ELECTRONIC TEXT PROCESSING IN THE LARGE SOUTH AFRICAN LIFE ASSURANCE COMPANIES

by

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THESIS PRESENTED FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
AT THE UNIVERSITY OF CAPE TOWN

FEBRUARY 1981

ACKNOWLEDGEMENTS

I wish to thank the following persons/organisations for the assistance given in completing this research:

Professor P. Sulcas, my promoter and supervisor for the genuine interest shown in the subject and his critical but constructive approach.

Mr K. Mattison, senior lecturer, my co-supervisor.

The South African National Life Assurance Company for providing the platform from which this research developed and the opportunity to test the theory in practice. Also for text processing facilities and language services provided.

The large South African life assurance companies who all responded to my questionnaire for the field study.

Numerous individuals and organisations for contributing by supplying information.

I certify that the thesis is my own work and that all references are accurately reported.

Signed by candidate

Signature Removed

S.J. MARAIS

SYNOPSIS

The use of computer technology and magnetic storage media for production typing led to a new term, "word processing". In this research word processing is considered to be part only of a more comprehensive concept - electronic text processing. This research project is directed towards the role of electronic text processing as an integral part of information management and integrated administrative support in the large South African life assurance companies. As far as could be determined this is the first comprehensive research done on electronic text processing against a business administration background at university level.

The research resulted from the growing emphasis on more cost-effective means for the origination, production, reproduction, storage, retrieval and distribution of text in organisations in general and in the highly paper-intensive life assurance industry specifically. Large international research institutions predict that electronic text processing will be one of the most active sections of the office information field.

The study focuses attention on the changing role of administrative office management in the South African life assurance industry; text processing procedures and equipment and the organisational implications of the introduction of the discipline. The feasibility, implementation and impact of electronic text processing are tested in one large South African life assurance company. The results of a field study evaluating the situation in similar organisations are also reported. The scope for electronic text processing is outlined resulting in the presentation of a "model" for integrated administrative support.

Life assurance is one of the most important sources of investment funds in South Africa and contributes substantially to the State's and the public sector's capital requirements. The research results make a marked contribution to knowledge on electronic text processing in general and outline ways and means for increased text processing production at lower cost in the South African life assurance industry.

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CHAPTER I

BACKGROUND

1.1 INTRODUCTION

This study deals with electronic text processing as an integral part of information management and administrative support in the large South African life assurance companies. In the literature preference exists for the term "word processing" as against "text processing". In the chapters that follow the term "text processing" is used for its more comprehensive description of the true nature of the activities involved. Electronic text processing is defined in section 3.2 and considered as a means for handling electronically those activities involved in the origination and transmission of word content - i.e. to make available thoughts or existing information in communicable text as a means towards greater office automation. Research by McNamara[1] shows that the use and the profitability of electronic text processing are not restricted to the life assurance industry only, but apply to offices in general. This research therefore covers only a selected sector of industry.

As a result of technological achievements in the field of electronic computers and the effect on office efficiency the transitional stage of administrative office management in adapting to these challenges is scrutinised. The procedural, technological, structural and behavioural implications of the introduction of electronic text processing are surveyed in detail. The feasibility, implementation and impact of electronic text processing on the head office operations of one large South African life assurance company (Company A) are subjected to detail analysis. Based on this experience the current status and impact of electronic text processing on the head office operations of large South African life assurance companies in general are surveyed by means of a field study. The results of the research are used to formulate the implications for the South African life assurance industry. A conceptual framework for an interactive administrative support system is offered and further areas for research defined.

The Ph.D candidate has been personally responsible for researching the theoretical background of electronic text processing, existing installations locally and abroad, and the successful implementation thereof in Company A.

The undertaking of the study has been motivated by a number of factors as will be substantiated in subsequent chapters, viz.

(i) Technological achievements in the field of electronic computers and communications developments have improved text processing and office efficiency, and this has brought about an improvement in the whole decision-making process based on the information handled and processed. Electronic text processing is increasingly viewed as an important element of information processing.

Large international research institutions examining the effect of new developments in information processing technologies in business management on an on-going basis indicate that the most active section of the office information field will be electronic text processing[(2)].

The highest level of productivity in all types of industry in the Republic of South Africa is required to counteract the high inflation rate. The life assurance industry makes an important contribution to the gross national product, and any development that can bring about a major increase in productivity and efficiency needs further attention.

(ii) The role of the administrative office manager is changing as a result of electronic text processing. Neuner, et al[(3)] is of the opinion that traditionally the office has been considered as a place where facts and figures were collected, processed and filed - usually on paper. As such it was considered a clerical record-keeping activity and storage location. This view is now being replaced by a more accurate view of the office - as a function for managing information. This view is substantiated by Connell[(4)] in a recent editorial in "Administrative Management".

The South African life assurance industry is in need of knowledge of the administrative potential of electronic text processing and a conceptual framework of the bearing of this on the functional areas of management, people, routine information processing, communication and work environment in future administrative management.

