours!) than all the strike action in the last 5 years - David Copperfield would be proud*" of some of the disappearing acts which the Respondent alleges this package is capable of achieving.

As he had stated for **Computers in general**, **R103** feels a "bad" comment would be that word processing products may lead to more time spent on low-grade work, for example, typing.

"*Better Report Preparation*" **[R112]**

The June 1995 document

There were 19 Respondents to the June 1995 document. Eight of these were female, ten were male and one Respondent ticked neither box.

Age Groups

Table 46: Age Group of Respondents

Age Group	No. of Respondents
20-24	2
25-29	2
30-34	3
35-39	0
40-50	6
50-60	4
Over 60	2

Table 47:

Results of Section A - Respondents' reactions to software problems

Comments		Total No. of Respondents
A.1	I welcome it as a challenge	2
A.2	I always learn something new through solving the problem	10
A.3	I feel that there are too many problems with computer software	1
A.4	I usually have to get someone else's help in solving the problem	5
A.5	The problem causes me to waste valuable time	4
A.6	It is usually tedious to correct the problem, but it has to be done	2
A.7	I rarely meet any problems in using computer software, so this question does not really apply to me	2
A.8	Usually I can solve any software problems fairly quickly using my own knowledge	2

Commentary on Table 47:

The most significant responses were to the question statements *A.4* and *A.5* (each selected by **four** Respondents; and *A.2* (selected by **nine** Respondents).

The least significant responses were to the question statements *A.1* and *A.6* (both selected by two Respondents; *A.3*, *A.7* and *A.8* (each of these were selected by **one** Respondent).

Some Respondents ticked more than one box.

Note: In all the results / responses provided below, the codes **RJ1**, **RJ2** and so on represent a Respondent to the June 1995 document.

Responses to Box A.9 (open-ended responses):

"The learning process is enhanced through interchange of ideas for solving problems and is a valuable learning experience for all involved.

Courses do not cater for this type of activity to the same degree" **[RJ1]**

RJ4 sometimes had to *"get help from other people in solving the problem - I rarely come across too many problems."*

RJ7 said she sometimes had to get help from someone else in solving the problem.

"In relation to the above, when using software I see it as a 'tool' which should aid in the completion of work more efficiently. If there is a problem with the tool (software) then this gets in the way of efficient and effective completion of the work in hand." **[RJ9]**

"In my job, I use a number of computer packages. The easy-to-use packages are great as it is usually quite easy to solve any problems, using the HELP function or the help desk, but I am using some specialist packages, which, when problems are encountered, can be very difficult to solve, and therefore extremely annoying. With a particular package, I have wasted days, phoning & faxing the supplier in America for information."

[**RJ14**, an engineer (non-managerial)]

"The sequence for accessing information can be tedious and not 'user friendly' but not serious enough to cause a major problem." **[RJ14]**

RJ15, who is in his sixties, had done some BASIC programming about a decade ago, but had *"lost touch with computing"*. He is *"only coming to terms with E-Mail etc. in the past year"*.

"In so far as possible, try to solve any software problems myself. If not successful, enlist help of colleagues, and finally would contact Software Support section within the company if problem persisted."

[**RJ16**, an engineer (non-managerial) in the 25-29 age group]

Responses to Section B

Question asked:

In which way(s) do you think information technology has changed the role of office workers?

Responses to Section B.1

{ ***My initial reaction to this question is:*** }

- **General comments**

RJ1 makes three points:

"Much more information available

Better analysis

Can easily be customised"

RJ2's comments are:

"Improved productivity

Enriched Jobs

Eliminated routine/repetitive jobs"

RJ3 states: "*There is a: Demand for more information.*

Better presented information.

Faster movement of information."

As more information becomes available, there is more distraction from core business.

However, much tedious working of figures has been simplified and speeded up."

RJ4 is a non-managerial engineer and she had this to say:

"Not being a conventional office worker I can only give my view as an Engineer. The use of Read Receipt on EMail allows you to know when someone has got your message - very useful.
If only small amounts of typing is {sic} *required I can do the document up myself - and there are no major delays."*

"It has certainly streamlined the work " commented **RJ5**, referring to information technology.

RJ6, a manager (engineering) feels I T had "*Subjected them* {meaning office workers} *to more monitoring + control."*

"More staff have had to learn keyboard skills to enable them to keep abreast of computer technology. This opened up new areas for all staff to learn new skills. The original keyboard operator also learned to diversify his / her role. A whole new vista has opened for staff. It is very challenging and exciting." **[RJ7]**

"It has certainly improved the time taken to transfer information between locations within the organisation. Information retrieval is faster.
- One drawback is that it is so easy to send information that a fair amount of 'junk' mail clogs up the system.
There has been some reduction in the amount of personal contact between office workers as it is now easier to send a message than it is to give it in person." **[RJ9]**

"It has increased the efficiency and presentation of output, but it has increased the quantity of work. The worker must be flexible and innovative to maximise the technology"

[**RJ14**, a technical (non-supervisory) employee]

RJ16 makes four points, all on the positive side:

"Work done efficiently & effectively.

Quality of output improved{}

Speed of communication enhanced. Also level of communication.

Much easier to track information."

"Records & information are much more accessible and up to date"

[RJ17, a clerical employee]

RJ18, a female clerical employee, expresses four opinions:

"1. Removes time consuming and tedious jobs like filing"

"2. Ready access to Information" {e.g. dealing with customer queries promptly reduces *"pressure"*}

"In a paper driven systems most of the time on 'phone queries is spent trying to trace customer documents."

"3." {That spreadsheets and databases implied the following}*"more flexible in production of information"*. She adds *"can produce various scenarios based on specific figures - without I T this type of work would be very time consuming and rarely done."*

"4. Empowers Workers - with spreadsheets and databases etc allows people to contribute to and be involved in creation and adaption of systems to computer based systems."

These references of **RJ18** to empowering workers, to contribution and to involvement are significant.

"It has made it possible to have a more efficient system for recording and retrieving work. It is possible to do previously laborious tasks simply and efficiently" says **RJ19**, a female engineer (non-managerial).

- **Comments relating to scope / content of work:**

"I feel it has greatly increased scope of work for office workers. Communication have increased greatly" **[RJ8]**

"Most people now doing their own messaging {} I take messages by E. Mail but tend to use secretarial help for sending, writing up reports, etc."

[**RJ15**, a manager (engineering)]

"It has increased the efficiency and presentation of output, but it has increased the quantity of work." So said **RJ14**, adding that the worker must be flexible and innovative to maximise the technology.

- **Comment related to skills / learning**

"I.T.'s arrival + integration has opened up a whole new world of skills + knowledge. I look forward to more widespread availability of PCs = self-teaching software (as most of it is). The problem is only one of time availability to develop my knowledge base by more use." [**RJ13**, a female administrative employee in the 50-60 age group]

- **Other comments:**

RJ11, who is in the 20-24 age group, says she is not *'scared'* of "*computers etc*", as they "*have always been around*". She "*can understand how older people might have difficulty with them.*"

RJ12 identifies an increase in employee efficiency - "*reduces' level of 'paperwork', script*"; she also implies that the "*communication process*", including that with "*external agencies*", is speeded up. "*Errors / repeat work (drafting of letters, reports etc)*" are reduced. "*Increase in skill levels - use of software, typing skills; less use of manual systems / methods*".

RJ13 says it has made her "*life in the job much easier {} All-in-1 alone is a marvellous tool.*" She cites "*easier writing {} filing, more space. Better info organisation + flexibility.*"

Responses to Section B.2
{ ***With regard to this particular question, I also feel that:*** }

- **General comments:**

"Too much paper copies used as back up" **[RJ1]**

"It has led to all staff, including non-clerical staff, doing more menial work, (their own typing + word-processing) instead of concentrating on their main tasks."

[RJ6, a manager (engineering) in the 40-44 years age group**]**

RJ11 believes that there are still as many *"pieces of paper floating around as before"*. *"There is usually a lot of info. contained on PCs etc, but it is as haphazard as the old filing systems. For people in administration work where before the same work had to typed time and time again, the use of computers has definitely improved the quality of their time at work."*

"A paper manufacturer invented the computer !!" **[RJ14]**

- **Comment relating to quality of life at work:**

"Has increased the 'working day' - lap top pcs are a common travel accessory: widespread availability of faxes, phones on trains, cars." **[RJ12]**

- **Comment relating to E-mail:**

RJ5 felt that the supposed aim of computers, "*specifically E-Mail*", in promoting "*paperless offices*" was not achieved. He added "*More paper flying around*", declaring that people tend to print out everything instead of filing and storing information. {Clearly he is referring to a liking, attributed to many users, for hard copy printouts.} He referred to faults in printers and alleged that a "*simple basic message in E-Mail involves printing two additional sheets.*"

- **Comment relating to effectiveness:**

Has "*increased co. {presumably = company} effectiveness*" as result of longer "*working day*"{}"*laptops*" {} "*widespread availability of fax and phone*" and the increased number of standalone workstations, meaning less necessity for staff to mingle. **[RJ12]**

- **Comments relating to training / skills / learning:**

"*There is now a much more presentable finish to work when using computers. One can design almost any type of form now - no need to use outside 'experts'.*" **[RJ7]**

"*I T has afforded me a great opportunity of personal development. I have acquired a transferable skill.*" **[RJ13]**

---

* **Comment relating to social impact of I T on office workers:**

I T "*has increased the no. of 'standalone' workstations - less necessity for staff to mingle*"

[RJ12]

---

* **Comment relating to presentation /appearance:**

Material formerly produced "outside" is now produced by staff, claims **RJ8**, "*and has a very professional finish*".

Responses to Section C

Question asked:

*How has information technology **(covering items such as personal computers; fax machines; portable phones; electronic mail; videoconferencing and other technologies)** affected the quality of your life at work? **For example:***

- ***how has it increased, or decreased, or had no effect on, your** job satisfaction?*
- ***how has it increased, or decreased, or had no effect, your** productivity **in the office?***
- ***how has it affected the ways in which you and your colleagues** work together as a team?*
- ***(you may** mention other **ways in which information technology affects the quality of your life at work)***

Responses to Section C.1

{ My initial reaction to question C is: }

- **General comments:**

RJ1 supplies 6 statements:

"*1. Production of reports easier;*

2. Same information available to everyone that need {sic}same;

3. Better presentation / production of OHP's {overhead projection transparencies};

4. Increase in job satisfaction;

5. Increased output.

6. Good for ego - staying in touch with modern system."

RJ4, who is in the 25-29 years age group, has had access to All-in-1 since joining ESB, so this Respondent has nothing to compare it with. RJ4's job "*involves working almost entirely with Work Management Systems so if we didn't have the software in place I feel that people in the Regions would have a lot more paper work to do - and no easy way of obtaining information e.g. if a customer phones in for info. Again the majority of these systems are in place quite a while.*"

RJ7, who ticked the Clerical; Secretarial; and Administrative job descriptions, responds:

- *"I get more job satisfaction now*
- *It has made me more productive at work.*
- *With E-Mail in operation, it is so easy to send / receive messages.*
- *Voice Mail is also very effective.*

All of these help to keep us more in touch with each other in our work environment, ergo more efficient work is produced."

"*Quality of Working Life enhanced enormously. Less stress*" **[RJ13]**

RJ18 states:

"*1. Use of above technologies has improved job satisfaction.*

Easier to contact people -

Fax - ensure message received, quickly and that copies of the originals are sent.

EMail - ensure messages sent and received

- easy to transfer documents and update them with minimum amount of work.

Mobile Phones - people can be contacted as required and queries dealt with.

2. Improve productivity - deal with queries promptly and efficiently."

- **Comments relating to job satisfaction:**

"Increased job satisfaction" **[RJ2]**

"Job satisfaction - no effect." **[RJ3]**

RJ5, a manager (engineering) in the 40-44 years age group, feels that I T *"had no effect"* on his job satisfaction.

RJ6, also a manager (engineering) in the 40-44 years age group, reports *"No significant effect on job satisfaction"*.

"Job satisfaction greatly increased" **[RJ8]**

"Job Satisfaction by personal achievement" **[RJ13]**

RJ15, a manager (engineering) in the over-60 age group, feels there has been *"no effect"* on his job satisfaction.

"Increased Job satisfaction" feels **RJ16**, a non-managerial engineer.

"I would not say it has increased or decreased Job Satisfaction, it has made the job more efficient & gives a more professional approach to our Consumers" says **RJ17**.

"It has increased my job satisfaction" says **RJ19**.

- **Comments relating to productivity:**

"Productivity - increased through automation of spreadsheets." **[RJ3]**

RJ5 feels I T *"had no effect"* on his productivity.

RJ6, a manager (engineering) feels I T *"Has increased productivity, by enabling better use of assets through accurate simulation of their behaviour."*

"My Productivity has also increased" **[RJ8]**

"Productivity has certainly increased. The flexibility that the use of modern databases allow {sic} means that information can be manipulated more effectively and efficiently than in the past." [**RJ9**, a non-managerial engineer in the 40 - 44 age group]

RJ11 states that if she had been in her present job, (in a technical area), 15 years ago, she would have spent her time writing long programs in FORTRAN (a computer language), *"to perform long-winded calculations"*. For this reason, she is *"extremely glad that computers have progressed so much, and that they have become much more computer friendly."*

"PRODUCTIVITY by speed of reply - no waiting for typists etc. Ease of access to info on screens." **[RJ13]**

"Output depends on key-board skills as regards speed. Good output, but often requires users to 're-invent the wheel' when items are designed on individuals accounts / word processors etc." **[RJ14]**

RJ15 feels his productivity has increased *"somewhat"*.

"Increased Productivity: although there is a temptation with graphics packages / word processing to get caught up in spending a lot of time enhancing the final presentation documents." **[RJ16]**

"It has increased Productivity" states **RJ17**, a clerical employee.

"It has increased productivity" says **RJ19**, echoing RJ17.

- **Comments relating to teamwork:**

"Teamwork - no effect." **[RJ3]**

"My job is a one off ie {sic}*I am not part of a team"*, states **RJ5**, a manager (engineering).

"Team work slightly facilitated by use of E-mail." reports **RJ6**, a manager (engineering).

"I would feel myself that I am contributing much more to work as a team member {} Where I may not have same qualifications as other members of office my I.T. Skills would far exceed theirs." **[RJ8]**

"Work plans for section staff are available within a shared electronic drawer. There is a sense of greater awareness of what other people are doing and where your job fits. In general there is the greater convenience of communicating electronically, whereby messages can be sent and will be responded to when people are available. This contrasts with using telephones whereby on calling a person who happens to be unavailable at the time of call, wastes valuable time." **[RJ9]**

"Team work - where access is not limited easy explanation. When restricted can create barriers" says **RJ13**; she continues *"send drafts to colleagues or teams so easily"*.

RJ15 feels the effect on teamwork to be *"not very much - work involves problem solving, planning, development"*.

"Probably has had an adverse effect on teamwork: electronic communication becoming much more the norm rather than face-to-face meetings. Exception to this would be working with colleagues to solve problems as in Part A." {of the June Document} **[RJ16]**

"As we all have our own Computers & input our own work, and work well together it would not be classed as Team Work." **[RJ17**, a clerical employee]

"It has allowed more effective team work." **[RJ19]**

- **Comment relating to the quality of life at work**

"*Overall quality of working life has improved*" according to **RJ12**, but tempers this positive statement: has given rise to "*isolation*" - he cites "*remote work stations*" as "*becoming the norm*".

- **Comments relating to communicating technologies in general**

RJ6 states that "*FAXes* {sic} *are v. useful + rapid as a means of communication*"

RJ7 felt that E-mail makes it "*easy to send/receive messages*", and spoke of keeping in touch with E-mail, "*ergo more efficient work is produced*", continuing on to state that all staff "*should be given the opportunity to learn and use the above technologies.*"
{This is an interesting aspiration, in the light of our earlier point that Craft & General staff have limited access to E-mail.}
Voice mail, felt **RJ7**, "*is also very effective*".

Voice mail "*is often ignored because it is impersonal*", opined **RJ14**.

"*Fax has speeded up things enormously*" **[RJ15]**

- **Other comments:**

"*Helps to keep up to date with children at home*" **[RJ13]**

"*It has allowed me to produce better quality reports including scanned in photographs etc. which improve the information content.*" **[RJ19]**

Responses to Section C.2
{ ***With regard to this particular question, I also feel that:*** }

"Large screens should be used to lessen the stress factor in using I T systems".

[**RJ1** - this is interesting when related to comments previously encountered in the literature concerning screen size]

RJ4 reports being involved in the implementation of a new computer system for certain offices outside the Head Office area - "*the initial reaction of staff was that they weren't looking forward to using it - but now they feel they can't do without it. The quality of my life has not changed considerably but I do find E mail facilities a MUST, & fax m/cs* {presumably = machines} *are also useful. However constantly getting answer machines can be a pain.*"

"All staff should be given the opportunity to learn and use the above technologies."

[RJ7]

"Everybody wants to use I.T. now, but people who are trained and skilled in other areas, in my opinion should leave it those who are skilled.
Some of the highest paid typists and users of software packages are doing work in ESB now which there is fully skilled Admin / Clerical staff not being used to do."

[**RJ8,** an Administrative employee]

RJ11 feels "*the transmission of information has become much quicker, through the use of faxes*" and E-mail. She finds it *"very useful to be able to have information within the same day, i.e. by fax. The use of discs* {i.e. computer disks} *to share formats, etc. for reports etc. is very useful for use among colleagues."*

"I think the fact that everybody is expected to be familiar with PCs and communications equipment is changing work definitions & roles - now a lot more 'administrative' type work done by engineers themselves rather than clerical workers. In this office, anybody <30 {Respondent means anybody **under** 30 years of age} *tends to do their own typing, faxing, photocopying, whereas clerical officers will now say most of their work comes from senior management or those >30"* { i.e. **over** 30 years of age}. **[RJ16**, an engineer]

RJ18 states:

"More flexible approach to work - down load information onto PC and sort and query as required. Improves the quality of work.

With networks and access to open files easy to do each others work within an area. Can mean that work of unit can be done even if members are away on leave."