Internationally the life assurance industry makes use of a predominantly white-collar work force. Here, in general[5], there has been a greater growth in numbers compared with the manual workforce, as a result of increasing volumes of paperwork. This industry has thus provided an important impetus for the development of electronic data processing systems with a high degree of sophistication. The Life Office Management Association[6], an international organisation for the life assurance industry, estimates the information mix in the current life assurance office at 90% text and 10% data, which means that information handling is largely not directly assisted by automation. Research in the field of electronic text processing as an important component of effective management provides a challenge to improve this situation.

The Life Office Management Association (LOMA) compiles operations and systems reports, and information on those aspects that may improve productivity and efficiency in the life assurance industry is regularly distributed among member assurance companies throughout the world. In a recent report[7] they state that office costs have become one of the biggest items in a company's budget. At the same time, productivity levels have not changed in proportion to these costs. They consider that one of the main reasons for this discrepancy is the lack of an office system. LOMA regards electronic text processing as a logical and essential first step in achieving an office system.

Active involvement of the Ph.D candidate in the development of efficient and more productive systems for administrative office management in a large South African life assurance company, and close liaison with other life assurance companies have revealed mutual problem areas for administrative office management in the field of text processing. These problem areas are universal for the life assurance industry, as has been substantiated by

research[8] and through personal contact with leading research institutions, universities, consulting firms, equipment vendors and users in the U.S.A., Europe and England[9].

The results of an electronic text processing installation in a large South African life assurance company point to substantial benefits for the industry as a whole.

(iii) No other comprehensive research done against a business administration background or in the assurance industry specifically in the proposed field of study at university level could be located locally and abroad. In the U.S.A. where the major electronic text processing development takes place the focus has mainly been on the implications on education e.g. research by Rieff[10], Casady[11] and Powell[12]. One M.B.A. thesis (equivalent to a technical report of the South African universities) presented in the U.S.A. touched on aspects of productivity and profitability but emphasised the future role and training requirements of the secretary in the changing office structure[13]. Biggs[14] surveyed word processing in a number of companies in South Africa to determine a rationale for selecting word processors.

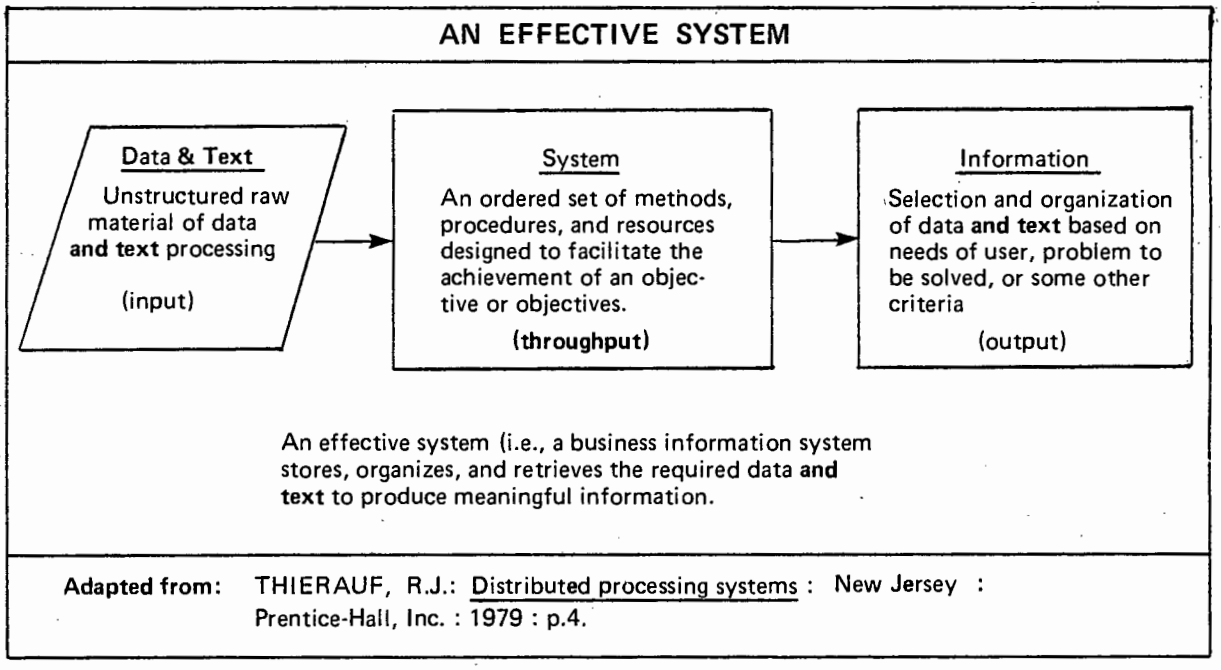
1.2 ELECTRONIC TEXT PROCESSING AND INFORMATION PROCESSING

According to Diebold - Europe[15]:

"..... it is becoming clear with advances in electronics technology and conceptual developments in word processing that 'word' and 'data' processing are in fact aspects of a functional continuum - information processing."