"Team work with I T is not effective in our open office even though we are all rarely together in the office.

Fax machines are not commonly used in our office (7 people) {}

Portable telephones would be very helpful but could be expensive as many would be any region and calls mostly at peak time"

[**RJ14**, a technical (non-supervisory) employee in the 40-44 age group - note his reference to "*many*", which seems ambiguous.]

Commentary:

The responses show a *combination of positive and negative views within Response Boxes,* despite the strategy of encouraging *diverse views* by providing *two* Boxes (e.g. B.1 and B.2) for Sections B and C.

CHAPTER 7

SURVEY CONCLUSIONS AND RECOMMENDATIONS

SURVEY CONCLUSIONS AND RECOMMENDATIONS

SURVEY CONCLUSIONS

In keeping with the uneasy relationship between humans and their technology, opinions varied as to the impact of information technology upon office workers.
Some Respondents described only beneficial effects, even going as far as to declare I T could have nothing but good effects. Other Respondents perceived I T in the role of master rather than servant, or spoke of harmful effects upon office workers, ranging from physical distress to boredom induced by certain tasks.

Some general outcomes

A fairly even split between female and male Respondents was observed.
Educational level attained relates well to the position held by the person (her/his job description). There was a reasonable number of third-level qualifications in evidence, as well as cases of holders of Leaving Certificates acquiring further qualifications.
Just over one-third held clerical, administrative or secretarial jobs.

A little over 72 % of the Respondents had been using a computer at work for over five years. The vast majority had at least 3 years' experience. This level of familiarity with computers bears out the decision to use attitudes towards computers as indicators of attitudes towards I T in general.

The office environment

Forty-two Respondents worked in offices which were supervised in a traditional manner (staff reporting to an office supervisor, for instance). Thirty-five staff members were subject to less-formal supervision or to no supervision at all. Teamwork was reported by a very small number (five).

Around 35 % of Respondents worked in rooms which were separated from other offices. (The majority of ESB offices are cellular in design.) A further 64 % occupied open plan accommodation.

Within these offices, environmental conditions were not ideal for working with computers. Over 60 % disagreed that their offices were properly ventilated, while a similar number felt that the air conditioning in their offices could be greatly improved.

Bodily discomfort

Bodily discomfort was reported by a proportion of Respondents, who mainly attributed this to their use of computer terminals. Among the types of discomfort reported were eye discomfort (which the August questionnaire had explored); headaches; and back discomfort.

On the question of whether Respondents experienced eye tiredness due to working at their computer screens, those assenting were outnumbered by those disagreeing.

Around 45 % of Respondents thought that their eyes frequently became tired from looking at their computer screens; but the remainder (around 55 %) responded that their eyes seldom or never became tired in this way.

The August questionnaire had not focused specifically on headache and back pain, yet Respondents themselves raised these issues: it is perhaps opportune to mention them briefly.

Headache

The Respondents' reports of headaches are interesting. During the Nineteen Seventies, complaints of headaches from VDU users began to be investigated; such research is ongoing.

Recently Dr. Arnold Wilkins and his team researched "optical illusions" (patterns of lines) which might be producing headaches if they occurred on a VDU screen [***Elements of statistics: Problems with patterns***]. The researchers - who in fact used paper representations of patterns rather than actual screens - found a strong association between the "illusions" and susceptibility to headaches among experimental subjects. For example, a positive Pearson correlation coefficient of .5 was found. Spearman's ranked correlation was also employed. But since a correlation never *proves* the cause, merely indicate that there may be a link, they used a *third* measure which showed that the location of the subject's headaches related well to the position of the optical illusion being tested.

One difficulty with responses to our own study is in gauging the effect which

- the possible boredom or intensity of the task involved;
- glare from overhead lighting;
- job stress;

may have influenced Respondents' perceptions of their headaches.

Back discomfort and pain

Pinpointing the cause of chronic back pain is difficult and there is often no effective cure. Pain can come from discs, muscles joints or ligaments, as well as from the nerves [**"Mini-scope gets to the root of back pain"**].

The prevalence of lower back pain, for whatever reason, means this topic is not one simply reserved for specialist journals: a popular magazine, *Essentials* [**Jane Brown**, October 1994: 99], described some of the approaches to combating back problems. So does **Campbell**, focusing on *office backache*, as he terms it.

Operation of VDUs traditionally calls for a *seated* position - clearly *standing* is regarded as not being feasible for office work. So the ergonomic relationship involving chair suitability and VDU operation may be a critical one. Backs may ache from prolonged sitting or bad posture.

Office seating could play a part in back problems - either as a contributory factor or as a partial solution. Galitz [1980: 190-191] notes that office seating should be *adjustable*.

Dagostino [1994] focuses on the *choice* of seating, saying that it is fundamental that the office chair chosen for the employee should support the lumbar region of the back.

Respondents seemed generally happy with their office seating. This is crucial, as computers and other I T devices are normally used whilst seated. A reasonable proportion of chairs were not fully-adjustable and/or in perfect working order: yet Respondents did not appear overly-concerned about the ergonomic implications (proper seating is said to assist productivity, for example).

I T training appears not to be uniform

The issue of staff training has received much attention in ESB.

There is a generous budget for this item, the expenditure being incurred on both in-house training (including on-the-job training) and external training.

Training in I T-related disciplines varies in its extent among Respondents to the survey..

Many Respondents have received formal training. This ranges from a single course, reported by a few Respondents, to a wide-ranging multiplicity of courses being attended by some individuals.

Training on All-in-1 was common - this is to be expected, as the questionnaires were sent to All-in-1 users.

Many Respondents had been trained in at least one PC software product, predominantly Word for Windows and Excel.

Some Respondents report receiving virtually no training at all. Unless we accept that modern software is so well-designed compared with older software that it can be used with only a rudimentary knowledge of, say, Windows, we are led to believe that users who profess to have received minimal training must in fact have learned by some means which they do not classify as "training" *per se*. This may be through a combination of on-the-job training (supplemented by consulting their colleagues; the system documentation; and help software) or by some other means which they do not specify.

A couple of Respondents declared that they are mostly *self-taught*. Windows-style software has many features built-in which could assist this process. A fair question to ask is whether self-managed learning is a less time-efficient method of learning (and therefore more costly in salary terms), than following specially-designed courses which could shorten the learning stage.

Additionally, the phenomenon of "the guru", as described in other enterprises, can be observed in ESB. A "guru" acts as a mentor or expert in particular aspects of I T, spending time imparting her/his knowledge to others in an informal manner - for example, a novice might ask the guru for assistance with a software problem.

The guru phenomenon has been described by I T consultants as a hidden cost of training. However, the fact that it exists points to a perceived need by novices for immediate help on a problem - evidently, more formal methods of tutelage, such as manuals and help screens are eschewed because it is easier to interrupt a colleague to ask her/his advice. Additionally, it may be more efficient to have a guru resolve a problem on the spot, so that the workflow is not interrupted.

No questions were asked that would indicate the extent of the effectiveness of training received, as that would have been beyond the scope of the study.

Sixty-five per cent of Respondents felt they were "always" learning something new from using their computers. A similar number were always finding new ways to do their work better. But Respondents were much more evenly divided when it came to the proposition that they are constantly finding out new things their computer can do which makes their work more interesting: 49.5 % agreed, whereas 47.7 % disagreed.

Outcomes of enrichment

Most Respondents viewed I T from a limited perspective. Software provides some, though not all, of the tools they require so as to perform effectively at the office. Respondents' written comments centred on technologies that were generally available; they made no reference to more exotic forms of I T such as videoconferencing. None reported using the executive information systems or decision support software referred to under Concept D earlier.

Electronic mail was generally perceived in a favourable light, for example in facilitating communications - people felt they would be less well-informed without E-mail.

Word processing products were perceived as useful for text creation and handling.

In the data management arena, **spreadsheets** seemed to help rein in the clutter of data, but **database** products were less widely used.

Some frustration was expressed at the inadequacy of certain software applications; such feelings would appear to be a contra-indication of enrichment.

Most Respondents felt they could not do their job as well without a computer.

I T was seen as **enhancing productivity** and **reducing tedium**.

Improvement in the **quality of life at work** or in the **jobs** of Respondents was reported, though not universally.

Streamlining is encouraged

Other impacts of I T on ESB office work surfaced under a variety of headings. The first of these might be termed "streamlining". According to this apparent outcome, the processes of work have been streamlined and computers have made Respondents' work easier to do.

Reports are being passed between employees faster, using E-mail. There appears to be less need to re-type documents when changes are made. Computers have helped users to manage their own jobs better (Question 22 f).

Time saving is claimed

A further outcome involved time saving strategies which I T can facilitate. Time-wasting repetition was being reduced. Where similar documents were produced with only minor variations, WP came into its own.

The survey results reveal that office users *appreciated systems which offer speediness*. Fax is speedy in a way that conventional office mail is not: fax was welcomed.

The precious commodity called time can be better accounted for using electronic diaries and calendars. Yet, concerning "scheduling product" and "time management product / option", a low level of job performance improvement was reported by respondents. The high level of "None" (no improvement) and "Don't Know" might indicate that many Respondents do not use these products.

Storing / "warehousing" of data becomes easier, more accurate

A third outcome related to data handling. Without some form of filing, office data quickly becomes unwieldy. Office automation systems, such as All-in-1 are allowing correspondence prepared using WP, or E-mail messages, to be stored in the equivalent of electronic filing cabinets. Respondents were favourable towards electronic filing and retrieval of documents; but some of them affirmed that paper output remains voluminous. Telephone numbers and departmental locations of colleagues are available on-screen to all ESB system users: this information is more likely to be up-to-date than its paper equivalent. Staff who have PCs have an even greater variety of tools, such as Excel spreadsheets and Access databases, to hold data. Such information, being readily available, is an aid to the employee.

Creating and correcting text becomes easier

A key aspect of office work, the creation, correcting and manipulation of text, was the focus for a fourth outcome. Over a century ago, text processing was transformed by the advent of the typewriter. This machine remained the preserve of specialised staff who converted the manuscript work to typescript. Similarly, word processing, when first introduced into ESB, was the preserve of a handful of dedicated operators. However WP spell checking and stylish formatting features have become available to far more employees. (**Warren** 1995 found that spell checkers were seen as "a boon".) Managers no longer need a typing service (according to a couple of Respondents). Grammar checking was far less used, judging by Respondents' answers to Page 4 of the August questionnaire. Perhaps most documents are short enough not to warrant grammar checking, or Respondents rely on their own knowledge. Some may not even be aware of the feature.

Desktop publishing was generally approved of by those who had experienced it.

Improving productivity, enhancing self--esteem

A majority of Respondents felt I T helped them to perform better in the workplace, though a handful of dissenting voices queried whether this effect was universal. If we accept that individuals like to feel productive, greater productivity may tend to increase self-esteem. One Respondent believed that he gained respect from colleagues who required [his] assistance with computer problems. Judging by anecdotal evidence gathered during the study, including comments by employees, having state-of-the-art technology appears to confer status on the possessors of the technology. Since the Nineteen Seventies, computerising of an activity has connoted making it more efficient. So far it is the administrative / engineering echelons within ESB which have borne the brunt of computerisation - while gaining the kudos. The impact on power station "craft and general staff " or power line crews seems to have been peripheral. But as the use of technology has traditionally been linked to such employments, it seems likely that the use of document management systems, workflow technology and geographical information systems will bring about an impact similar to technology's affect on officer staff.

Software dislikes - and likes

Thirty-two of the 113 Respondents nominated a software product which they disliked using.

It had been hoped that a pattern for the variety of software most disliked might emerge: additionally, because Respondents were invited to state reasons for disliking the product, *undesirable factors* in software might be identified.

Respondents supplied reasons for disliking a product which included its poor design; its inferiority to a rival product; or its lack of useful features. Some Respondents liked a product in general terms but disliked aspects of that product, for example the fact that it used non-standard keying combinations. A couple of products which were accepted uncritically by most Respondents were detested by a couple of others: All-in-1 is the best instance of this reaction.

Generally there was an air of acceptance towards software products, even those that were tiresome to use. One Respondent, a secretary, adopted a pragmatic approach in saying that with "practice" comes "familiarity" and hence the system gets "easier".

What is apparent is the extent to which users become intimate with their information systems. They appear to enter a relationship with the computer screen, which supplies them with a simulacrum of the task they are performing. A century ago it must have seemed strange to the first telephone subscribers to converse with a disembodied voice; but people soon adapted. Today, our Respondents praise the usefulness of their E-mail and word processing software while taking them for granted. Practically none of our Respondents felt these two applications could be dispensed with.

Some attitudes to software

Frustration with software products emerged as a theme. Naturally, users vented their frustration at electronic systems which failed to operate as expected and required. They sought improvement in software features which would increase the usefulness or ease of operation of the product.

All-in-1, the office automation product widely used in ESB, seems inadequate for the demands placed upon it by some users, although others seem quite happy with it. This software product was designed in the Nineteen Eighties when most computer screens were monochrome (displaying shades of one colour only), so few office workers were accustomed to seeing the colourful, adaptable PC software common in today's office. All-in-1 suffers by comparison with Word: the latter product has wider formatting and layout facilities.

In listing their "likes" and "dislikes" among software products, Respondents were enthusiastic about the former - and at times outspoken about the latter.

All-in-1 was regarded as useful by many - hardly surprising since the survey was aimed at users of the system.

Word processing software is widely-used, even by those with limited keyboarding skills. Respondent R25 maintained that WP had produced an "excellent effect"; she could not return to using a typewriter. Another Respondent thought that WP had made the activity of typing less cumbersome, more interesting and more efficient. Respondent R15 felt the WP feature on All-in-1 was not very useful. Comments on Microsoft Word ranged from "versatile", "flexible" to "powerful".

Desktop publishing was not encountered widely, but Respondents who used this facility were impressed; R29 remarked on its versatility.
Spreadsheets may be more familiar to people from an accounting background: they were not as widely reported as WP.

Systems designed for ESB applications, such as **PMIS, MMIS** and **MOCCS** were accepted because they facilitated speedier production of reports, whilst keeping records more up-to-date on a continuous basis. They were flexible for, and adaptable to, the job in hand.

The *small* number of Respondents who nominated a product they *disliked* using makes a statistical analysis less than reliable. No consistent pattern emerged among the products criticised, though All-in-1 did come in for criticism more than once.
For example, one Respondent criticised its lack of a GUI (Graphical User Interface), while another felt it was out-dated - a dinosaur of a system, in fact.
Respondent R29 felt using "recommended software" with a PC caused more problems than it solved. The lack of standardisation in keystrokes was mentioned by two Respondents as a reason for disliking products. But in fairness, this is inevitable given that systems have been designed by different teams of developers at different times.

Involvement in software design

Sixty-two per cent of Respondents wanted some more involvement in designing the software they use; 33 % would like much more involvement. Twenty-seven Respondents (about 24 %) wanted no involvement whatsoever.
A number of staff were critical of aspects of certain software products which they *have to use* because their job necessitates using these products.

Respondents referred to a higher *quality* of output as a result of I T

Job enrichment and other motivationally-oriented initiatives were formerly posited on a belief that workers can be encouraged to perform better than they otherwise might have. This view appears to have matured more recently. A credo has evolved which deems that employees will inherently seek to perform well, without coercion or even tangible reward - given the right employment climate.

Several Respondents spoke of the lessening of tedium brought about by computers. Traditionally, some office work was perceived as being routine or being so overly-simplified as to bore the worker.
Ironically, an accusation that could be levelled against computing in the old batch processing days was that it substituted the routine of the computerised input form for the routine of paperwork.

Modern computing seems different.
Users in the average ESB office today seem to have a greater variety of tasks to perform than their predecessors faced. They are using a variety of software tools - spreadsheets, WP and specialised databases - with more autonomy than they enjoyed previously. (Stewart and Cantor had discussed the issue of work autonomy, as we saw earlier).
Compared with the past, software products used by our Respondents operate at higher processing speeds. Data is processed to a high degree of accuracy. Reports and documents of higher text and graphic quality are drafted and "proofed" more easily and consistently; these documents are printed out more rapidly.

While most Respondents who expressed an opinion about computers in general were positive - occasionally enthusiastic - about the outcome, a small percentage of Respondents attacked the drudgery which they felt computers produced.

Better employees, better managers

Examining the statistical results, together with the Respondents' comments, other trends emerged.

A majority of Respondents felt they had become "better employees" as a result of working with computers.

Respondents disagreed that they had become "better managers" through using their computers. The combined figure for "Don't Know" responses and non-responses to this question was almost 40 %, probably reflecting the fact that many Respondents would not have considered themselves as managers. It had been expected that clerical / administrative staff and non-managerial engineers would see themselves as managers in the broader sense of "managing" at work; but the wording appears to have been taken in the literal sense.

Job variety, scope and role

While there is positive evidence that the drudgery synonymous with some office work has been reduced, there is little to indicate that **job variety** has been enhanced. Apparently, the same type of tasks are being done, albeit more rapidly, with grater accuracy.

Job scope and **job roles** have slightly altered. People can do more of their own typing, and presumably take responsibility for the final document, errors included. Managerial staff are making slight inroads into the "female ghetto" that **Benét** ascribed to the secretary.

In ESB, the process of eroding secretarial-typist boundaries began with the increasing availability of office automation products and PCs in the latter half of the Nineteen Eighties. Yet, some years later, our Respondents have only indicated a few specific examples of ways in which job roles had altered. Respondent R19 believed that WP would do away with clerical jobs, since anyone can use WP "with a bit of practice". Two Respondents mentioned how WP allows them to do their own typing, without recourse to a typist. A Clerical Officer stated that clerical workers have had their jobs "nicked".

Office automation was partly intended to improve clerical productivity. We may wonder if allowing managers or employees other than clerical staff to do clerical work is really efficient (because the task has been *streamlined* by cutting out the clerical intervention) or if it is inappropriate for them to spend time carrying out WP work, calculating figures and so on.

In the overall organisational context, the *wider job scope and job discretion* experienced by non-clerical staff may compensate for the loss of job "exclusivity" implied by that Clerical Officer mentioned above.