Thierauf[16] views 'data' as unstructured facts as input to an information system, whilst 'information' is regarded as selected data coming as output from a system and being meaningful to the user. The 'system' transforms the data into information. If 'data' and 'text' are seen in supplementary function an adaptation of Thierauf's diagram[17] of an effective system is feasible.

TABLE 1



Information is increasingly regarded as a management resource:

Duffy[18]

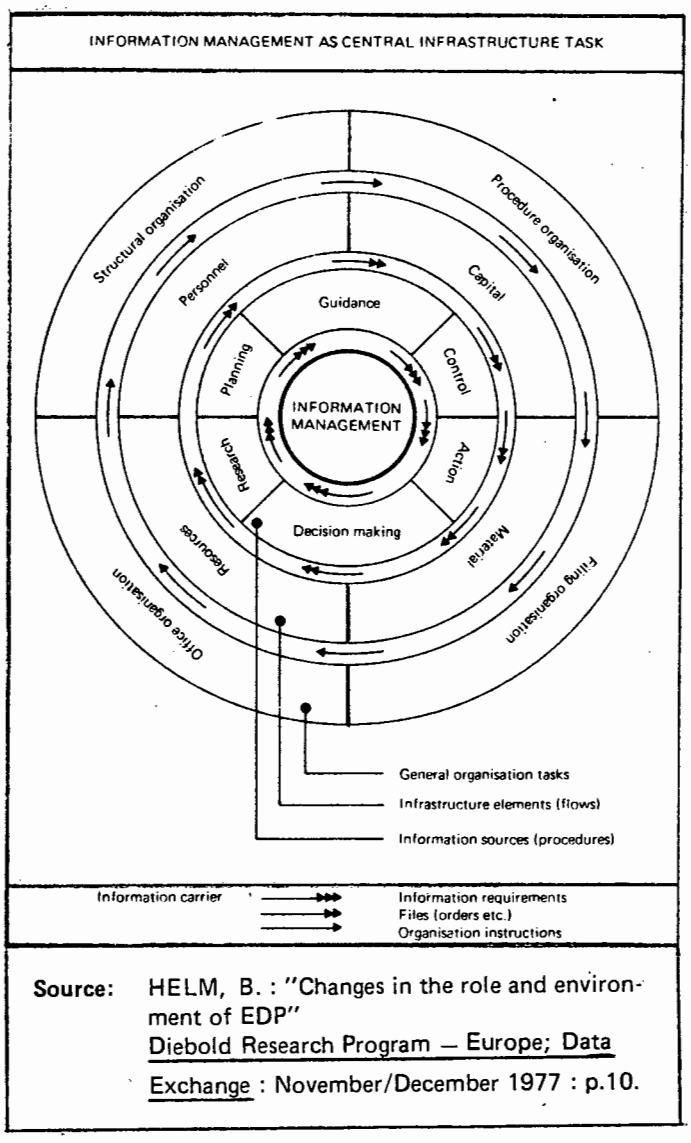
"Traditionally, the private organisation has been seen as a system that interacts with its environment. Resources (in the form of men, money, materials and machines) are inputs from the environment to the organisation, where a conversion process takes place. Outputs (in the form of goods and services) are returned to the environment. Increasingly, reference is made to a fifth resource - information."

Thierauf[19]

"There is a growing awareness that accurate and timely information is a vital resource of the firm and that an effective information system is a means of providing the needed information."

Helm[20] predicts that in the future the historically developed functional organisational structures will have to be re-thought and re-structured in the light of information processing procedures. Information management will be regarded as a central infrastructure task, presented diagrammatically in Table 2.

TABLE 2



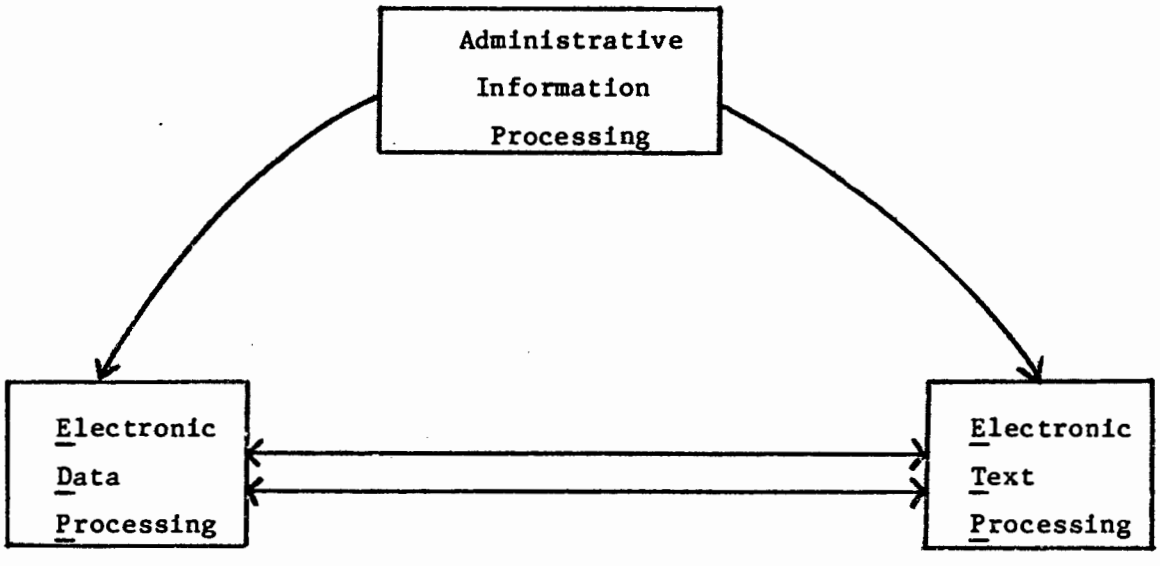
Source: HELM, B. : "Changes in the role and environment of EDP"
Diebold Research Program – Europe; Data Exchange : November/December 1977 : p.10.