Respondents agreed that they have "met and overcome new challenges" as a result of working with computers - although the nature of these challenges can only be guessed at.

Effects on communication

One indicator of empowerment lies in the communicating process.

Empowerment, feels Foy, requires effective communication downwards from management. She suggested the use of **fax** as a means of spreading internal messages and awareness of the company's aims.

Observations within ESB demonstrate that management seems *not* to employ fax as a tool, for this or any similar purpose. Nor did Respondents see fax as a management-employee communication tool.

Traditional paper-based communication and electronic mail (for those who have access to the technology) remain the primary non-verbal communicating media in ESB.

One communicating technology that was widely-approved of was electronic mail.

The general consensus was that it hastened communication and kept staff in touch. In an empowered organisation, technology plays a role in keeping the lines of communication open. Yet if E-mail is an aid to communication, then a rider should be added: not enough people in ESB have direct access to E-mail. Fewer than 2,000 of the approximately 9,600 ESB staff do in fact have such access, the majority of whom are office-based. Few non-office staff have access to the kinds of systems that our Respondents found so useful.

Over 78 % of Respondents agreed that if they did not have access to electronic mail, they would be less aware of what is happening in ESB [Question 22 - r]. Respondent R25 went as far as to say she "couldn't survive" without this facility.

One negative aspect of E-mail that surfaced was the irritation people felt at reading "junk mail". By this, users meant they received E-mail messages on their screens that were of no interest to them - news of staff retirements and the like. A small fraction of Respondents condemned the "junk mail" that E-mail delivers to them. But as recently as August 1995, ESB's I T Service Centre reminded users of All-in-1 that the facility of reaching *all subscribers to the system simultaneously with a single message* ("broadcasting", in a sense) was only to be used where appropriate - for example, where all recipients would be interested in the message.

Within each department, managers broadcast messages to their staff via E-mail. Occasionally, messages are broadcast from the "Corporate Centre" (the function which oversees company-wide activities, such as public relations).

Mantovani discusses the effect of electronic mail on office politics, saying that internal corporate power relationships are altered by it.

No Respondent referred to these imputed side-effects. Instead Respondents universally focused on the usefulness of E-mail. This is to be expected: users presumably do not spend time hunting for subtle shifts in power relationships - even if such shifts existed.

Given the continuing atmosphere of change within the organisation, it is to be expected that people will use available technology in order to stay informed.

Further effects of E-mail and voice-based technologies

The highest scoring item of technology in terms of **improved job performance** was electronic mail. This accords well with Respondents' written comments regarding the software products which they liked and with Respondents' written comments regarding electronic mail.

More Respondents felt E-mail improved their job performance because it facilitated *sending* messages to a colleague than because it facilitated *receiving* messages.

In designing the survey, we assumed the Respondents would be most appreciative towards widely-used technologies and those technologies which have useful features.

Respondents were much vaguer in showing their appreciation of improved *voice-based* technologies.

Advances in these technologies have not been as startling as those in software, although the scope and capability of equipment available to ESB workers has widened from the Nineteen Eighties onwards.

ESB push-button telephones incorporate sophisticated features which are designed to make telephoning more effective: call forwarding and caller transferring are examples.

In tandem with telephones, **voice mail**, by recording incoming phone messages while the user is out of the office, may reduce frustration for both the caller and the called party.

Overall, voice mail received a lower rating from most Respondents in terms of improvement of job performance than did other technologies, such as electronic mail.

Perhaps this was due to voice mail being a task-specific tool, less "enabling" than E-mail. Perhaps, too, Respondents viewed it as more of a one-sided tool.

To explain: E-mail assumes the recipient will read the message, so will derive some usefulness from it. But voice mail is less widely available than E-mail; so while a person who has voice mail finds it useful, s/he is less likely to encounter it when phoning a colleague. Therefore it is less useful as a medium for "leaving" a recorded message on someone else's phone than as a medium for receiving such a message. This might tend to downgrade the perceived usefulness of voice mail to the Respondent.

Effects of computers and PCs

One Respondent considered that computers are still under-utilised in ESB.

R54 and R55 felt that computers were essential to their work. The quality of R25's working life had been improved considerably; R43 believed that computers had no harmful effect on her.

Respondents gave a satisfaction rating to PCs as a means of *better controlling their work* which was slightly higher than for PCs as a means of *gaining greater access to information*.

Respondent R80 viewed PCs as a necessity in an organisation the size of ESB. To others, PCs represented a time-saving or error-reducing technology. Respondent R54 reported that PCs "very significantly" improve working methods.

Two Respondents spoke of the eye tiredness or soreness they had experienced in relation to PCs. Another felt PCs were very tiring; additionally, the long-term possible health risks were as yet unclear.

Empowerment and enrichment: the overall outcome

Information technology has altered some job relationships in a tangential way. Respondents did not attribute any general feeling of increased power over their work or over decisions that affected them to the impact of I T. Rather they spoke in terms of greater efficiency, accuracy and timeliness in producing greater volumes of output. I T does appear to have enriched the working experiences of Respondents though the enrichment is often of a mundane nature: procedures are simplified; greater awareness of events within the company is created; and so on. I T carries a set of perceived drawbacks which tend to undermine user acceptance of I T. These include the *complexity* inherent in systems; the *unevenness in the spread* of useful technologies (such as powerful software); a built-in *obsolescence* of the software itself; some degree of pressure to update one's *learning*; and *physical discomforts* attributed to the use of computers. Simultaneously, the jobs of most Respondents remain subject to forces beyond the reach of I T. These forces - among which we could number *organisational change*; *office environment*; *job relationships*; and *job content* - will mitigate the claimed benefits of I T.

There can be an air of cynicism towards the motives which lie behind management buzzwords.

Empowerment and enrichment run the risk of becoming iconic substitutes for action, unless these buzzwords are translated into reality.

RECOMMENDATIONS

(1) ESB should examine whether staff have the most efficient versions of a particular product.

(2) The upgrading of software needs to be planned coherently, with the needs of the eventual end-users in mind, to minimise frustration; provision for additional training may be advisable.

(3) As can be judged from Respondents' comments, many users are willing to make suggestions for improvement. For example, Respondent R58 believes that when an E-mail message is not sent immediately, it should be dated according to the date of sending, rather than the date it was originally created.
By means of users groups, electronic mail and regular paper-based surveys, the company should ask employees exactly what they need from software. User groups have been experimented with in ESB, apparently resulting in only limited success. Nevertheless, a modified form of these could be revived. Questionnaires could be issued, perhaps as an on-line (integral) feature with the software provided to users.

(4) In-house developers of software should suspend any wariness they may feel towards users - instead users should be more involved in designing software that will be used effectively.

(5) To avoid costly compensation claims and impaired productivity, an ergonomics study could be carried out within the company into the health and safety aspects of information technology. This initiative could be linked to the relevant health and safety statements drawn up in the workplace.

Suggestion for further research

It would be interesting to *compare* the length of time a user has been using a particular product *with* the degree of difficulty s/he continues to experience in using certain features. This might throw some light on the lasting effects of incorrect learning or poor design.

APPENDICES

APPENDIX A:

Notes on officer staff broken down by general category as at December 1994

[Source: ESB PMIS June 1995]

- The figure for **Officer staff** on the list does not include Craft & General Staff (such as electricians, fitters, general workers, linesmen, porters, storekeepers, watchmen and similar categories).

- The figure for **Technical staff** includes Technologists, Chemical Technicians and others, but does not include Chemists.

- The figure for **Professional/Specialist staff** includes Chemists, Training Officers, Canteen Managers, "Safety Services Officers", for example.

- The figure for **Sales** staff includes those in ESB Shops together with those who are designated "Controllers" and those Load Development Officers and Energy Advisers who are located in Head Office and Regional Offices.

- The figure for **I T staff** excludes Clerical / Administrative staff and Managers employed within ESB's I T department (I T Services).

APPENDIX B:

How the generalised Job Descriptions were arrived at

[Source: August Questionnaire Page 1]

- *Managers* are separated into two groups:

  - **"Managerial - engineering"**: those who are managers in an engineering function (an engineering department, a power station, for example); and
  - **"Managerial non-engineering"**: those who do **not** fall under this heading.

- **"Supervisory"** includes those who describe themselves as supervisors or whose job appears to be of a supervisory nature.

- **"Administrative"** includes those whose job appears to be of an administrative nature.

- **"Clerical"** includes Clerical Officers and others whose job appears to be of a clerical nature.

- **"Secretarial"** includes Confidential Secretaries to Managers, or those whose job appears to be predominantly secretarial.

- **"Technical"** includes any Respondent who describes herself/himself as "Station Chemist" or "Chemical Technician", for example.

- **"Engineer"** includes all who describe themselves as Engineers, except those Engineers who are in the **Managerial - engineering** category above.

- **"Professional/Specialist"** includes "Safety Specialist" or "Training Officer", for example.

APPENDIX C:

Reasons given for liking the software product, together with relevant codes

[Source: August Questionnaire Page 3]

Notes:

- The numbers preceding each reason or group of reasons refer to an arbitrary code created to "process" the reasons, using SPSS.
- Some Respondents gave answers that indicated that they were pleased or satisfied with the product, but their statements were difficult to codify - so these reasons were generalised into the reason coded as 70 (the Respondent experiences "positive" feelings towards the Product).

Reason Code	**Reason for liking the software product**
8	Respondent experiences general satisfaction at using this product
9	The Job of the Respondent requires that s/he use this product
10	Flexibility of the product is satisfactory
11	The product is flexible/versatile
12	The product is **very** flexible/very versatile
13	The product is flexible and user-friendly (see Glossary)
15	The product can be modified to suit the needs of the Respondent ***or*** the product has options
17	The product is easy to understand
18	The product is easy to learn
20	The user-friendliness of the product is satisfactory

Reason Code	Reason for liking the software product
22	The product is user-friendly
24	The product is "WYSIWYG" (see Glossary)
25	The product is easy to use or fairly easy to use
26	The product is very easy to use
27	The product produces useful results
29	The product ensures data is secure e.g. it allows back-up
30	The product allows easy access to information (in other words, the product is useful for data management)
34	The product keeps the Respondent up-to-date or well-informed
36	The product helps keep the Respondent's information up-to-date
40	The product produces professional-looking output ***or*** output that looks well
42	The product produces visual presentations that are satisfactory
43	The products produces printing that is satisfactory ***or*** the product prints satisfactorily
55	The product facilitates the importing or the exporting of data between applications
56	The product facilitates information transfer ***or*** the product facilitates **fast** information transfer
65	The product facilitates communication (electronic mail)
67	The product facilitates communication within ESB ***or*** the product facilitates speedy communication within ESB
68	The product is fairly useful ***or*** the product is reasonably useful ***or*** the product is useful ***or*** the product is versatile ***or*** the product is efficient

Reason Code	**Reason for liking the software product**	
69	The Respondent finds the product to be useful	*or*
	the Respondent finds the product to be satisfactory	*or*
	the Respondent finds the product to be "good"	*or*
	the Respondent finds the product to be "OK"	
70	The Respondent experiences "positive" feelings towards the product	
71	The Respondent finds the product excellent	*or*
	the Respondent finds the product very efficient	
72	The product outputs useful data well	*or*
	the product makes the Respondent's job easier to do	
74	The Respondent specifies one or more uses for the product	
Speed =		
75	The product produces results quickly or the product is "fast"	*or*
	the product saves time as far as Respondent is concerned	
77	The product facilitates speedy communication	
78	The product facilitates speedy access to information	
79	The product facilitates speedy alterations by the Respondent	
81	The product can be "customised" (see Glossary)	
80	The product is very versatile	
82	The product is very useful	
83	The product is very powerful	
84	The product is essential (as far as the Respondent is concerned)	
85	The product is better than a paper-based alternative (see Glossary)	*or*
	the product reduces paper in the Respondent's office etc.	*or*
	the product facilitates the "paperless office" (see Glossary)	
86	The product is a useful product	*or*
	the Respondent uses it a lot	*or*
	the product is a "good" product	

Reason Code	**Reason for liking the software product**
87	The Respondent expresses one or more critical comments (although R. **likes** the product)
88	The Respondent likes the product because s/he is very familiar with it
89	Respondent is only at the initial learning stage with the product
90	Respondent does **not** like using the product ***or*** Respondent is **critical** of the product

APPENDIX D:

Reasons given for disliking the software product, together with relevant codes

[Source: August Questionnaire Page 5]

Notes:

- The numbers preceding each reason or group of reasons refer to an arbitrary code created to "process" the reasons using SPSS.
- Samples of the number of Respondents whose reasons match the code are shown in chain brackets { }.
- The term *negative feelings* is used as a general term to cover statements by the Respondent that indicate feelings of hostility, dislike, apathy and so on brought about through using the product; it is also used where the Respondent implies the product is user-unfriendly / faulty / badly-designed or that s/he simply does not like it, but s/he does not express a definite reason for disliking the product.

Reason Code	**Reason for disliking the software product**
15	The manuals are inadequate
20	The Respondent receives or has received inadequate training in the use of the product: **{2 Respondents}**
25	The Respondent experiences negative feelings and produces poorer work because product is inferior to a rival product (or "*differs from the norm*" [R55])
28	The Respondent experiences negative feelings because s/he does not have an up-to-date version of the product
38	The Respondent has difficulty in being aware of the full range of features that the product possesses

Reason Code	**Reason for disliking the software product**	
40	The product is not user-friendly *or*	
	the product is not very user-friendly *or*	
	the product is user-unfriendly (see Glossary) *or*	
	the product is very user-unfriendly *or*	
	the product is difficult to use *or*	
	the product is not fully satisfactory:	**{8 Respondents}**
47	The product lacks features:	**{2 Respondents}**
50	The product is badly-designed - e.g. commands are difficult:	**{3 Respondents}**
51	The Respondent is critical of the design of the product *or*	
	the Respondent is critical of the operation of the product:	**{2 Respondents}**
53	The product is not flexible	
54	The product is not WYSIWYG (see Glossary) *or*	
	the product is **not always** WYSIWYG:	**{2 Respondents}**
55	The product does not facilitate the creation of information *or*	
	the product does not facilitate the storage of information *or*	
	the product does not facilitate the retrieval of information	
56	The keystrokes (see Glossary) are frustrating in their design:	**{2 Respondents}**
58	The keystrokes employed by the product are dissimilar to a comparable product *or*	
	the operation of the product is dissimilar to the operation of a comparable product:	**{3 Respondents}**
60	The Respondent finds the product of limited use *or*	
	the Respondent finds the product is not very useful	
Speed =		
61	The product has "slow" graphics	
62	The product is very "slow":	**{2 Respondents}**
63	The product is "slow"	
64	The product is sometimes "slow"	

Reason Code	**Reason for disliking the software product**
71	The product needs a lot of memory ***or*** the product uses a lot of memory
77	The product has inferior word processing facilities: **{2 Respondents}**
82	The product has an inferior interface - e.g. it is not interactive
84	The product is menu-driven or the menu is open to criticism: **{2 Respondents}**
87	The Respondent is not very experienced/skilled with **spreadsheets**
88	The Respondent is at an early learning stage ***or*** the Respondent is at an early stage but s/he hopes/expects to improve

APPENDIX E:

Summary of Respondents' Comments and Comment Codes relating to *Computers in general*

[Source: August Questionnaire Page 10]

Notes:

- The initial digit, e.g. 7, indicates the Comment Code created for the set of similar comments, which follow it.
- Abbreviations are as follows: R. = Respondent; h. = her/his *or* = her/him.

Computers in general

Comment Code	**Respondent's Comment (s)**
7	R.'s attitude is neutral/fairly neutral/"accepting" towards computers
8	R. not very knowledgeable about computers
12	R. received good training in using computers
14	R. finds computers very interesting to use
18	Computers do what R. requires; ***or*** computers increase R.'s control over h. work
22	Computers increase respect of others towards R.
30	R. experiences only beneficial effects of computers; ***or*** R. states only beneficial effects
35	R. feels computers facilitate speedier completion of tasks, so they are essential

Comment Code	**Respondent's Comment (s)**
	Data Management:
38	Computers facilitate faster access to data; ***or***
	computers facilitate more efficient access to data; ***or***
	computers facilitate transfer of data
40	Computers facilitate alteration(s) to suit the user - including alterations in text etc.
42	Computers make job-related information more accessible

44	Computers are very beneficial; ***or***
	computers are very beneficial for Respondent; ***or***
	computers are a "*great asset*"
45	Computers are beneficial as a tool
47	My office could not operate as efficiently without computer(s); ***or***
	R. could not operate as efficiently without computers; ***or***
	computers increase efficiency; ***or***
	computers increase accuracy
48	R. likes using computer(s), generally speaking; ***or***
	R. expresses "positive" attitude/feeling towards computer(s)
50	R. feels computers are very useful
51	R. feels computers increase job satisfaction, e.g. by reducing menial work
52	R. feels computer(s) make work more interesting; ***or***
	R. feels computer(s) make work less boring
53	R. feels computers save time in doing tasks; ***or***
	R. feels computers increase h. ability to do work more quickly
54	R. feels computers produce better quality work; ***or***
	R. feels computers increase/have increased efficiency
55	Computers improve R.'s access to information
56	Computers reduce stress ***or***
	computers reduce frustration

Comment Code	**Respondent's Comment (s)**
57	Computers enable difficult tasks to be completed more easily; ***or*** computers make / have made work easier
58	Computer(s) provide R. with more detailed information
62	Computer(s) have improved the **quantity** of R.'s work output
63	R. is frustrated by a lack of skill or a lack of certain skills
64	One aspect of computer(s) is critically commented on
70	R. is dissatisfied with product(s); ***or*** R. is very dissatisfied with product(s) -e .g. standardisation/compatibility of certain product(s) used in ESB is unsatisfactory
71	R. feels frustration at computer's failure to respond to certain commands
73	R. feels frustration at computer's failure to "output " data correctly - e.g. to print correctly
74	R. feels frustration at computer's failure to "output" correctly - but this frustration is to a lesser degree than expressed under Code 73 above
75	R. received little training in using computer(s); ***or*** R. received inadequate training in using computer(s); ***or*** R. received no training in using computer(s)
76	R. feels regulations concerning use of computers are not taken seriously or are ignored
79	R. feels computers(s) can have undesirable physical effects on user(s), including effects on vision; ***or*** (office) seating can have an effect on user(s)
80	R. does not use computer(s) very much
81	R. feels computers are under-utilised in ESB; ***or*** R. feels computers are utilised within ESB in a less-than-effective manner
82	R. feels ESB relates computer literacy more to the job than to the person using the computer; ***or*** R. feels ESB derives more benefit from computers than does the computer user [R76]

Comment Code	**Respondent's Comment (s)**

83 R. feels working at computer screen causes:

- user(s) to have feelings of isolation; ***or***

- user(s) to become more sedentary; ***or***

- physical discomfort among user(s)

84 R. feels that computers take much time to produce quality work

85 R. feels frustration at computer's lack of user-friendliness

86 R. feels too much data is produced on h. screen

87 R. is critical of the impact of computer(s) on:

- a) office; ***or***

- b) work; ***or***

- c) both a) and b)

88 R. reported stress due to computers; ***or***

R. feels computer(s) increase:

- stress;

- workload;

- tiredness

89 R. feels frustration due to slowness of data retrieval when using computer(s)

90 R. does not use computers

95 "N/A" response; ***or***

R.'s response is difficult to codify

APPENDIX F:

The August 1994 questionnaire

ADVICE ABOUT COMPLETING THE QUESTIONNAIRE:

- Please tick ✓ one box ☐ , in each row of boxes, which you think answers the question best.
- If you have **no opinion** or **if a question does not apply to you**, please tick the *DON'T KNOW* (**DK**) box where provided.

---

1. Are you: Female ☐ Male ☐

2. What is your Marital Status, please: ....

3. What age are you, please: ______ years of age

4. Please indicate the education level which you have obtained:

....

....

....

5. Please indicate any formal training you have received on: computers; word processing or other software products; typing courses; etc.:

....

....

....

....

....

6. How many years' service in ESB do you have?: ______ years

7. Please give a brief description of your present job:

....

....

....

....

7a. Would you describe yourself as: Manager: ☐ Supervisor: ☐ Administrator: ☐

Clerical employee: ☐ Technical: ☐ Professional: ☐

Other (**please specify**) ....

8. For how long have you been using a computer at work: No. of years ________

9. How many other persons are employed in your office (i.e. in the same room; or nearby, if it is open plan)? : ________

9a. How is your office supervised?

....

....

10. How would you describe your office: Open Plan: ☐ A room separated from other offices: ☐

Other (**please specify**) ....

---

11. Is your office chair:

a) Very comfortable:	Yes	☐	No	☐	No opinion	☐
b) Fully-adjustable:	Yes	☐	No	☐	No opinion	☐
c) In perfect working order:	Yes	☐	No	☐	No opinion	☐

---

12. Please indicate the extent to which you AGREE / DISAGREE with the following statements:

[**SA** = *STRONGLY AGREE*; **A** = *AGREE*; **D** = *DISAGREE*; **SD** = *STRONGLY DISAGREE*; **DK** = *DON'T KNOW*]

	SA	A	D	SD	DK
a) My office is properly ventilated:	☐	☐	☐	☐	☐
b) The lighting in my office is ideal for working at my computer screen:	☐	☐	☐	☐	☐
c) The air conditioning in my office is excellent:	☐	☐	☐	☐	☐
d) The air conditioning in my office could be slightly improved:	☐	☐	☐	☐	☐
e) The air conditioning in my office could be greatly improved:	☐	☐	☐	☐	☐

---

13. Do your eyes become tired from looking at your computer screen? :

Frequently ☐ Seldom ☐ Never ☐

---

14. Please describe any discomfort that you feel at least once a day which you think is caused by working at your computer terminal (e.g. stiff neck, sore back etc.)

....

....

....

....

....

15. Of the software products / features that you use, please indicate how useful you find each:

[VU = *VERY USEFUL;* U = *USEFUL;* SU = *SOMEWHAT USEFUL;* NV = *NOT VERY USEFUL;* UL = *USELESS*]

	VU	U	SU	NV	UL
a) All-in-1:	☐	☐	☐	☐	☐
b) The database product you use (if any) e. g. Access:	☐	☐	☐	☐	☐
c) The Desktop Publishing package you use (if any):	☐	☐	☐	☐	☐
d) The word processing feature (WP) within All-in-1:	☐	☐	☐	☐	☐
e) A word processing product that you use on a PC (e.g. "Word"):	☐	☐	☐	☐	☐
f) The spreadsheet product you mainly use (e.g. Excel, Lotus 1-2-3):	☐	☐	☐	☐	☐
g) Electronic Mail :	☐	☐	☐	☐	☐
h) Microsoft Paintbrush:	☐	☐	☐	☐	☐
i) Microsoft PowerPoint:	☐	☐	☐	☐	☐
Other (s): (please name the products or features, e.g. MOCCS etc.)					
j)	☐	☐	☐	☐	☐
k)	☐	☐	☐	☐	☐
l)	☐	☐	☐	☐	☐
m)	☐	☐	☐	☐	☐

---

16. Please name the software product(s) and feature (s) which you use most during your working day; indicate approximately how many hours a day you would use it / them; and why you like using it / them:

a) Name of Product No. 1.. **Hours:** ______

a.1) Why do you like using it?..

....

b) Name of Product No. 2.. **Hours:** ______

b.1) Why do you like using it?..

....

c) Name of Product No. 3.. **Hours:** ______

c.1) Why do you like using it?..

....

17a. *Regarding the word processing product which you use most often, please indicate the extent to which you AGREE / DISAGREE with the following statements:*

[**SA** = *STRONGLY AGREE*; **A** = *AGREE*; **D** = *DISAGREE*; **SD** = *STRONGLY DISAGREE*; **DK** = *DON'T KNOW*]

Name of Product: ....

	SA	A	D	SD	DK
a) It was **easy** to become skilful in using it:	☐	☐	☐	☐	☐
b) It was **fairly difficult** to become skilful in using it:	☐	☐	☐	☐	☐
c) It was **extremely difficult** to become skilful in using:	☐	☐	☐	☐	☐
d) I **still dislike its difficulty** when I am using it:	☐	☐	☐	☐	☐
e) I would like **more training** in this product so as to get the most benefit from it:	☐	☐	☐	☐	☐
f) I find that the **"spell checker"** feature is essential:	☐	☐	☐	☐	☐
g) I find that the **"grammar checker"** feature is essential:	☐	☐	☐	☐	☐

17b. *Regarding the spreadsheet package which you use most often, please indicate the extent to which you AGREE / DISAGREE with the following statements:*

[**SA** = *STRONGLY AGREE*; **A** = *AGREE*; **D** = *DISAGREE*; **SD** = *STRONGLY DISAGREE*; **DK** = *DON'T KNOW*]

Name of Product: ....

	SA	A	D	SD	DK
a) It was **easy** to become skilful in using it:	☐	☐	☐	☐	☐
b) It was **fairly difficult** to become skilful in using it:	☐	☐	☐	☐	☐
c) It was **extremely difficult** to become skilful in using it:	☐	☐	☐	☐	☐
d) I **still dislike** its difficulty when I am using it:	☐	☐	☐	☐	☐
e) I would like **more training** in this product so as to get the most benefit from it:	☐	☐	☐	☐	☐
f) I find that the **"spell checker"** feature is essential:	☐	☐	☐	☐	☐
g) I find that the **"automatic chart creation"** feature is essential:	☐	☐	☐	☐	☐

18. If there is a software product that you very much dislike using at work, please indicate why you dislike using it:

Name of the software product ....

*I dislike using this product **because**:*

....

....

....

19. With regard to the software products that you use each day at work, please indicate how much you would, or would not, like to be involved in designing these:

[**SA** = *STRONGLY AGREE*; **A** = *AGREE*; **D** = *DISAGREE*; **SD** = *STRONGLY DISAGREE*; **DK** = *DON'T KNOW*]

	SA	A	D	SD	DK
a) I would like **some more involvement** in designing these:	☐	☐	☐	☐	☐
b) I would like **much more involvement** in designing these:	☐	☐	☐	☐	☐
c) I would prefer to have **no involvement** in designing these:	☐	☐	☐	☐	☐

20. Please indicate how easy / how difficult you find the following procedures:

[**VE** = *VERY EASY*; **FE** = *FAIRLY EASY*; **D** = *DIFFICULT*; **VD** = *VERY DIFFICULT*; **DK** = *DON'T KNOW*]

	VE	FE	D	VD	DK
a) Making backup copies **of disks**:	☐	☐	☐	☐	☐
b) Recovering data **that you have deleted in error**:	☐	☐	☐	☐	☐
c) Changing the **tab** settings **on your word-processing product**:	☐	☐	☐	☐	☐
d) Changing between different **fonts on your word processing product**:	☐	☐	☐	☐	☐
e) Using the **"cut and paste"** feature on **your word processing product**:	☐	☐	☐	☐	☐
f) Using the **"spell checker"** feature on **your word processing product**:	☐	☐	☐	☐	☐
g) Using the **"grammar checker"** feature on **your word processing product**:	☐	☐	☐	☐	☐
h) Getting a **spreadsheet** to appear **exactly** the way you want it to appear:	☐	☐	☐	☐	☐
i) Avoiding mistakes in **entering numbers** on your **spreadsheet:**	☐	☐	☐	☐	☐
j) Making sure all your **formulae** are correctly entered on your **spreadsheet**:	☐	☐	☐	☐	☐
k) **Linking data** from one **spreadsheet** to another **spreadsheet**:	☐	☐	☐	☐	☐

21. Please indicate the extent to which you AGREE / DISAGREE with the following statements:

[**SA** = *STRONGLY AGREE*; **A** = *AGREE*; **D** = *DISAGREE*; **SD** = *STRONGLY DISAGREE*; **DK** = *DON'T KNOW*]

	SA	A	D	SD	DK
a) My computer terminal takes up **too much room** on my desk:	☐	☐	☐	☐	☐
b) There are too many **different colours** on my computer screen:	☐	☐	☐	☐	☐
c) I should be able to **change** the different colours of different features on my computer screen **any way that I like**:	☐	☐	☐	☐	☐
d) My **keyboard** takes up **too much room** on my desk:	☐	☐	☐	☐	☐
e) My **keyboard** is difficult to use:	☐	☐	☐	☐	☐
f) I am often confused by the **Function Keys**:	☐	☐	☐	☐	☐
g) There are **too many keys** on my keyboard for me to learn what they do:	☐	☐	☐	☐	☐
h) I am **pleased** with my ability to type quickly and accurately:	☐	☐	☐	☐	☐
i) I am often **frustrated** at my poor typing skills:	☐	☐	☐	☐	☐
j) I needed **a lot of training** to become proficient in using my computer:	☐	☐	☐	☐	☐
k) I became proficient in using my computer after only a **short period** of training:	☐	☐	☐	☐	☐
l) I need **much more training** to get the best out of my computer:	☐	☐	☐	☐	☐
m) Each time I receive a new feature or upgrade on my computer, there are **too many new things to learn at once**:	☐	☐	☐	☐	☐
n) The software training **manuals** are **not well-designed** enough to help me:	☐	☐	☐	☐	☐
o) **I find the following features very useful in saving me time**:					
o.1) The **"cut and paste" feature on my software products**:	☐	☐	☐	☐	☐
o.2) The ability to **link** data between different **spreadsheets**:	☐	☐	☐	☐	☐
o.3) The ability to **link** data between a **spreadsheet** and **my word processing document**:	☐	☐	☐	☐	☐
p) I can **easily and quickly find** my files on the **Directory** of files:	☐	☐	☐	☐	☐
q) I seldom experience difficulties in getting my printer to **print out a document** for me:	☐	☐	☐	☐	☐

*22. **Please indicate the extent to which you AGREE / DISAGREE with the following statements:***

[**SA** = *STRONGLY AGREE*; **A** = *AGREE*; **D** = *DISAGREE*; **SD** = *STRONGLY DISAGREE*; **DK** = *DON'T KNOW*]

	SA	A	D	SD	DK
a) I am always learning **new features** that my computer can provide:	☐	☐	☐	☐	☐
b) I am always finding new ways to do my work **better** by using my computer:	☐	☐	☐	☐	☐
c) I am constantly finding out new things my computer can do which make my work **easier to do:**	☐	☐	☐	☐	☐
d) I am **constantly** finding out new things my computer can do which make my work **more interesting:**	☐	☐	☐	☐	☐
e) I could **not** do my job so well without using a computer:	☐	☐	☐	☐	☐
f) I could manage my job **very well** without using a computer:	☐	☐	☐	☐	☐
g) It would make **no difference** to my job whether I used a computer or not:	☐	☐	☐	☐	☐
h) I use a computer **too much** during my day at work:	☐	☐	☐	☐	☐
i) I would like to use a computer **much more** in my work:	☐	☐	☐	☐	☐
j) Using a computer has made my work **more interesting**:	☐	☐	☐	☐	☐
k) My work is **boring because I have to use a computer to do it**:	☐	☐	☐	☐	☐
l) I have met and overcome new **challenges** through working with my computer:	☐	☐	☐	☐	☐
m) **My chances of being promoted** have been **improved** because I work with a computer:	☐	☐	☐	☐	☐
n) I have **developed** more as a **person** through working with my computer:	☐	☐	☐	☐	☐
o) I have become a **better employee** through working with my computer:	☐	☐	☐	☐	☐
p) I have become a **better manager of staff** by using my computer:	☐	☐	☐	☐	☐
q) **My relationships with my co-workers** have **improved** because I work with a computer:	☐	☐	☐	☐	☐
r) If I did not have access to **electronic mail**, I would be **less aware** of what is **happening in ESB**:	☐	☐	☐	☐	☐

23. Please indicate the extent to which you AGREE / DISAGREE with the following statements:

[SA = *STRONGLY AGREE*; A = *AGREE*; D = *DISAGREE*; SD = *STRONGLY DISAGREE*; DK = *DON'T KNOW*]

	SA	A	D	SD	DK
a) Computers have **destroyed** the sense of **"team spirit"** in my office:	☐	☐	☐	☐	☐
b) Computers have **harmed, but not destroyed,** the sense of **"team spirit"** in my office:	☐	☐	☐	☐	☐
c) Computers have **improved** the sense of **"team spirit"** in my office:	☐	☐	☐	☐	☐
d) Computers have made **no difference** to the sense of **"team spirit"** in my office:	☐	☐	☐	☐	☐

24. Please indicate the extent to which the items a) to n) below have, or have not, improved your performance of your job.

Explanation of how to fill in the boxes:

If you experienced **no change** in performance: .... tick box **0**
If you experienced **very low** improvement in performance: ... tick box **1**
If you experienced **low** improvement in performance: .... tick box **2**
If you experienced **some** improvement in performance: .... tick box **3**
If you experienced **high** improvement in performance: .... tick box **4**
If you experienced **very high** improvement in performance: ...tick box **5**
If you have **no opinion** or if the item **does not apply**: ....tick box **DK**

	0	1	2	3	4	5	DK
a) high-quality computer **printer:**	☐	☐	☐	☐	☐	☐	☐
b) **desktop publishing** product, because you can produce "professional-looking" documents:	☐	☐	☐	☐	☐	☐	☐
c) **graphics** software which allows you to prepare colourful, well-laid-out artwork/graphic images:	☐	☐	☐	☐	☐	☐	☐
d) software products that allow you to **schedule your work**, e.g. on-screen **calendar:**	☐	☐	☐	☐	☐	☐	☐
e) a **"time management" product or option** that helps you plan your time at work:	☐	☐	☐	☐	☐	☐	☐
f) **your spreadsheet** product, because it makes carrying out routine calculations much simpler:	☐	☐	☐	☐	☐	☐	☐
g) **your spreadsheet** product, because it ensures that your calculations are accurate:	☐	☐	☐	☐	☐	☐	☐
h) **your word-processing** product, because it produces **correspondence** that looks **"impressive"**:	☐	☐	☐	☐	☐	☐	☐
i) **electronic mail**, because it is the **most efficient** way to send a message to your colleagues:	☐	☐	☐	☐	☐	☐	☐
j) **electronic mail**, because it is the **most efficient** way to receive a message from a colleague:	☐	☐	☐	☐	☐	☐	☐
k) **having a PC on your desk, because** it gives you **easier access** to **your data:**	☐	☐	☐	☐	☐	☐	☐
l) **having a PC on your desk**, because you can have **more control** over your software products:	☐	☐	☐	☐	☐	☐	☐
m) **a push-button** telephone, because it provides helpful features that you find essential:	☐	☐	☐	☐	☐	☐	☐
n) **"voicemail"** because using this means you seldom miss **important phone calls**:	☐	☐	☐	☐	☐	☐	☐

*25. Finally, please make any **comments** you wish about the **"good effects"** and / or **"harmful effects"** that computers, or other technology, such as electronic mail, have had on **your own working life**:*

a) Computers in general:

....

....

....

....

....

....

b) Database Products, such as Access:

....

....

....

c) Electronic Mail:

....

....

....

d) Using a PC:

....

....

....

....

....

....

e) Spreadsheet products:

....

....

....

....

....

f) Word Processing products:.

....

....

....

....

THANK YOU!