Duffy[21] is of the opinion that the underlying technologies of information processing have begun to merge. Some managers have begun to realise that all these technologies are part of the total information resource of an organisation; that the information resource is a substantial cost element; and that it is the only resource that is not the responsibility of one manager.

Stuckenbröcker[22] expects that information processing will advance into new fields, whilst recent developments in technology offer a variety of bases from which integrated management systems with a high degree of efficiency and ease of communication can be established to interlink data processing, information storage and retrieval and word processing.

The office of the future may be regarded as an interactive information processing centre, the productivity of which will depend on simplified work flow and procedures with the aid of electronic office machines and less handling of paper. The concept of interactive administrative information processing may be subdivided into two categories, viz. electronic data processing and electronic text processing. Schematically this may be depicted as follows:

TABLE 3



1.3 THE SOUTH AFRICAN LIFE ASSURANCE INDUSTRY

Some 39 companies are registered as South African life assurers[23]. The Life Offices' Association of South Africa[24] has revealed:

- That presently some 2 000 000 South Africans are individual life assurance policy-holders with one or more companies. Approximately an equal number are employee members of assured pension schemes.

- Assurance companies invest policy-holder savings and therefore make funds available for the development needs of government, industry and other sectors of the national economy. An amount of R1314m was saved by way of life assurance premiums in 1978. With R4,2m to invest every working day of 1978, life assurance was one of the most important sources of investment funds in South Africa. Assets are invested in all the important sectors of the economy and thereby contribute substantially to the State's capital requirements.

- Life assurance companies are statutorily obliged to invest certain proportions of their funds in the public sector. (R583m invested in public sector securities for 1978).

- A life office incurs expenses in procuring new business and administering its existing business. Continuous attention is given to restricting these expenses to a minimum and accordingly there is a continuous development of computer and management techniques. As a result of this, there has been a decrease in the operating expenses of the South African life assurance industry over the past 5 years from 17,5% to 14,2%.

The Life Offices' Association (LOA) divides life assurers arbitrarily into two categories, i.e. large and small, where only 9 companies represent the first category(25). The indication is(26) that the largest and second largest companies are responsible for approximately 50% of the total life assurance business. The large category accounts for 83% of the total premium income while the others are responsible for the remainder.

1.4 OBJECTIVES, METHODOLOGY AND LIMITATIONS

Initially the researcher planned to approach all the life assurers to participate. Personal knowledge of the viability of electronic text processing in some and negotiations with vendors and other institutions revealed that the short term prospects for electronic text processing were small in other than large companies. For that reason it was decided to concentrate on the 9 companies considered large by the Life Offices' Association. One company in this group installed an advanced electronic text processing system, is considered to be a pioneer(27) in the field and has proven results. The experience gained with the installation serves as the basis for further research and comparison.

1.4.1 Objectives

The research aims:

(i) To provide an understanding of administrative office management in transition as a result of technological

advances in text processing and to outline traditional office problems and solutions thereto in the life assurance industry. (Chapter II)

(ii) To define the concept of electronic text processing and further the understanding of the procedural aspects of its logical phases, viz. origination, production, reproduction, storage, retrieval and distribution. (Chapter III)

(iii) To provide knowledge on input, throughput and output systems for electronic text processing, and guidelines for systems selection. (Chapter IV)

(iv) To indicate the structural and behavioural implications of the introduction or expansion of electronic text processing in organisations. (Chapter V)

(v) To gauge the feasibility, implementation requirements and impact of electronic text processing in one large South African life assurance company to determine the extent to which it will have success in:

- Increasing labour productivity.
- Reducing the cost of paper handling.
- Reducing the volume of paper and facilitating information storage.
- Increasing the availability, accuracy, quality and turn-around time of information.
- Facilitating decision-making and communication.
- Creating meaningful career paths and higher job satisfaction for typists/secretaries.
- Providing a basis for interactive administrative support.

(Chapter VI)

(vi) To substantiate through the results of a field study the validity of hypotheses formulated on the current status and impact of electronic text processing on the head office operations of the large South African life assurance companies. (Chapter VII)

(vii) To indicate the implications of the research findings for the South African life assurance industry in general. (Chapter VIII)

(viii) To identify how the future office is likely to develop from the impetus of new technology and to present a conceptual framework for interactive administrative support. (Chapter IX)

1.4.2 Methodology

Electronic text processing has to do with computer technology and many new terms were created recently to describe functions. Every effort has been made to keep the terminology at a non-technical level. A descriptive list is given as an appendix at the end of this thesis to clarify certain terminology. The terms "text processing" and "word processing" are used synonomously.