APPENDIX F - 10

APPENDIX G:

The June 1995 document

i) Are you **Female:** ☐ **Male:** ☐

ii) To which one of the following Age Groups do you belong? (e.g. 20-24 **indicates** Between 20 and 24 years of age**):**

20-24: ☐ 25-29: ☐ 30-34: ☐ 35-39: ☐ 40-44: ☐ 45-49: ☐ 50-60: ☐ Over 60: ☐

iii) Please indicate which of the following basic descriptions best describes your present job:

Manager (non-engineering) ☐ Manager (engineering) ☐ Administrative ☐

Clerical ☐ Secretarial ☐

Technical (non-supervisory) ☐ Supervisor ☐ Engineer (non-managerial) ☐

Other Job Description (if none of the above descriptions are appropriate):

____

A. ***When you meet a problem in using computer software, what is/are your most common reaction(s)?:***
{Please tick ☑ the box(es) next to the appropriate statement(s)}

		☑
A.1	I welcome it as a challenge	
A.2	I always learn something new through solving the problem	
A.3	I feel that there are too many problems with computer software	
A.4	I usually have to get someone else's help in solving the problem	
A.5	The problem causes me to waste valuable time	
A.6	It is usually tedious to correct the problem, but it has to be done	
A.7	I rarely meet any problems in using computer software, so this question does not really apply to me	
A.8	Usually I can solve any software problems fairly quickly using my own knowledge	

A.9 *I may experience other reaction(s) to such a problem, namely the following :*

....

....

....

....

....

....

....

....

....

....

In the following sections you are invited to express your personal opinions concerning information technology.

B. ***In which way(s) do you think information technology has changed the role of office workers?:***

B.1 *My initial reaction to this question is:*

....

....

....

....

....

....

....

....

....

....

....

....

B.2 *With regard to this particular question, I also feel that:*

....

....

....

....

....

....

....

....

....

....

....

....

C. ***How has*** *information technology* ***(covering items such as personal computers; fax machines; portable phones; electronic mail; videoconferencing and other technologies)*** *affected the quality of your life at work?* ***For example :***

- ***how has it increased, or decreased, or had no effect on, your*** *job satisfaction?*
- ***how has it increased, or decreased, or had no effect on, your*** *productivity* ***in the office?***
- ***how has it affected the ways in which you and your colleagues*** *work together as a team?*
- ***(you may mention*** *other* ***ways in which information technology affects the quality of your life at work)***

C.1 My initial reaction to question C is:

....

....

....

....

....

....

....

....

....

....

....

C.2 With regard to this particular question, I also feel that:

....

....

....

....

....

....

....

....

....

....

....

....

GLOSSARY

GLOSSARY

This is only a general guide to some of the terms used in the context of this study.
It does not purport to be either definitive or exhaustive.
Grateful acknowledgement is made to "ISD Jargon" (see Bibliography) from which publication some of these definitions have been taken verbatim or adapted.

All-in-1: an office automation software product produced by Digital Equipment Corporation and customised for ESB requirements.

Change Management: in the context of I T, this implies the smooth implementation of system changes.

Clip art: ready-made drawings and other images of objects, which can be enhance the appearance of documents, charts and the like.

Customised: a product can be "customised" when the user can adapt/alter it to her/his own requirements.

Database: a collection of data stored in a structured format; used also to refer to the software products that manage such databases.

Desktop publishing: an enhanced form of Word Processing, allowing images and drawings to be combined with text in a document.

DOS: Disk Operating System - the most common operating system used on PCs.

Ergonomics: the study of the relation between man and his occupation, equipment and environment, and particularly the application of anatomical, physiological and psychological knowledge to problems arising therefrom [Wendy Olphert].

GUI: Graphical User Interface, which allows the user to operate computer programs by using a pointing device, such as a mouse.

Hardware: this refers to the computer itself, the screen, disk drives, printers and other physical components of a system.

Icon: A small image on a screen, representing (for example) a computer program. "Clicking" on this with a mouse activates the programme.

Information Technology Services (I T Services or I T S): the department which provides a central I T service to ESB. Areas of responsibility include applications development, hardware and software acquisition and telecommunications.

Keystroke: striking a key on the keyboard constitutes a keystroke.

LAN: a Local Area Network, which may consist of a number of PCs and mainframe computer facilities linked together.

Laptop: a form of portable PC.

Log-on / logging on: the procedure whereby a user enters the computer system to begin using it.

MMIS: this is the Materials Management Information System. It refers to a number of systems relating to the materials management activity of ESB, notably the Warehousing and Stock Control System as well as POAP (see below).

MMS: the Maintenance Management System manages plant maintenance for ESB Generation Stations.

MOCCS: the Management Operations and Cost Control System (MOCCS) is defined as an interactive budgeting, costing and management reporting system which provides management with information to plan, budget, monitor and control all ESB's activities.

Mouse: a small hand-operated device which the computer user moves across the desk: clicking buttons mounted on its surface activates icons or menus on the screen.

Notebook: a small portable PC.

OCR: Optical Character Recognition.

Operating system: a set of programs controlling most of the computer's operations, such as the flow of data between keyboard and screen.

Paper-based: in this present study, the term refers to systems or products or processes that involve mainly the handling / processing / manipulating / storage of paper documents.

Paperless office: the arrival of computer-based office systems was expected to eliminate paper-based systems and paperwork from the office: it would become "paperless".

PC: Personal Computer, say on a desk top, or a portable version, say, a laptop.

PIRS (Personnel Information Retrieval System): this is a text retrieval system which contains all the text of all ESB Personnel procedures and ESB Industrial Council Recommendations, for example. It is available throughout ESB to managers and those involved in industrial relations activities.

PMIS (Personnel Management Information System): this is a personnel information system available throughout ESB to Personnel/Human Resources staff and Payroll staff, as well as all managers. It contains personnel, absentee, sick leave and related data for all ESB employees and Pensioners.

POAP (Purchase Order/Accounts Payable): this provides on-line real time entry and enquiry on data covering the Purchasing and Accounts Payable aspects of the MMIS (referred to above). It is also referred to as AP/PO or POAP.

Pointing device: a device that controls a pointer (say, an arrow) on a computer screen. One example is "the mouse".

SCADA: Supervisory, Control and Data Acquisition (SCADA) is a term which describes a system based on information technology for real-time control of equipment. SCADA systems are used extensively by Power Utilities to control their generating, transmission and distribution stations.

Screen: this normally refers to the *computer terminal screen*. "Monitor" is also used.

Software: this usually refers to the programmes and data used in information technology systems.

Spreadsheet: this is the software equivalent of a large sheet divide into cells, laid out in rows and columns, on which numbers - such as budget figures - and formulae can be entered. Spreadsheets are intended to facilitate complicated calculations. Reports can be produced from the information they contain. Typical products are Excel, Lotus 1-2-3 and Smart.

Terminal: this term is commonly used to refer to the computer terminal, which can consist of a *Visual Display Unit (VDU)* together with a *keyboard*, used for inputting data.

User-friendly: products and systems that are viewed by users as helpful, easy to use and understand and so on are termed user-friendly.

User-unfriendly: the opposite to user-friendly.

VAX: this refers to a range of minicomputers produced by Digital Equipment Corporation (DEC) and installed in ESB.

VDU (Visual Display Unit): the TV-style screen used to display data within computer systems, for example (also called VDT).

Word processing software: usually abbreviated to **WP**, this type of software is designed for text-based applications, such as creating letters, reports and other documents. The files so created can be retrieved and edited. Text can be formatted in various ways as well as underlined; **bolded**; and *italicised* for example. WP's facility called "mailmerge" allows a data base of names and addresses to be combined with the text of correspondence, for sending to a number of recipients. Typical products are Word for Windows and WordPerfect.

Work-flow (also "workflow" / "workflow automation"): workflow automation software is a toolset for developing applications to manage, measure and revise work processes that span the efforts of multiple workers and applications (and sometimes span multiple organisations). Workflow aims to recover the time lost *between* tasks [**Thé** 1995].

WYSIWYG: this stands for ***What You See Is What You Get***, referring to a feature in DTP and other applications that ensures the image *seen* on the screen accurately represents what will be *printed out* on a printer.

BIBLIOGRAPHY

BIBLIOGRAPHY

Adam, Frédéric and Ciaran Murphy (1995).

The old order is tumbling. *Technology Ireland*, Vol. 27, No. 1, April 1995: 19-21.

***Administration* (1957).**

The Electricity Supply Board: Special Issue of *Administration*, Vol. 5, No. 3, Autumn 1957. Dublin: Institute of Public Administration.

Alexander, John J., Jr. (1992).

The value of desktop gear. *Datamation*, Vol. 38, Issue 11, 15 May 1992: 117-120.

Alexis, M. and T. Wilson (1972).

Information processing for decision-making.

In M. Gilbert (ed.) *The modern business enterprise: Selected Readings (1972)*: 314-328.

Harmondsworth, Middlesex: Penguin Books.

Andrews, Frank M. *et al* (1981).

A guide for selecting statistical techniques for analyzing social science data.

Second edition. Ann Arbor, Michigan: Institute for Social Research, The University of Michigan.

Anthony, P. D. (1977).

The ideology of work. London: Tavistock Publications.

Appleton, Elaine L. (1993).

Link corporate data and documents.

Datamation, Vol. 39, No. 7, 1 April 1993: 65-70.

Argyris, C. (1957 - 1970 TorchBook edition**).**

Personality and organizations: the conflict between system and the individual.

New York: Harper & Row.

Argyris, C. (1964).

Integrating the individual and the organization.

New York: John Wiley & Sons.

(Republished 1990, New Brunswick, U.S.A: Transaction Publishers.)

Armbruster, Albert (1983).

Chapter 10: Ergonomic requirements. In Harry J. Otway and Malcolm Peltu (eds.), *New office technology: human and organizational aspects* (1983): 169-189. London: Frances Pinter (Publishers) Ltd. for the Commissions of the European Communities.

Armstrong, Anne (1995).

Rotten at writing.

Letter published in *New Scientist*, Vol. 146, No. 1,974, 22 April 1995: 57.

Arnold, E. (1980).

Word processing & manpower.

In *Infotech State of the Art Report Series 8 Number 3. Office Automation: invited papers* (1980): 1-18. Maidenhead, Berkshire: Infotech.

Arnold, Mike (1979).

The Shared Logic System. In *Word processing: selection, implementation and uses (1979)*: 185-192. Uxbridge: Online Conferences.

Arthur, Charles (1994).

The future of work: it's all in the mind.

New Scientist, Vol. 142, No. 1,921, 16 April 1994: 28-31.

Asimov, Isaac (1975).

The stars in their courses.

St. Albans, Herts, U.K.: Granada Publishing.

Atkinson, Jacqueline (1992).

Better time management: how to get more out of your day.

London: Thorsons (a Division of HarperCollins).

Bailey, P. (1985).

Mastering office practice. Second edition.

Basingstoke, Hampshire: Macmillan Educational Ltd.

Bailey, Robert (1995).

Conference Comment. CeBIT brings forward tomorrow: CeBIT '95, Hannover, Germany, 8-15 March 1995.

Electronic Library, Vol. 13, No. 2, April 1995: 151-157.

Baldry, Christopher (1988).

Computer, jobs and skills: the industrial relations of technological change.

New York and London: Plenum Press.

Barker, Jane and Hazel Downing (1985).

Word processing and the transformation of patriarchal relations of control in the office.

In Donald MacKenzie and Judy Wajcman (eds.) *The social shaping of technology: how the refrigerator got its hum* (1985): 147-164.

Milton Keynes: Open University Press.

Barnard, Catherine, Jon Clark and Roy Lewis (1995).

The exercise of individual employment rights in the Member States of the European Community. Research Series No. 49. April 1995.

Southampton: Employment Department Group, University of Southampton.

Barrington, K. and V. Jamison.

If you are a stockbroker, then this is how you are likely to die.

The Sunday Business Post, Vol. 7, No. 6. February 5, 1995:25-26.

Beaty, Wayne and Denise Warkentin (1994).

People, planning, predictions pull D P & L to pinnacle.

Electric Light & Power, December 1994, Vol. 72, No. 12: 14-16.

Begg, David and Brendan McSweeney (1984).

Electricity in Ireland. A policy statement on behalf of the ESB Officers Association.

Dublin: ESB Officers Association.

Belasco, James A. (1990).

Teaching the elephant to dance: empowering change in your organisation.

London: Hutchinson Business Books Ltd.

Belkin, N. J. *et al* (1991).

User interfaces for information systems.

Journal of Information Science 17 (1991): 327-344.

Bell, C. R. (1974).

Men at work. London: George Allen & Unwin.

Benét, Mary Kathleen (1972).

Secretary: an enquiry into the female ghetto. London: Sidgwick and Jackson.

Berdie, Doug. R., John. F. Anderson and Niebuhr A. Marsher (1986).

Questionnaires: design and use. Second edition.

London: The Scarecrow Press.

Better working conditions for VDU users.

Management Services, Vol. 36, No. 1, January 1992: 46.

Bevan, Edis B. (1988).

The task for a new professionalism. In Bryan Glastonbury, Walter LaMendola and Stuart Toole (eds.) *Information technology and the human services* (1988): 332-341. Chichester: John Wiley & Sons.

Beyond downsizing, beyond rightsizing: the profit opportunities of Smartsizing.

Special Advertising Supplement to *Datamation*, Vol. 38, No. 10, 1 May, 1992: S.8-S.9.

Bicknell, David (1995).

Is your business PC too clever by half? *Computer Weekly*, 6 July 1995: 24.

Birkbeck, Julie (1996).

Monitors - a sight-seeing tour. *Irish Computer*, Vol. 19, No. 11, January 1996: 52-54.

Bjørn-Andersen, Niels (1983).

Chapter 7: The changing roles of secretaries and clerks.

In Harry J. Otway and Malcolm Peltu (eds.) *New office technology: human and organizational aspects* (1983): 120-137. London: Frances Pinter (Publishers) Ltd. for the Commissions of the European Communities.

Bjørn-Andersen, Niels (1984).

Management use of new office technology.

In Harry J. Otway and Malcolm Peltu (eds.) *The managerial challenge of new office technology* (1984): 99-124. London: Butterworths.

Blakey, C. W. (1980).

Word processing in the typing pool and the secretarial environment.

In *Infotech State of the Art Report Series 8 Number 3. Office Automation: invited papers* (1980): 19-32. Maidenhead, Berkshire: Infotech.

Blennerhassett, Evelyn (1987).

Senior civil servants and information technology: experience of a pilot management development programme. Dublin: Institute of Public Administration.

Blot, Isabelle (1994).

L'apport d'une classification automatique pour etudier une question ouverte: les responses orales de commercants. (*A tool for computer analysis of open-ended questions in a customer satisfaction telephone survey.*) 94NO00025.

Clamart, France: Electricite de France.

Boardman, John, Jasper Griffin and Oswyn Murray (1993).

The Oxford history of the classical world.

Oxford: Oxford University Press / The Softback Service.

Boisot, Max (1987).

Information and organisations: the manager as anthropologist.

London: Fontana Paperback.

Boyd, Fraser (1992).

Whatever happened to the paperless office?

Management Services, Vol. 36, No. 1, January 1992: 37.

Boyling, Jeffrey.

Piano gives a lesson for the workplace.

Financial Times, No. 32,264 Week No. 2, 12 January 1994: 21.

Brand, Stewart (1980).

Chapter 13: Texture in living and working.

In C. Stewart Sheppard and Donald C. Carroll *Working in the twenty-first century*

(1980): 131-133.

New York: John Wiley & Sons.

Braverman, Harry (1974).

Labor and monopoly capital: the degradation of work in the Twentieth Century.

New York and London: Monthly Review Press.

Bray, Paul (1991).

Managing change. *Which Computer?* Vol. 14, No. 8, August 1991: 52-64.

Bray, Paul (1992).

Trail blazer. *Which Computer?* Vol. 15, No. 10, October 1992: 81-82.

Brockman, J. and E. Rosenfeld (1973).

Real time.

London: Pan Books.

Brousell, David, Elaine Appleton and Jeff Moad (1992).

Levi Strauss's CIO on: The technology of empowerment.

Datamation, Vol. 38, No. 12, 1 June 1992: 120-124.

Brousell, David R. (1993).

The virtual data center. *Datamation*, Vol. 39, No. 8, 15 April 1993: 104.

Brown, James A. C. (1954).

The social psychology of industry: human relations in the factory.

Harmondsworth, Middlesex: Penguin Books.

Brown, Jane (1994).

Ask the experts. Back pain. *Essentials.* October 1994: 99-100.

Brown, R. and M. Brown (1994).

Empowered: a guide to leadership in the liberated organisation.

London: Nicholas Brealey Publishing.

Burke, Brendan (1993).

Every day a learning day. *T & D (Training & Development) Journal*,

Vol. 1, Issue No. 6, February 1993: 1-2. (ESB publication).

Burke, James (1978).

Connections.

London: Macmillan London Ltd.

Burton, Paul F. (1994).

Electronic mail as an academic discussion forum.

Journal of Documentation, Vol. 50, No. 2, June 1994: 99-110.

Butera, Federico amd Emilio Bartezzaghi (1983).

Chapter 6: Creating the right organizational environment.

In Harry J. Otway and Malcolm Peltu (eds.) *New office technology: human and organizational aspects* (1983): 102-119. London: Frances Pinter (Publishers) Ltd. for the Commissions of the European Communities.

Buzan, Tony (1995).

Use your head. Fourth revised edition.

London: BBC Books.

Byrne, Anne (1993).

Chief executives. Born rather than made?

Irish Times, Education & Living Supplement, 9 February 1993: 1.

Byrne, Dermot P. (1982).

The Information Needs of Managers. A Study of the Information Needs of Managers within the Operation Function of the ESB.

A Thesis presented for the Degree of MBA, Department of Business Administration, University College, Dublin, August 1982.

Cairns, Nial W. N. and George Wilson (1991).

Total Quality: the challenge to change.

IBAR - Irish Business and Administrative Research, Vol. 12, 1991: 136-145.

Camiti, Susan (1995).

What team leaders need to know. *Fortune*, Vol. 131, No. 3, 20 February 1995: 59-62.

Campbell, Colm (no date of publication stated).

Suffering office backache.

Leaflet available from The Back Shop, 32 Exchequer Street, Dublin.

Cane, Alan (1994).

Leo: the tea shop's other trade. The FT Review of Business Books: 3.

Financial Times, No. 32,405 Week. No. 26, 29 June 1994.

Canning, Lorcan S. (1981).

Public sector industrial relations: the case of the Electricity Supply Board.

In Hugh M. Pollock (ed.) *Industrial relations in practice*. Issues in industrial relations 1. (1981): 96-111. Dublin: The O'Brien Press.