This study is presented in nine chapters with footnotes (and appendices where deemed necessary) at the end of each.

Chapter I introduces the topic and outlines the relationship of electronic text processing to information processing, puts the South African life assurance industry in perspective as a vital factor in the economy, outlines the objectives of the study, the methodology applied and the limitations experienced.

Chapter II outlines administrative office management in the South African life assurance industry, indicating traditional office problems experienced and offering comparative solutions to these. The changing role of the administrative manager is emphasised. (Objective 1.4.1 (i))

Chapter III broadens the perspective of electronic text processing by covering the procedural aspects in depth with reference to the administrative potential and current position locally and abroad. (Objective 1.4.1 (ii))

In chapter IV electronic text processing systems are covered outlining available technology and future trends. It is necessary to touch on certain technical issues but it is always endeavoured to illustrate them practically. Guidelines for systems selection are presented. (Objective 1.4.1 (iii))

Chapter V is concerned with the structural and behavioural implications of electronic text processing - scrutinising organisation structures, management and the worker. (Objective 1.4.1 (iv))

Chapter VI is an account of the feasibility, implementation and impact of electronic text processing on the head office operations of one large South African life assurance company. The factors leading to the research are outlined and text processing problem areas are indicated. The stages of feasibility study, systems design and implementation are presented. The results are shown in organisational, administrative and financial terms. The scope of electronic processing in the company is outlined. (Objective 1.4.1 (v))

Chapter VII details the research methodology followed in a field study carried out in large South African life assurance companies. It indicates the companies chosen, limitations, anticipated results in the form of hypotheses, the questionnaires compiled, the classified data, evaluated results and generalisations to be drawn. (Objective 1.4.1 (vi))

Chapter VIII indicates the implications of the research findings, especially in terms of the parameters for success stated in research objective 1.4.1 (vi), for the South African life assurance industry in general. It is shown whether the research findings only apply to organisations of a particular size or universally. The value of the research in terms of a contribution to knowledge is outlined. (Objective 1.4.1 (vii))

Chapter IX is an overview of the study and presents a scenario as to the contribution of electronic text processing to the future office. A conceptual framework of interactive administrative support is offered. The educational implications of the research is outlined. Finally an indication is given of how the findings and conclusions that could be drawn from the study meet the objectives stated in 1.4.1.

1.4.3 Limitations

Electronic text processing as a basis for interactive administrative support, as developed through this research, is a new concept. Word processing, as the discipline is generally known, by electronic means is a relatively new development to organisations in general but predicted to be a major growth area. Rapid technological advances took place during the course of the research project and new applications are continually announced. Scenarios of the "office of the future", and technologies that are supposedly outdated by the time they reach the market, are regularly presented. Many of these are "supplier-driven" to create a buyer's market, whilst others are presented by consultants and users alike claiming vast experience and expertise which undoubtedly cannot be possible at this stage of development. This situation prevails not only abroad but becomes a regular feature in local journals. If this is the state of the art with a research topic it calls for an objective and selective approach. Research material was difficult to find. A limited number of text books are published in this field and it was necessary to rely on articles published in magazines since 1975.

Electronic text processing is also a relatively new concept to the life assurance industry in the Republic of South Africa. With the exception of one large life assurance company, pioneering in this field, most others have only implemented systems in their head offices since the acceptance of this research proposal (beginning of 1979) and often on an experimental basis only. This resulted in certain difficulties in obtaining relevant information from knowledgeable people in the various organisations surveyed as their viewpoints are not necessarily based on practical experience but rather on assumptions. This situation was reflected in some of the covering letters received with completed questionnaires.

CHAPTER 1 : FOOTNOTES

(1) McNAMARA, J.J. : Word processing and administrative support : Unpublished M.B.A. thesis : Warner College, New York : June 1973 : p.60.

(2) ARTHUR D. LITTE INC. : Administrative Management : January 1979, p.42.

(3) NEUNER, J.J.W. et al : Administrative Office Management : Ohio : South Western Publishing : 1972 : p.18.

(4) CONNELL, J.J. : "How your job will change in the next 10 years" : Administrative Management : January 1979 : p.26.

(5) DIEBOLD, J. : "Office information systems - productivity improvements using office automation technology" : Diebold Research Program - Europe ; Data Exchange : July/August 1979 : p.3.

(6) LOMA : "System for a corporate office processing environment" : Operations and Systems Report No. 47 : January 1979 : p.5.

(7) LOMA : "Op cit : p.5.

(8) LOMA : Op cit : pp.3 - 23.

LOMA : "Word processing in life assurance companies" : Operations and Systems Report No. 52 : August 1979 : pp.2 - 20.

(9) The result of a number of visits to attend conferences and exhibitions on electronic text processing or related fields, allowing the opportunity to make further contacts and gain wider knowledge of the subject.

(i) Research institutions/consultancy firms : Diebold Research Program (Europe); Arthur D. Little Inc., Altman & Weil Inc., International Word Processing Society, Quantum Science Corporation and Ball State University of Indiana (U.S.A.).

(ii) Users in England, Europe and the U.S.A.

(iii) Leading international suppliers of text processing equipment.

(10) RIEFF, R. : "Entry - level job qualifications and employee attitudes in New York City word processing centres and implications for secondary school business education curricula in the New York Metropolitan area." : Unpublished Ph.D thesis : New York University (U.S.A.) : 1974.

(11) CASADY, M.J. : "Job satisfaction of magnetic typewriter operators in word processing" : Unpublished Ph.D thesis : University of Minnesota (U.S.A.) : 1973.

(12) POWELL, M.E. : "The modern automated word processing system - its implications for changes in the curriculum for business and office education." : Unpublished Ph.D thesis : University of Montana (U.S.A.) : 1975.

(13) MC NAMARA, J.J. : Op cit.

(14) BIGGS, G.L. : Word processing : Unpublished M.B.A. technical report : Graduate School of Business, University of Cape Town : November 1978.

(15) DIEBOLD RESEARCH PROGRAM - EUROPE : "Word processing" : Research Report NO. E134 : April 1976 : p.1.

(16) THIERAUF, R.J. : Distributed processing systems : New Jersey : Prentice-Hall, Inc. : 1979 : p.4.

(17) THIERAUF, R.J. : Op cit : p.5.

(18) DUFFY, N. : "Why managements are becoming more involved with information systems" : Business South Africa : April 1979 : p.39.

(19) THIERAUF, R.J. : Op cit : p.5.

(20) HELM, B. : "Changes in the role and environment of EDP" : Diebold Research Program - Europe; Data Exchange : November/December 1977 : p.10.

(21) DUFFY, N. : Op cit : p.16.

(22) STUCKENBRÖCKER, B. : "External information resources for online access - a new organisational task" : Diebold Research Program - Europe; Data Exchange : March/April 1979 : p.23.

(23) REGISTRAR OF INSURANCE : Thirty-fourth annual report for year ended 31 December 1977 : August 1979 : p.14.

(24) LIFE OFFICES' ASSOCIATION OF S.A. : Review of life insurance : 1978 : pp.2 - 12.

(25) LIFE OFFICES' ASSOCIATION OF S.A. : Half-yearly statistics : Circular 2822 : 18 April 1979.

(26) REGISTRAR OF ASSURANCE : op cit : p.15

TEMKIN, B. : "S.A. Wêreldleier in versekering" : Rapport (Sake-rapport) : 1 July 1979 : p.3.

FINANCIAL MAIL : Top companies supplement : 20 April 1979 : p.156.

(27) BUSINESS SYSTEMS & EQUIPMENT : "Is this the ultimate in word processing?" : Volume 8, No. 10 : October 1977 : p.1.

CHAPTER II : ADMINISTRATIVE OFFICE MANAGEMENT IN THE SOUTH AFRICAN LIFE ASSURANCE INDUSTRY

CHAPTER II

ADMINISTRATIVE OFFICE MANAGEMENT IN THE SOUTH AFRICAN LIFE ASSURANCE INDUSTRY

2.1 INTRODUCTION

This chapter aims at putting administrative office management in perspective against traditional office problems and the increased emphasis on office automation. It accounts for the present status, the transitional stage and future challenges of administrative office management. Present day administrative office problems in the life assurance industry are analysed to indicate the implications. Solutions are also offered to these problems.

The organisational context of administrative office management is covered in section 2.2. The various parts of an organisation are outlined and the role of administrative office management then related to it.

Section 2.3 deals with administrative office management in transition. The changing role of this specialised field of management as a result of technological advances in office equipment will be emphasised. Office automation will be viewed as an evolutionary process, allowing administrative office management to improve administrative procedures in a planned structured way. This will be dealt with against four stages of growth in offices in general, viz. initiation, expansion, formalisation and maturity. The initiation stage will be dealt with in detail, since the focus of this research is mainly on this stage with the objective of creating an awareness of, and offering, practical solutions by means of electronic text processing to a variety of office problems.

The approach in section 2.4 will be to determine the relevant factors (or development issues) in the integrated electronic office. These factors will be analysed to determine the scope of administrative office management in future and to indicate the relative importance of each factor.

A number of common administrative office problems are analysed in section 2.5 and specifically related to the life assurance industry in general. The increasing volumes of paperwork, rising costs and people problems are subjected to detail analysis.

In section 2.6 solutions are offered to the administrative office problems outlined in section 2.5. Text processing is offered as an important discipline for bringing about cost-effective offices meeting the demands of the relevant factors in the integrated electronic office dealt with in section 2.4.

2.2 THE ORGANISATIONAL CONTEXT OF ADMINISTRATIVE OFFICE MANAGEMENT

The role of administrative office management can only be properly evaluated against the background of where it fits in organisations. According to Mintzberg[1] organisations can be divided in five basic parts, viz.