Carby, Keith (1976).

Job redesign in practice. London: Institute of Personnel Management.

Carlzon, Jan (1989).

Moments of truth. New York: Harper & Row (Perennial Library Edition).

Changing to compete: Programme 1 (1994).

Video. Dublin: A ProMedia Production for ESB Corporate Affairs, 1994.

Chappell, Caroline (1994)

The missing link. *Computing*, 1 December 1994: 40-41.

Cheek, M.

Figuring it out. *Computer Weekly*, February 9 1995: 34-36.

Cheung, Scott T. Y. (1993).

A study of the Office Automation training methodologies undertaken in Hong Kong companies. *Journal of Information Science* 19 (1993) 267-278.

Chief Executive's Safety Committee Staff Summary Report for 1992.

Dublin: ESB.

Child, John (1977).

Organization: a guide to problems and practice. London: Harper & Row.

Christie, Bruce (ed.) (1985a).

Human factors of information technology in the office.

Chichester: John Wiley & Sons.

Christie, Bruce (1985b).

Chapter 4: Overview. In Bruce Christie (ed.) *Human factors of information technology in the office* (1985): 75-96. Chichester: John Wiley & Sons.

Christie, Bruce (1985c).

Chapter 12: Introducing office systems: guidelines and impacts.

In Bruce Christie (ed.) *Human factors of information technology in the office* (1985): 273-296. Chichester: John Wiley & Sons.

Christie, Bruce and M. Polly Kaiser (1985).

Chapter 2: The office: a psychological perspective.

In Bruce Christie (ed.) *Human factors of information technology in the office* (1985): 24-56.

Chichester: John Wiley & Sons.

Clark, Charles T. (1995).

Groupware: linking people together.

Digital News and Review, Vol. 12, No. 1, 9 January 1995: 25-27.

Clutterbuck, David (1985).

Chapter 1: The brave new world of work.

In David Clutterbuck (ed.), *New patterns of work* (1985): 1-12.

Aldershot, Hants: Gower.

Clutterbuck, David and Susan Kernaghan (1994).

The power of empowerment: release the hidden talents of your employees.

London: Kogan Page.

Cochrane, Peter, Kim Fisher, and Rob Taylor-Hendry (1993).

The office you wish you had.

British Telecommunications Engineering, Vol. 12, Part 2, July 1993: 91-96.

Cohen, A. R. and L. Bradford (1991).

Influence without authority. New York: John Wiley & Sons.

Computing for the Less Terrified: Design.

BBC 1 TV programme, 26 June 1994.

Computing for the Less Terrified: Troubleshooting.

BBC 1 TV programme, 10 July 1994.

Connecting with the future.

ESB strategies for the 1990s. March 1990.

Dublin: ESB.

Connolly, Alison (1995).

The human factor. *Computer Weekly*, February 9, 1995: 40.

Cook, Rick (1992).

What's ahead for PC / Fax. *Datamation*, Vol. 38, No. 14, 1 July 1992: 27-29.

Cookman, Brian (1993).

Desktop design: getting the professional look. Second edition.

London: Blueprint (an imprint of Chapman & Hall).

Cooper, Robert (1974).

Job motivation & job design.

London: Institute of Personnel Management.

Coping ... with your job.

One of a *Coping* series of pamphlets distributed by The Mental Health Association of Ireland - reprinted with kind permission of The Canadian Mental Health Association.

Corbitt, Terry (1991).

Obtaining information for decision-making.

Management Services, Vol. 35, No. 4, April 1991: 14-17.

Corder, Colin (1989).

Taming your company computer: how to control systems development without understanding computers.

London: McGraw-Hill.

Coupland, Douglas (1992).

Generation X: tales for an accelerated culture. London: Abacus.

Coventry, W. F. (1970).

Management made simple. Reprinted, with revisions, 1973. London: W. H. Allen.

Crabbe, Steve (1993).

Building a better workplace by design.

Personnel Management, Vol. 25, No. 8, August 1993: 20-25.

Craig, Marianne (1991).

Office workers' survival handbook: a guide to fighting health hazards in the office.

New edition by Eileen Phillips. London: The Women's Press.

Crawford, Philip (1993).

Make everyone a power user. *Which Computer?*, Vol. 16, No. 7, July 1993: 105-108.

Cronk, Randall D. (1993).

EISes mine your data. *Byte*, Vol. 18, No. 7, June 1993: 121-128.

Cruikshank, J. E., A. S. Merritt and T. M. Porter (1965).

The rise of Western civilisation. Ontario: Longmans Canada Ltd.

Dagostino, Marty (1994).

Lumbar support most critical feature to consider during chair selection.

Occupational Health & Safety, Vol. 63, No. 3, March 1994: 63-65.

Daly, James (1994).

The Mac turns 10. *Computerworld*, Vol. 28, No. 2, 10 January 1994: 81-85.

Damousi, Joy (1994).

The women of Oz: the changing role of women in Australia. Australia Post.

Danziger, J. N. and Kenneth L. Kraemer (1986).

People and computers: the impacts of computers on end-users in organizations.

New York: Columbia University Press.

Danzin, André (1983).

Chapter 1: The nature of new office technology. In Harry J. Otway and Malcolm Peltu (eds.) *New office technology: human and organizational aspects* (1983): 19-36. London: Frances Pinter (Publishers) Ltd. for the Commissions of the European Communities.

Datacomms: an even brighter future with ISDN.

Business & Finance Computing, September 1993: 17-18.

Davenport, Thomas H. (1994).

Saving IT's soul: human-centred information management.

Harvard Business Review, Vol. 72, No. 2, March-April 1994: 119-131.

Davidow, W. H. and M. S. Malone (1992).

The virtual corporation: structuring and revitalising the corporation for the 21st century. New York: HarperCollins.

Davids, Meryl (1995).

Where style meets substance.

Journal of Business Strategy, Vol. 16, No. 1, January/February 1995: 49-60.

Davidson, Clive (1993).

Seeing is believing. *Computer Weekly*, 9 December 1993.

Dawson, Sandra (1992).

Analysing organisations. Second edition.

Basingstoke, Hampshire, U.K.: Macmillan Press.

Dawson, S. J. R. (1980).

Office systems: a non-technological revolution. In *Infotech State of the Art Report Series 8 Number 3. Office Automation: invited papers* (1980): 45-62.

Maidenhead, Berkshire: Infotech.

De Board, Robert (1983)

Counselling people at work: an introduction for managers.

Aldershot: Gower Publishing.

Desmarais, Norman (1994).

An electronic carriage...... or a horseless book?

Audiovisual Librarian, Vol. 20, No. 4, November 1994: 286-292.

Devine, Brendan (1989).

Motivation determinants and job satisfaction indicators in Irish industry. Dissertation for Degree of Master of Arts, August 1989, Department of Sociology, Faculty of Arts, St. Patrick's College, Maynooth.

Dillon, Antoinette and Patrick Flood (1992).

Organisational commitment: do human resources practices make a difference? *IBAR (Irish Business and Administrative Research)* Vol. 13, 1992: 49-61.

Dobson, David (1992).

The risk processors. *Which Computer?,* Vol. 15, No. 10, October 1992: 44-46.

Donkin, Richard (1995).

Management resistance is biggest obstacle to adapting workplace to changing customer needs. *Irish Times*, No. 44,235, 12 June 1995: 17.

Dopson, Sue and Rosemary Stewart (1993).

Information technology, organizational restructuring and the future of middle management.

New Technology, Work and Employment, Vol. 8, No. 1, March 1993: 10-20.

Doswell, Andrew (1983).

Office automation.

Chichester: John Wiley & Sons.

Douglas, John (1992).

Seeking order in chaos. *EPRI Journal*, Vol. 17 No. 4, June 1992: 4-13.

Drechsler, Frank and John Bateson (1986).

Management, information and expert systems. Dublin: Irish Academic Press.

Drucker, Peter F. (1973).

Chapter 5: Evolution of the knowledge worker. In Fred Best (ed.) *The future of work* 1973: 58-63. Englewood Cliffs, New Jersey: Prentice-Hall.

Drucker, Peter F. (1991).

The new productivity challenge.

Harvard Business Review, Vol. 69, No. 6, November-December 1991: 69-79.

Drucker, Peter F. (1992).

The new society of organizations.

Harvard Business Review, Vol. 70, No. 5, September-October 1992: 95-104.

Drucker, Peter F. (1993).

Post-capitalist society. Oxford: Butterworth-Heinemann.

Dudman, Jane (1995).

Minding the training gap. *Computing*, 6 April 1995: 35.

Duignan, James (1993).

Executive Information Systems and the nature of executive work in relation to the development and implementation of an Executive Information System in ESB Ireland.

Dissertation for M. Sc. in Organisation Behaviour, Trinity College Dublin / Irish Management Institute, 1993.

DWMS: Distribution Work Management System.

T & D (Training & Distribution) Journal, Vol. 1, Issue No. 5, October 1992: 22.

(ESB publication).

Earnshaw, R. A. (ed.) (1987).

Workstations and publication systems. New York: Springer-Verlag.

Ein-Dor, P. and C. R. Jones (1985).

Information systems management: analytical tools and techniques.

New York: Elsevier Science Publications.

Elements of statistics: Problems with patterns.

BBC 2 TV / Open University programme.

E-Mail or E-Femail?

Datamation, Vol. 40, No. 7, 1 April, 1994: 21.

Emery, Fred (1993).

An Appreciation: Eric Landsdown Trist (1909-1993).

Human Relations, Vol. 46, No. 10, October 1993: 1171-1176.

Emery, J. C. (1969).

Organizational planning and control systems.

New York: Macmillan Publishing Company.

***Empowerment* (1995).**

BBC 2 TV programme, 17 June 1995.

Empowerment, a leap of faith?

Management Training, August 1993: 13-16.

E.S. (1995)

Clichéd corporate conversations from hell.

Fortune, Vol. 131, No. 3, 20 February 1995: 12.

ESB Corporate Plan 1991-1995.

March 1991. Dublin: ESB.

ESBOA Annual Report 1988.

Annual General Meeting, Limerick 15 October 1988.

Dublin: ESB Officers Association.

Evans, Linnet (1994).

The digital sage. *Computer Weekly*, 5 May 1994: 46-47.

Evans, Linnet (1995a).

Cut down the paperwork. *Computer Weekly*, 23 March 1995: 44-46.

Evans, Linnet (1995b).

Gaining recognition. *Computer Weekly*, 6 July 1995: 30-31.

Executive-and-Secretary Telephone Systems.

Siemens Review Vol. xxi, No. 4, 1954.

(Quoted in *Siemens Review*, Vol. 61, No. 6, 1994: 21.)

Faggin, Federico (1992).

The birth of the microprocessor. *Byte*, Vol. 17, No. 3, March 1992: 145-150.

Fawcett, Neil (ed.) 1995.

Microsoft employs Office politics with Windows 95.

Computer Weekly, 23 March 1995: 25.

Fearfull, Anne (1992).

The introduction of information and office technologies: the great divide?

Work, Employment and Society, Vol. 6, No. 3, September 1992: 423-442.

Feldman, Daniel C. and Hugh J. Arnold (1983).

Managing individual and group behavior in organizations.

New York: McGraw-Hill.

Final Report of the Joint Steering Committee on the Review of Relationships within ESB, February 1993.

Dublin: ESB.

Flippo, Edwin B. (1980).

Personnel Management. Fifth edition.

Tokyo: McGraw-Hill Kogakusha Ltd.

Flynn, Theresa (1995).

Are you sitting comfortably?

Technology Ireland, Vol. 26, No. 8, January 1995: 20-22.

Fogarty, Joseph (1957).

Money matters. *The Electricity Supply Board:* Special Issue of *Administration*, Vol. 5, No. 3, Autumn 1957: 123-138. Dublin: Institute of Public Administration.

Foley, James and Frank Scott (1993).

QWL Quality of Working Life: an exercise in applied horticulture. *T & D (Training & Development) Journal*, Vol. 1, Issue No. 6, February 1993: 3-4. (ESB publication).

Foster, Jeremy J. (1993).

Starting SPSS/PC+ and SPSS for Windows: a beginners guide to data analysis. Wilmslow, United Kingdom: Sigma Press.

Foy, Nancy (1994).

Empowering people at work. Aldershot, Hampshire: Gower.

Frampton, Rachel (1994).

Just do as I say. *Computer Weekly*, 7 July 1994: 32.

Francis, Bob (1992).

Operating systems take pen in hand. *Datamation*, Vol. 38, No. 12, 1 June 1992: 57-60.

Franks, Ray (1989).

Commonsense computer management: a guide for the non-professional. London: Kogan Page in association with the Chartered Institute of Management Accountants.

Frey, Robert (1993).

Empowerment or else.

Harvard Business Review, Vol. 71, No. 5, September-October 1993: 80-94.

Friedman, Andrew L. (1994).

The Information Technology Field: using fields and paradigms for analyzing technological change. *Human Relations*, Vol. 47, No. 4, April 1994: 367-392.

Galen, Michele and Karen West (1995).

Companies hit the road less traveled. *Business Week*, No. 3,427, 5 June 1995: 82-85.

Galitz, Wilbert O. (1980).

Human factors in office automation.

Atlanta, Georgia: Life Office Management Association.

Gallie, Duncan (1991).

Patterns of skill change: upskilling, deskilling or the polarization of skills?

Work, Employment and Society, Vol. 5, No. 3, September 1991: 319-351.

Garvin, David A. (1993).

Building a learning organization.

Harvard Business Review, Vol. 71, No. 4, July-August 1993: 78-91.

GEC project explores the world of virtual working.

Electrical Review Vol. 226, No. 18, 17-30 September 1993: 18-19.

Geldard, Frank Arthur (1972).

The human senses. Second edition. New York & London: John Wiley & Sons.

Geyl, Dieter (1962).

Debates with historians. Glasgow: Fontana / Collins.

Gilbert, Dan (1994).

Power to the people. *Which Computer?,* Vol. 17, No. 2, February 1994: 52-57.

Gilbert, M. (ed.) (1972).

The modern business enterprise: selected readings.

Harmondsworth, Middlesex: Penguin Books.

Gilhawley, Des (1989).

Corporate executive culture in ESB Generation Function.

Great Island, Wexford: ESB.

Glastonbury, Brian, Walter LaMendola and Stuart Toole (eds.) (1988).

Information technology and the human services.

Chichester, England: John Wiley & Sons.

Glenfield, Paul (1995).

Keying in compo. *Business and Finance*, Vol. 30, No. 27, 5 May 1994: 28.

Glisson, Charles and Mark Durick (1988).

Predictors of job satisfaction and organizational commitment in human services organizations. *Administrative Science Quarterly*, Vol. 33, No. 1, March 1988: 61-81.

Glister, Ed (1993).

Workplace system saves ConEd $2 million annually.

Electric Light & Power, Vol. 71, No. 9, September 1993: 31.

Godefroy, Christian H. and John Clark (1991).

The complete time management system. London: Judy Piatkus (Publishers) Ltd.

Goldstein, Irwin L. (1993).

Training in organizations: needs assessment, development and evaluation.

Pacific Grove, California: Brooks / Cole Publishing Co.

Goodman, Leonard Landon (1957).

Man and automation. Harmondsworth, Middlesex: Penguin Books.

Grandjean, E. (1987).

Ergonomics in computerized offices. London: Taylor and Francis Ltd.

Greene, Judith and Manuela D'Oliveira (1982).

Learning to use statistical tests in psychology: a students guide.

Milton Keynes: Open University Press.

Grint, Keith (1991).

The sociology of work: an introduction.

Cambridge, U. K.: Polity Press in association with Basil Blackwell.

Guest, David and Derek Fatchett (1974).

Worker participation: individual control and performance.

London: Institute of Personnel Management.

Guidance on new display screen equipment regulations launched.

Management Services, Vol. 37, No. 1, January 1993: 8-10.

Gunnigle, Patrick, and Patrick Flood (1990).

Personnel management in Ireland: Practice. Trends. Developments. Dublin: Gill and Macmillan.

Haas, E. B. (1990).

When knowledge is power: three models of change in organizations. Berkeley and Los Angeles: University of California Press.

Habakkuk, H. J. and M. Postan (eds.) (1965).

The Cambridge Economic History of Europe. Volume VI. The Industrial Revolutions and after: Income, population and technological change (I). Cambridge: Cambridge University Press.

Habakkuk, H. J. and M. Postan (eds.) (1965).

The Cambridge Economic History of Europe. Volume VI. The Industrial Revolutions and after: Income, population and technological change (II). Cambridge: Cambridge University Press.

Hackman, J. R. and G. R. Oldham (1980).

Work redesign. Reading, MA: Addison-Wesley.

Hammer, M. and N. D. Zisman (1980).

Design and implementation of office information systems. In *Infotech State of the Art Report Series 8 Number 3. Office Automation: invited papers* (1980): 77-96. Maidenhead, Berkshire: Infotech.

Handy, Charles B. (1985a).

The future of work: a guide to a changing society. Oxford: Basil Blackwell.

Handy, Charles B. (1985b).

Gods of management: the changing work of organisations. Revised edition.

London: Pan Books.

Handy, Charles B. (1985c).

Understanding organizations. Third edition.

Harmondsworth, Middlesex: Penguin Books.

Handy, Charles B. (1993).

Understanding organizations. Fourth edition.

Harmondsworth, Middlesex: Penguin Books.

Handy, Charles B. (1994).

The empty raincoat: making sense of the future.

London: Hutchinson.

Harrison, J. and R. Dawber (1976).

Clerical accounting.

London: Pitman Publishing.

Harrison, Rosemary (1992).

Employee development. Management Studies 2.

London: Institute of Personnel Management.

Harvey, N. (with additional material by A. F. Twomey) (1994).

Effective supervisory management in Ireland.

Dublin: NCIR Press.

Hastings, Timothy M. (1994).

Semi-states in crisis: the challenge for industrial relations in the ESB and other major semi-state companies.

Dublin: Oak Tree Press in association with Graduate School of Business, University College, Dublin.

Health and safety aspects of VDUs.