(i) The strategic apex; Charged with overall responsibility for operations to ensure that set objectives are achieved and meaningful decisions are taken. Activities are characterised by a minimum of repetition and standardisation.

(ii) The middle line; The formal authority between the strategic apex and the operating core, normally consisting of a number of different hierarchical levels responsible for achieving through guided leadership, the strategy set by the strategic apex.

(iii) The operating core; The area of input, processing, output and direct support activities which are necessary for producing products or services. This is seen as the heart of every organisation, facilitated by administrative components. Standardised work procedures normally exist.

(iv) Support staff; Providing indirect support for the operating core of the organisation outside the basic flow of operating work.

(v) The techno-structure; Consisting of the analysts concentrating on planned change to meet organisational demands and to effect standardisation.

Quible[2] views the administrative office management function as primarily supportive, freeing many individuals in an organisation from these activities. Some of these support units are self-contained, almost like mini-organisations, with their own equivalent of an operating core, e.g. a text processing centre in an organisation. With increased office automation these support units tend to get more centralised and specialised, requiring professional administrative office management and skilled personnel. This adds a new dimension to administrative office management.

Some of the objectives of administrative office management pointed out by Quible are closely related to those factors or development issues in the integrated electronic office. Since these are dealt with in Section 2.4 it is only necessary to point out here that they are part of administrative office management's responsibility.

2.3 ADMINISTRATIVE OFFICE MANAGEMENT IN TRANSITION

The role and scope of administrative office management has broadened in recent years with rapid advances in technology, equipment and work processes. Connell[3] predicts that the administrative office manager in future will be faced with increasingly sophisticated technologies facilitating management communications, improving office productivity and providing more meaningful work to office personnel. This view is substantiated in various volumes of recent local and overseas publications referring to the concept of the "office of the future". The role of administrative office management can be seen as one of transition - carefully selecting those changes that will be of real value to organisations.

While technology is increasingly providing administrative office management with the tools to change administrative processing dramatically, the implementation will be rather evolutionary than revolutionary. This means that planned change can be effected in administrative processes and that progress can be monitored. Grundsteidl[4] warns that one must realise that in the area of office automation organisations are still in a pioneering phase. He stresses the importance of looking at the total system and its interrelationships.

An interesting view of the stages of growth in general administrative systems is expressed by Strassmann[5]. The four stages are : mechanisation of tasks, machine-aided transactions, work redesign and work enlargement. According to Nolan[6] information systems in organisations mature through four stages of growth, i.e. initiation, expansion, formalisation and maturity. Zisman[7] foresees similar stages of growth in the office and examines them further from this point of view:

(i) Initiation; Awareness of technology and the use of mechanised office equipment for reducing office costs and increasing productivity, concentrating on the more efficient production of paper.

(ii) Expansion; The office mechanisation phase aims at replacing paper flow with electronic means and developing devices to that effect. The integration of these devices to form a cohesive whole is not important at this stage. People problems are to be expected, with the challenges of organisational problems bigger than the technical ones.

(iii) Formalisation; Cohesive systems will be planned, integrating applications and facilities with a shift from mechanisation to automation - from device orientation to process orientation.

(iv) Maturity; The stabilisation phase. The generation of change, the integration thereof into the work environment and the stabilising of the effects thereof.

Nolan's[8] four-stage concept, although still valid, has since been superseded by his viewpoint of six applicable stages, viz. initiation, contagion, control, integration, data administration and maturity. According to research done by Diebold[9] only a very small percentage of large companies have reached the stage of maturity in some automated office systems. The development and implementation of text processing is primarily still in the initiation stage, although some activities may have reached the maturity stage.

Zisman's[10] account of the initiation stage is used as a framework for highlighting aspects relevant to this research. According to him this stage will mark the awareness by organisations of technological opportunities for cost reduction or increased production - normally limited to text processing equipment.

Some users may take advantage of interfacing text processing equipment to phototypesetting systems and other output media. The emphasis will in this stage rather be on the more efficient production of paper than reducing paper. Administrative office management will therefore first concentrate on these areas of office automation and as success is achieved expand to the next stage. This is a necessary first step in the transition process - moving from initiation to maturity and changing the very nature of work in the process.