Guidelines for negotiators. Issued September 1985.

Dublin: Irish Congress of Trade Unions.

Healy, Paul (1993).

Understand your computer and it will understand your business.

Management, Vol. 40, No. 10, November 1993: 26-27.

Healy, Paul (1994a).

Don't blame the tools, just adapt them.

Management, Vol. 41, No. 1, January 1994: 30-31.

Healy, Paul (1994b).

Looking after Number One. *Management*, Vol. 41, No. 2, February 1994: 18-19.

Hedberg, Sara (1993).

New knowledge tools. *Byte*, Vol. 18, No. 8, July 1993: 106-111.

Hedderson, J. (1986).

SPSSx made simple.

Belmont, California: Wadsworth Publishing Company.

Heller, Robert (1981).

The business of winning: how to succeed in business by really trying.

London: Sidgwick & Jackson.

Heller, Robert (1995).

The naked manager for the Nineties.

London: Little, Brown and Company.

Herzberg, Frederick (1968a).

Work and the nature of man.

London: Staples Press.

Herzberg, Frederick (1968b/1987).

One more time: how do you motivate employees?

(First published 1968; reprinted 1987).

Harvard Business Review, Vol. 65, No. 5, September-October 1987: 109-120.

Herzberg, Frederick, Bernard Mausner and Barbara Bloch Snyderman (1959/1993).

The motivation to work. New York: John Wiley & Sons.

(Republished 1993 with a new introduction by Frederick Herzberg. New Brunswick, U.S.A.: Transaction Publishers.)

Higgins, Colman (1994a).

Old games, new words. *Management*, Vol. 41, No. 2, February 1994: 14-17.

Higgins, Colman (1994b).

Time please. *Management*, Vol. 41, No. 6, June/July 1994: 10-12.

Hill, George M. (1993).

Re-engineering electric utilities: what works, and what doesn't.

Electrical World, Vol. 207, No. 12, December 1993: 8-9.

Hilton, Phil. (1993).

The philosophy of effectiveness.

Personnel Management, Vol. 25, No. 9, September 1993: 52-53.

Hobby, Jason (1995a).

Revolution in the workplace.

Computer Weekly, February 2, 1995: 30.

Hobby, Jason (1995b).

Unsettling accounts.

Computer Weekly, February 9, 1995: 28.

Hobby, Jason (1995c).

Verbal remedies.

Computer Weekly, 20 July 1995: 34-35.

Hogarth, Terence (1993).

Worker support for organisational and technical change: workplace industrial relations in UK manufacturing - the case study evidence.

Work, Employment and Society, Vol. 7, No. 2, June 1993: 189-212.

Hogben, Lancelot (1967).

Mathematics for the million.

Revised edition. London: Pan Books.

Horwitz, R. (1973).

Realities of profitability: an analysis of managerial action. London: Pan Books.

Houlder, Vanessa (1995).

Back to the future: Vanessa Houlder reports on the advantages of case-based reasoning, the latest problem-solving technique.

Financial Times, No. 32,594 Week No. 6, 7 February 1995: 15.

Howarth, C. (1984).

The way people work: job satisfaction and the challenge of change.

Oxford: Oxford University Press.

***How modern technology affects the experienced worker - Ireland* (1986).**

EF / 86 / 21 / EN. Report from the European Foundation for the Improvement of Living and Working Conditions.

Luxembourg: Office of Publications for the European Commission.

***Human factors and information technology* (1983).**

National Electronics Council.

Hurley, John J. P. (1982).

Productivity, organisation and employee attitudes: a study in 14 electricity power plants. Doctoral Dissertation, University of Nijmegen, 1982.

Hynes, Justin (1994).

Mobile office holds key to the future. Computers in Business supplement to *The Sunday Business Post*, Vol. 6, No. 50, 11 December 1994: 7.

ICTU Irish Congress of Trades Unions Twenty-sixth Annual Report 1984.

Dublin: Irish Congress of Trades Unions.

Information Needs Study.

Vol. 1. Management Summary. September 1982.

Dublin: Arthur Andersen / ESB Project Team.

Information Needs Study.

Vol. 2. Information Needs and Project Descriptions. September 1982.

Dublin: Arthur Andersen / ESB Project Team.

Information Systems Department Management Conference November 1991. Proceedings.

Dublin: ESB.

Information Technology Education / Training Survey of Managers and Supervisors in ESB.

March 1992. I.T. Training, Training & Development Department, ESB.

Dublin: ESB.

***Information Technology Impact Study* (1990).**

Dublin: ESB.

Intelligent Office standard.

Information Security Monitor, Vol. 10, No. 5: 3-4.

ISD Jargon: a glossary of computing terms.

Revised July, 1992. Issued by Planning & Technology Division, Information Systems Department, ESB. Produced by Business Methods DTP Group, ESB.

ITS - survey of staff opinion December 1993.

Dublin: ESB.

Jackins, H. (1983).

The reclaiming of power. Seattle: Rational Island.

Janner, Greville (1989).

Janner on presentation. Second edition. London: Business Books.

Johansen, Robert, David Sibbet, Suzyn Benson, Alexia Martin, Robert Mittman and Paul Saffo (1991).

Leading business teams: how teams can use technology and group process tools to enhance performance. Reading, Massachusetts: Addison-Wesley Publishing.

Johnson, Andrew (1993).

Inside project management. *The Software Magazine*, Vol. 1, No. 9, October 1993: 99-.

Kane, Eileen (1991).

Doing your own research: basic descriptive research in the social sciences and humanities. London: Marion Boyars Publishers.

Kanter, Rosabeth Moss (1977).

Men and women of the corporation. New York: Basic Books.

Kanter, Rosabeth Moss (1989a).

The new managerial work. *Harvard Business Review*, Vol. 67, No. 6, November-December 1989: 85-92.

Kanter, Rosabeth Moss (1989b).

When giants learn to dance: mastering the challenge of strategy management and careers in the 1990s. New York: Simon and Schuster.

Kanter, Rosabeth Moss and B. A. Stein (eds.) (1979).

Life in organizations: workplaces as people experience them.

New York: Basic Books, Inc.

Kanter, Rosabeth Moss with Barry A. Stein (1980).

A tale of "O": on being different in an organisation. New York: Harper & Row.

Karasek, Robert and Töres Theorell (1990).

Healthy work: stress, productivity and the reconstruction of working life.

New York: Basic Books.

Keating, Mary (1982).

Improving the quality of life at work. In Hugh M. Pollock (ed.) *Reform of industrial relations*. Issues in industrial relations 2. (1982): 11-23. Dublin: The O'Brien Press.

Keating, Mary A. (1987).

Personnel management in Ireland. In *Industrial relations in Ireland: contemporary issues and developments* (1987): 72-78. Department of Industrial Relations, UCD.

Keller, Suzanne (1980).

Chapter 15: Shifting values: new choices and old dilemmas.

In C. Stewart Sheppard and Donald C. Carroll *Working in the twenty-first century* (1980): 145-154. New York: John Wiley & Sons.

Keller, Tiffany and Fred Dansereau (1995).

Leadership and empowerment: a social exchange perspective.

Human Relations, Vol. 48, No. 2, February 1995: 127-146.

Keyes, Jessica (1995).

So, where's the I T payoff? *Byte*, Vol. 20, No. 5, May 1995: 260.

Kidder, Tracy (1982).

The soul of a new machine. Harmondsworth, Middlesex: Penguin Books.

Kiernan, Vincent (1994).

Where there's light there's brass.

New Scientist, Vol. 144, No. 1,955, 10 December 1994: 8.

Kimble, Chris and Kevin McLoughlin (1995).

Computer based information systems and managers' work.

New Technology, Work and Employment, Vol. 10, No. 1, March 1995: 56-67.

King, Hannah (1993).

Walls around the electronic library.

The Electronic Library, Vol. 11, No. 3, June 1993: 165-174.

Kizilos, Peter (1990).

Crazy about empowerment? *Training*, Volume 27, No. 12, December 1990: 47-56.

Kohn, Alfie (1993).

Why incentive plans cannot work.

Harvard Business Review, Vol. 71, No. 5, September-October 1993: 54-63.

Kossen, Stan (1994).

The human side of organizations. Sixth edition.

New York: HarperCollins College Publishers.

Kotter, John P. and Leonard A. Schlesinger (1979).

Choosing strategies for change.

Harvard Business Review, Vol. 57, No. 2, March-April 1979: 106-114.

Kraft, W. Philip, Jr. (1971).

Job enrichment for production typists - a case study.

In John R. Maher (ed.) *New perspectives in job enrichment* (1971): 115-128.

New York: Van Nostrand Reinhold Company.

Laking, David (1994).

The realities of empowerment. In Robert Heller (ed.), *Managing 95: the global perspective* (1994): 137-138. London: Sterling Publications.

Lamarre, Leslie (1995).

Lighting the office environment. *EPRI Journal*, Vol. 20, No. 3, May/June 1995: 22-27.

Laudon, Kenneth C. and Jane Price Laudon (1993).

Business information systems: a problem-solving approach.

Second edition (international edition).

Orlando, Florida: The Dryden Press / Harcourt Brace Jovanovich.

Laver, Murray (1980).

Computers and social change. Cambridge Computer Science Texts. 10.

Cambridge: Cambridge University Press.

Lawson, David (1994).

Arctic weather on the job.

Financial Times, No. 32,346 Week No. 16, 20 April 1994: 20.

Lewin, Roger (1994).

A simple matter of complexity.

New Scientist, Vol. 141, No. 1,911, 5 February 1994: 37-40.

Levy, Steven (1994).

Ten years of Macintosh. *Apple Report*, February 1994: 8-10.

Levy, Steven (1995).

Insanely Great: the life and times of Macintosh, the computer that changed everything. Penguin.

Liebenau, Jonathan, and James Backhouse (1990).

Understanding information: an introduction.

London: Macmillan.

Liebowitz, Jay (1993).

Roll your own hybrids.

Byte, Vol. 18, No. 8, July 1993: 113-115.

London, Simon (1995).

The incredible shrinking office.

Financial Times, No. 32,641 Week No. 14, 3 April 1995: 16.

Lowe, Graham S. (1987).

Women in the administrative revolution: the feminization of clerical work.

Cambridge, U.K.: Polity Press in association with Basil Blackwell.

Lynch, George T. (1993).

Word for Windows for dummies. Quick reference.

San Mateo, California: IDG Worldwide Books.

Malin, F. A. (1986).

The Information Systems Department: its role and strategic importance.

In *Fourth Informatics Conference Proceedings*, Scheveningen, 9-11 June 1986,

361 E 1.1.2: 1-5.

Paris: International Union of Producers and Distributors of Electrical Energy.

Management initiatives for continuous quality improvement programs.

I/S Analyzer, Vol. 29, No. 2, February 1991: 11.

Manning, Maurice and Moore McDowell (1985).

Electricity Supply in Ireland: the history of the ESB.

Dublin: Gill and Macmillan.

Mansell-Lewis, Emma (1994).

Curing all ills. *Computer Weekly*, 13 October 1994: 40.

Mantovani, Giuseppe (1994).

Is Computer-Mediated Communication intrinsically apt to enhance democracy in organizations? *Human Relations*, Vol. 47, No. 1, January 1994: 45-62.

Marlett, Nancy (1988).

Empowerment through computer telecommunications. In Bryan Glastonbury, Walter LaMendola and Stuart Toole (eds.) *Information technology and the human services* (1988): 244-264. Chichester: John Wiley & Sons.

Martin, Peter (1995).

A guide to delayering.

Financial Times, No. 32, 641, Week No. 14, 3 April 1995: 10.

Mason, R. O. (1980).

The office of the future as a socio-economic system.

In *Infotech State of the Art Report Series 8 Number 3. Office Automation: invited papers* (1980): 141-149. Maidenhead, Berkshire: Infotech.

Massey, J.

Cultural resolutions. *Computing*, February 23, 1995: 30-31.

Max, Daniel (1995).

Pulp factions. *Irish Times*, No. 44,128, 6 February 1995: 17.

McAleese, Don (1994).

RSI - the beginning of the end or the end of the beginning?

Irish Computer, Vol. 18, No. 2, April 1994: 36-37.

McClimans, Fred J. (1995).

Putting some power into empowerment.

Data Communications, Vol. 24, No. 9, July 1995: 31-32.

McColgan, Declan (1994a).

Workgroup computing: teamwork in action.

Business & Finance, Vol. 18, No. 8, October 1994: 22-27.

McColgan, Declan (1994b).

Tomorrow's office: a leap into the unknown.

Business & Finance, Vol. 18, No. 10, December 1994: 22-25.

McCrone, John (1994).

Don't forget your memory aide.

New Scientist, Vol. 141, No. 1,911, 5 February 1994: 32-36.

McGillivray, Rosemary (1993).

InfoAccess - platform for the distribution of Southern African information.

The Electronic Library, Vol. 11, No. 4/5, August/October, 1993: 245-247.

McGregor, Douglas (1960).

The human side of enterprise. New York: McGraw-Hill Book Co.

McManus, John (1994).

Bill's brave new world. Business This Week Supplement to *Irish Times*,

No. 44,039, 21 October 1994: 14.

Medcof, John W. (1989).

The effect of extent of use of information technology and job of the user upon task characteristics.

Human Relations Journal, Vol. 42, Issue 1, January 1989: 23-41.

Mestel, Rosie (1995).

Bosses with attitude set the tone.

New Scientist, Vol. 145, No. 1,963, 4 February 1995: 9.

Mini-scope gets to the root of back pain.

New Scientist, Vol. 147, No. 1,984, 1 July 1995: 18.

Mintzberg, Henry (1973).

The nature of managerial work.

New York: Harper and Row.

MOCCS News **(1991).**

Management Operations and Control System: Newsletter. November 1991.

Dublin: ESB.

Moore, Taylor (1993).

Human performance in the spotlight.

EPRI Journal, Vol. 18, No. 6, September 1993: 14-21.

Morrissey, Thomas J. (1989).

Employee participation at sub-board level.

In *Industrial relations in Ireland: contemporary issues and developments* (1989): 233-246.

Dublin: Department of Industrial Relations, U.C.D.

Mulqueen, Tony (1994).

Ten years after... *Irish Computer*, Vol. 17, No. 10, January 1994: 46-47.

Mumford, Enid (1983).

Chapter 4: Successful systems design. In Harry J. Otway and Malcolm Peltu (eds.) *New office technology: human and organizational aspects* (1983): 68-85. London: Frances Pinter (Publishers) Ltd. for the Commissions of the European Communities.

Murphy, B. M. (1971).

Computers in your life.

London: Hutchinson Junior Books Ltd.

Murphy, Ciaran and Frédéric Adam (1994).

Information indigestion! *Technology Ireland*, Vol. 25, No. 9, February 1994: 34-36.

Neff, W. (1985).

Work and human behavior. Third edition.

New York: Aldine.

Newell, Susan (1995).

The healthy organization: fairness, ethics and effective management.

London: Routledge.

Newman, William H., Charles E. Summer and E. Kirby Warren (1972).

The process of management: concepts, behavior and practice. Third edition.

Englewood Cliffs, N. J.: Prentice-Hall.

Nixon, Bruce (1995).

Training's role in empowerment.

People Management, Vol. 1, No. 3, 9 February, 1995: 36-38.

O'Broin, Noirin and Gillian Farren (1978).

The working and living conditions of Civil Service typists.

Paper No. 93. June 1978. Dublin: The Economic and Social Research Institute.

O'Kelly, Kevin P. (1990).

Participation in technological change: the Irish experience.

Working Paper No.: EF / WP / 90 / 34 / EN.

Dublin: European Foundation for the Improvement of Living and Working Conditions.

O'Loghlen, Peter (1993).

Developing an information system blueprint in Ireland.

Transmission and Distribution International, Vol. 4, No. 3, September 1993: 34-35.

Olphert, Wendy (compiler) (1989).

Ergonomics. *Personnel Management* Factsheet No. 23. November 1989.

O'Mahony, Daniel Joseph (1986).

The impact of on-line technology on job structures and skill levels in branches of Allied Irish Banks plc. Dissertation presented as part of the requirements of the 1986 Master of Business Administration Degree Examination of the National University of Ireland (University College, Dublin).

On call: new technology makes managers more accessible but is that always a good thing?

Management, Vol. 41, No. 4, May 1994: 7.

Oppenheim, A. N. (1968).

Questionnaire design and attitude measurement. London: Heinemann.

O'Reilly, James C. (1985).

A framework for information flow in a large Irish organisation. A study of information transfer in the Electricity Supply Board.

Thesis presented for Degree of Master of Arts, Queen's University Belfast, 1985.

Osher, Herbert M. (1992).

Software without walls. *Byte*, Vol. 17, No. 3, March 1992: 122-128.

Otway, Harry. J. and Malcolm Peltu (eds.) (1983).

New office technology: human and organisational aspects.

London: Frances Pinter (Publishers) Ltd. for the Commissions of the European Communities.

Otway, Harry. J. and Malcolm Peltu (eds.) (1984).

The challenge of new managerial roles. In Harry J. Otway and Malcolm Peltu (eds.) *The managerial challenge of new office technology* (1984): 1-16.

London: Butterworths.

Ovans, Andrea (1992).

Can E-Mail deliver the message? *Datamation*, Vol. 38, No. 11, 15 May 1992: 128.

Patton, Robert (1994).

Office romance: a Japanese builder spins dreams of a workplace utopia.

Scientific American, Vol. 270, No. 5, May 1994: 82-83.

PC passions.

I T (Irish Tatler) magazine, June 1995. Dublin.

Peltu, Malcolm (1993).

Customer conscious. *Computing*, 19 August 1993: 20-21.

Peltu, Malcolm (1995).

Safety in numbers. *Computing*, 12 January 1995: 34.

Pentland, Brian T. (1992).

Organizing moves in software support hot lines.

Administrative Science Quarterly, Vol. 37, No. 4, December 1992: 527-548.

Peters, Thomas J. and Robert H. Waterman Jr. (1982).

In search of excellence: lessons from America's best-run companies.

New York: Harper and Row.

Pfeffer, J. (1981).

Power in organizations. Marshfield, Massachusetts: Pitman Publishing.

Pinker, Steven (1994).

The language instinct: the new science of language and mind.

London: Allen Lane / The Penguin Press.

Plans and policies for client/server technology.

IS Analyzer, Vol. 30, No. 4, April 1992: 1-9.

Portillo, Michael (1995).

The work revolution will enrich us all.

Sunday Times, News Review, Section 3, 19 February 1995: 3.9.

Postan, M. M., E. E. Rich and Edward Miller (eds.) (1963).

The Cambridge Economic History of Europe. Volume III: Economic organization and policies in the Middle Ages. Cambridge: Cambridge University Press.

***PowerPoint Handbook* (1992).**

Microsoft Corporation.

Preece, Jenny, Yvonne Rogers, Helen Sharp, David Benyon, Simon Holland and Tom Carey (1994).

Human-Computer Interaction. Wokingham, England: Addison-Wesley.

Purcell, Kate (1990).

Research on gender: understanding the world in order to change it.

Work, Employment & Society, Vol. 4, No. 4, December 1990: 605-618.

Quittner, Joshua (1995).

Worms in the Apple. *Time*, Vol. 146, No. 16, 16 October 1995: 61.

Rae, Andrew (1965).

Work study: a practical primer. Third edition. London: Odhams Books.

Rajan, Amin (1984).

New technology and employment in insurance, banking and building societies: recent experience and future impact. Aldershot: Gower.

Ramanathan, Jay (1994).

The workflow process paradigm.

Oracle Magazine, Vol. VIII, No. 3, Summer 1994: 120.

Rathus, Spencer A. (1987).

Psychology. Third edition. New York: Holt, Rinehart and Winston.

Ray, Garry (1993).

Word 6.0 adds features, usability.

Computerworld, Vol. 27, No. 47, 22 November 1993: 37-41.

Raymond, Santa and Roger Cunliffe (1995).

Master of your own workplace destiny.

Financial Times, No. 32,653, Week No. 16, 19 April 1995: 13.

Read, Donald Richard (1992).

Mastering Harvard Graphics 3.0. First edition.

Blue Ridge Summit, PA: Windcrest / McGraw-Hill.

Reichardt, Jasia (1978).

Robots: fact, fiction and prediction.

London: Thames & Hudson.

Reitz, H. Joseph (1981).

Behavior in organizations. Revised edition.

Homewood, Illinois: Richard D. Irwin, Inc.

Report on the organisation, structure, roles and relationships. Electricity Supply Board.

July 1984.

H. Miller and Associates Ltd.; Theodore Barry and Associates; E.S.B. Task Force.

Reshaping ESB to meet the challenges of the 1990s.

Electricity Supply Board. Report to the Board. July 7th, 1992.

McKinsey and Company Inc.

Review of Relationships within ESB. First Report of the Joint Steering Committee, July 1992.

Dublin: ESB.

Richards-Carpenter, Colin (1993).

The power of information.

Personnel Management, Vol. 25, No. 9, September 1993: 67-68.

Ridgeway, Christopher and Brian Wallace (1994).

Empowering change: the role of people management.

London: Institute of Personnel Management.

Rifkin, Jeremy (1995).

The end of work? *New Statesman & Society*, Vol. 8, No. 356, 9 June 1995: 18-25.

Robinson, John K. (1992).

One man's computer. *Management Services*, Vol. 36, No. 2, February 1992: 30-33.

Robson, M. (1984).

Quality circles in action. Aldershot: Gower.

Roche, John (1978).

Planning in the ESB. Dublin: Institute of Public Administration.

Rodwell, Graham (1988).

Computers and the hermeneutic dimension of human services. In Bryan Glastonbury, Walter LaMendola and Stuart Toole (eds.) *Information technology and the human services* (1988): 310-325. Chichester: John Wiley & Sons.

Roethke, Theodore (1985).

The Collected Poems: Page 44. London: Faber & Faber Ltd.

Rogers, Jackie Krasas (1995).

Just a temp: experience and structure of alienation in temporary clerical employment. *Work and Occupations*, Vol. 22, No. 2, May 1995: 137-166.

Rogowitz, Bernice E. (1992).

Displays: the human factor. *Byte*, Vol. 17, No. 7, July 1992: 195-200.

Roots: the pioneers 1918-1939.

Management Services, Vol. 35, No. 2, February 1991: 16-21.

Rose, M. (1969).

Computers, managers and society. Harmondsworth, Middlesex: Penguin Books.

Rosenthal, Samuel (1979).

Ocular problems of V.D.U's: fact and fiction. In *Word processing: selection, implementation and uses* (1979): 131-144. Uxbridge: Online Conferences.

Rothstein, Lawrence H. (1995).

The empowerment effort that came undone.

Harvard Business Review, Vol. 73, No. 1, January-February 1995: 20-31.

Rowe, Brenda (1981).

Type it yourself. Harmondsworth, Middlesex: Penguin Books.

Rowley, J. E. (1988).

Abstracting and indexing. Second edition. London: Clive Bingley Ltd.

Rush, Ramona R., Elizabeth B. Shear, Janrose C. Zingg, Judy A. Goodrich and Linda A. Porter (1988).

Technology over time: (Communication / information) lessons we should have learned. In Bryan Glastonbury, Walter LaMendola and Stuart Toole (eds.) *Information technology and the human services* (1988): 388-397.
Chichester: John Wiley & Sons.

Ryan, Bob (1992).

Built for speed. *Datamation*, Vol. 38, No. 3, 1 February 1992: 123-135.

Ryan, K. D. and D. K. Oestreich (1991).

Driving fear out of the workplace: how to overcome the invisible barriers to quality, productivity and innovation.
San Francisco: Jossey-Bass.

Safety Notes No. 223.

July 1994. Dublin: ESB Distribution Department.

Saksida, Marino (1992).

Information - a vision of the future: the human dimension.
Journal of Information Science Vol. 18, No. 5, 1992: 323-327.

Schlack, Mark and Bill Semich (1995).

Windows 95 Watch. *Datamation*, Vol. 41, No. 7, 15 April 1995: 15.

Schmitten, Ulrich (1995).

Phones with built-in intuition.

Siemens telcom report international, Vol. 18, Issue 4, July/August 1995: 66-68.

Schofield, Jack (1995).

Why PCs will continue to dominate desktops.

Computer Weekly, 23 March 1995: 30.

Schofield, Jack (1995).

Lotus finds out that it is not as easy as 1-2-3.

Computer Weekly, 9 February 1995: 26

Scott, Cynthia D. and Dennis T. Jaffe (1991).

Empowerment: building a committed workforce. London: Kogan Page.

Secretan, Lance H. (1972).

How to be an effective secretary. London: Pan Books.

Senn, J. A. (1989).

Analysis and design of information systems.

Second edition (International edition). New York: McGraw-Hill.

Seybold, Patricia B. (1993).

Cracking the code. *Computerworld*, Vol. 27, No. 40, 4 October, 1993: 33.

Shanahan, Annette (1995).

The strain of mousing. *Technology Ireland*, Vol. 27 No. 4, July/August 1995: 37.

Sharpe, Richard (1995).

Altogether now. *Computer Weekly*, 30 March 1995: 30-31.

Sime, M. E. and M. J. Coombs (eds.) (1983).

Designing for human-computer communication.

London & New York: Academic Press.

Simons, Robert (1995).

Control in an age of empowerment.

Harvard Business Review, Vol. 73, No. 2, March-April 1995: 80-88.

Sinclair, John and David Collins (1992).

Empowerment. *Leadership & Organization Development Journal*, Vol. 13, No. 3, 1992: 18-25.

Skynner, Robin and John Cleese (1994).

Life and how to survive it. London: Mandarin.

Smith, David (1995).

Death knell of the job? No, don't write its obituary yet.

Sunday Times, News Review, Section 3, 19 February, 1995, Pages 3.8-3.9.

Smith, Hyrum W. (1994).

The 10 natural laws of successful time and life management: proven strategies for increased productivity and inner peace. London: Nicholas Brealey Publishing.

Smith, John H. (1987).

Elton Mayo and the hidden Hawthorne.

Work, Employment & Society, Vol. 1, No. 1, March 1987: 107-120.

Smith, J. S. M. (1960).

A sense of history. Book 1: Learning to live together and homes to live in.

Leeds: E. J. Arnold and Sons Ltd.

Smith, Mark (1994).

Accidental heroes take large byte of Silicon Valley.

Sunday Independent, 13 February, 1994: 21.

Smith, Terry C. (1990).

Making successful presentations: a self-teaching guide. Second edition.

New York: John Wiley & Sons Inc.

Shell, Ned (1992).

Users want the bare fax. *Datamation*, Vol. 38, No. 18, 1 September 1992: 116-119.

Sparrow, Paul (1991).

Developing a human resource management strategy: International Computers Ltd.

In Karen Legge, Chris W. Clegg and Nigel J. Kemp *Case studies in information technology, people and organisations* (1991): 109-118.

Oxford and Manchester: NCC Blackwell Ltd.

Stacey, Ralph D. (1991).

The chaos frontier: creative strategic control for business.

Oxford: Butterworth-Heinemann.

Starr, Colin (1994).

The workflow of computing. In Robert Heller (ed.) *Managing 95: the global perspective*: 158-160. London: Sterling Publications.

Sterne, John (1987).

Whatever happened to office automation?

Irish Computer, Vol. 10, No. 11, January 1987: 35.

Stevens, Garry (1993).

Power and EDP departments: a case study.

New Technology, Work and Employment, Vol. 8, No. 2, September 1993: 111-121.

Stewart, Phyllis L. and Muriel G. Cantor (1982).

Varieties of work. Beverley Hills: Sage Publications.

Stibic, V. (1982).

Tools of the mind: techniques and methods for intellectual work.

Amsterdam - New York - Oxford: North-Holland Publishing Co.

Stocker, Paul (1992).

Human factors in the office environment. London: Her Majesty's Stationery Office.

Stonier, Tom (1991).

Towards a new theory of information.

Journal of Information Science 17 (1991): 257-263.

Strassmann, Paul A. (1985).

Information payoff: the transformation of work in the electronic age.

New York: The Free Press.

Strassmann, Paul A. (1988, 1990).

The business value of computers.

New Canaan, Connecticut: The Information Economics Press.

Stubbs, Roger (1992).

Appendix 1: The MORI results. In *Review of Relationships within ESB. First Report of the Joint Steering Committee, July 1992*: 34-37.

Sudman, Seymour and Norman M. Bradburn (1982).

Asking questions: a practical guide to questionnaire design.

San Francisco: Jossey-Bass.

Sveiby, K. E. and T. Lloyd (1987).

Managing knowhow: add value ..... by valuing creativity.

London: Bloomsbury Publishing Ltd.

Tannenbaum, Arnold S. (1966).

Social psychology of the work organisation.

London: Tavistock Publications.

Technology briefing: Lotus Development's Notes.

Computer Weekly, 22 June 1995: 18.

Technology fails to help promote women at work.

Computing, 22 September, 1994: 34.

Teeling, John and Anne Lynch (1985).

Modern Irish Business. Dublin: ETA Publications.

Tennick, Arthur (1993).

A word about Word. *Irish Computer*, Vol. 17, No. 10, December 1993: 37.

Terkel, Studs (1975).

Working: people talk about what they do all day and how they feel about what they do.

London: Wildwood House Ltd.

The changing nature of leadership.

Economist, Vol. 335, No. 7918, 10-16 February 1995: 65.

The Desktop Window.

Brochure: ICL. 1992, Registered no. 96056.

The only way to check the vision of VDU operators is at their own workstation.

Advertisement for Vutest in *Personnel Management*, Vol. 25, No. 10, October 1993: 65.

The trouble with teams: togetherness has its perils.

Economist, Vol. 334, No. 7897, 14-20 January 1995: 69.

Thé, Lee (1992a).

PCs tool up for hypertext. *Datamation*, Vol. 38, No. 3, 1 February 1992: 35-36.

Thé, Lee (1992b).

Stress Test for GUI Programs.

Datamation, Vol. 38, No. 18, 1 September 1992: 37-40.

Thé, Lee (1995).

Workflow tackles the productivity paradox.

Datamation, Vol. 41, No. 15, August 15 1995: 65-67.

Thomas, Michael (1985).

In search of culture: holy grail or gravy train?

Personnel Management, Vol. 17, No. 9, September 1985: 24-27.

Tilney, Kathy (1994).

The future of the office. In Robert Heller (ed.) *Managing 95: the global perspective*: 167-168.

London: Sterling Publications.

Training: Computer-based training works.

Personnel Journal - New Products.

Supplement to Personnel Journal, Vol. 73, No. 11, November 1994: 1-5.

Transform.

Bulletins No. 7, 26 December 1993; No. 8, 11 March 1994; and No. 9, 8 July 1994.

Dublin: ESB.

Trevor-Roper, Hugh (1987).

Introduction: The Baroque Century. In Hugh Trevor-Roper (ed.) *The Golden Age Of Europe: from Elizabeth I to the Sun King.* London: Thames & Hudson.

Turabian, Kate L. (1982).

A manual for writers of research papers, theses and dissertations.

London: William Heinemann Ltd.

Turner, Thomas, Michael J. Morley and Patrick J. Gunnigle (1994).

Developments in industrial relations and HRM in the Republic of Ireland.

IBAR (Irish Business and Administrative Research), Vol. 15, 1994: 76-92.

Tyler, Geoff (1992).

Can VDUs damage your health?

Management Services, Vol. 36, No. 2, February 1992: 36-40.

Tyler, Geoff (1995a).

The office citadel crumbles.

Management Services, Vol. 39, No. 9, September 1995: 32-33.

Tyler, Geoff (1995b).

Voice recognition - an opportunity being missed?.

Management Services, Vol. 39, No. 11, November 1995: 30-32.

Urry, John (1990).

Work, production and social relations.

Work, Employment and Society, Vol. 4, No. 2, June 1990: 271-80.

***Visual display units* (1983).**

Health and Safety Executive.

London: Her Majesty's Stationery Office.

Vogt, Judith F. and Kenneth L. Murrell (1990).

Empowerment in organizations: how to spark exceptional performance.

San Diego, California: University Associates, Inc.

Voice Mail: An investment in productivity, communications, and customer service.

Datapro. Managing Information Technology. Technology Issues and Trends: 1283. November 1995: 1-7.

Walley, Paddy (Edited by Jim Brick) (1993a).

Learning the future: a brief guide to the knowledge society.

Galway: City of Galway VEC.

Walley, Paddy (1993b).

Chapter 12: The future of work. In Colm Keane (ed.) *The jobs crisis* (1993): 156-167.

Cork and Dublin: Mercier Press.

Warren, Liz (1995).

Write to fit. *Computer Weekly*, 23 March, 1995: 38.

Watcham, M. (1973).

Office practice for schools.

Maidenhead, Berkshire: McGraw-Hill Book Co.

Webber, Alan W. (1993).

What's so new about the new economy?

Harvard Business Review, Vol. 71, No.1, January-February 1993: 24-42.

Weisbord, Marvin R. (1987).

Productive workplaces: organizing and managing for dignity, meaning and community. San Francisco: Jossey-Bass.

Weiss, Howard M. (1990).

Chapter 4: Learning theory and industrial and organizational psychology.

In Marvin D. Dunnette and Leaetta M. Hough (eds.) *Handbook of industrial and organizational psychology. Vol. 1.* Second edition.

Palo Alto, California: Consulting Psychologists Press Inc.

We've put management control at your fingertips. MOCCS.

ESB in-house leaflet (undated). Dublin: ESB.

Wharton, Keith (ed.) (1983).

Office networks: the user's view. Aldershot, Hants.: Gower.

Wheelwright, Geoff (1991).

Taking Notes. *Which Computer?* Vol. 14, No. 8, August 1991: 41-44.

When the bloat comes in.

Economist, Vol. 329, No. 7831, 2-8 October 1993: 95-96.

Willcocks, Leslie and David Mason (1987).

Computerising work: people, system design and workplace relations.

London: Paradigm Publishing.

Williams, Napier (1992).

Video arrives on the desktop.

Irish Computer, Vol. 18, No. 7, September 1994: 56-58.

Williams, Napier (1994).

Is there life after DOS? *Irish Computer*, Vol. 18, No. 8, October 1994: 42-43.

Willier, Mary Jane (1995).

The workplace of the future. *Executive Excellence,* Vol. 12, No. 4, April 1995: 5-6.

Witkin, Stanley L. (1988).

Guidelines for the development and assessment of human factors in software programs. In Bryan Glastonbury, Walter LaMendola and Stuart Toole (eds.) *Information technology and the human services* (1988): 310-325. Chichester: John Wiley & Sons.

Wood, Stephen (ed.) (1982).

The degradation of work?: skill, deskilling and the labour process. London: Hutchinson.

Wood, Stephen and John Kelly (1982).

Chapter 4: Taylorism, responsible autonomy and management strategy. In Stephen Wood (ed.) *The degradation of work?: skill, deskilling and the labour process* (1982): 74-89. London: Hutchinson.

Wright, Tim (contributor) (1994).

The shape of things to come. *Which Computer?*, Vol. 17, No. 9, September 1994: 52-59.

Wszola, Stan (1993).

Fax plus OCR: more than meets the eye. *Byte*, Vol. 18, No. 9, August 1993: 130-140.

Youngman, M. B., R. Oxtoby, J. D. Monk and J. Heywood (1978).

Analysing jobs. Farnborough, Hants., England: Gower Press.

Zeldin, Theodore (1994).

An intimate history of humanity. London: Sinclair-Stevenson.

Zuboff, Shoshana (1982).

New worlds of computer-mediated work.

Harvard Business Review, Vol. 60, No. 5, September-October 1982: 142-152.

Zuboff, Shoshana (1988).

In the age of the smart machine: the future of work and power.

Oxford: Heinemann Professional Publishing Ltd.

Zuboff, Shoshana (1995).

The Emperor's new workplace.

Scientific American, Vol. 273, No. 3, September 1995: 162-164.