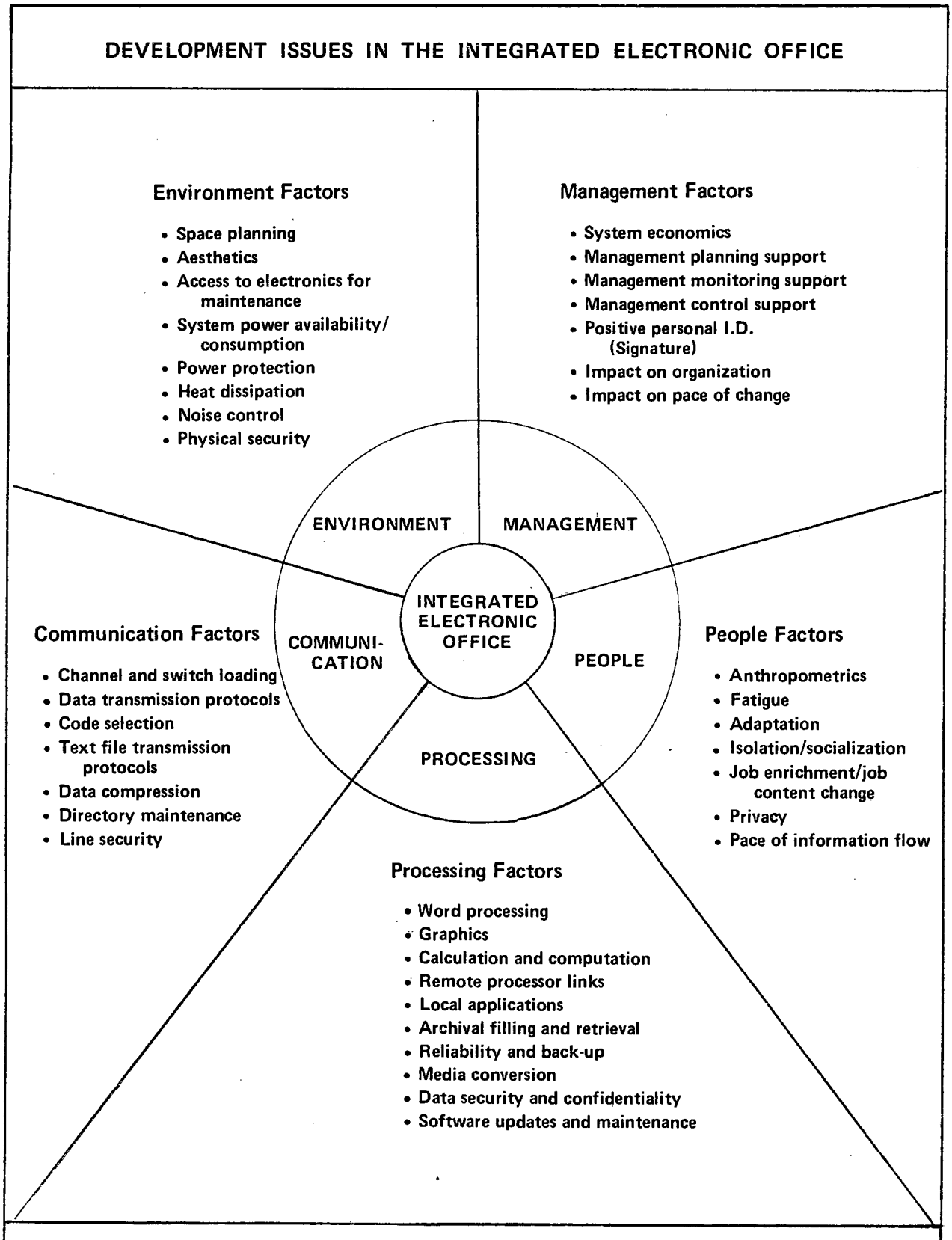
2.4 THE SCOPE OF ADMINISTRATIVE OFFICE MANAGEMENT

The fast changes that are taking place in administrative office management, create a need for a conceptual framework of the various factors (or functional areas) involved and their relative importance. In surveying the literature various viewpoints are found on each of these functional areas of administrative office management. The general tendency is to view a particular functional area, be it technology, or information, or people as the most important. These different schools of thought too often ignore other functional areas that are interrelated. Administrative office management has to do with all these functional areas and only through successful co-ordination can the desired end results be achieved.

White[11] reports on one sophisticated user of automated office equipment in the United States of America. He offers us a schematic presentation (depicted in Table 4) of the development issues (or functional areas) in the integrated electronic office envisaged by this organisation.

TABLE 4

DEVELOPMENT ISSUES IN THE INTEGRATED ELECTRONIC OFFICE



Source: WHITE, R.B. : "A prototype for the automated office" : Datamation : April 1977 : p.88.

Since systems are designed to suit individual needs, this approach is not offered as the basis for all research on automated offices systems. Some of the activities reflected under each functional area in Table 4 may not apply to a given situation and others may have to be added. This approach will, however, be used to analyse the scope of administrative office management in each of the five functional areas of management, people, processing, communication and environment. These factors are integrated and are only isolated to be analysed for the purpose of understanding them and the process better.

2.4.1 Management

The managerial process involves several different managerial functions. Since the management process concentrates on achieving desired results the functions of planning, organising, leading, co-ordination and control are all instrumental in this. These functions involve action with the aid of resources under certain conditions to produce goods or services of an acceptable standard at reasonable cost. They also involve information for decision-making. Administrative office management can make a contribution in this respect with the aid of text processing. Neuner's[12] view on this is:

> "As a principal party in the collection, processing, storage, retrieval, and distribution of information, the administrative office manager plays an important role in the decision making process. His task becomes one of providing the decision maker, at the least possible cost, with information that is accurate, accessible, and sufficiently current to be useful."

2.4.2 People

People have always played an important role in administrative processing. Any change in office procedures affects the workers. Connell's[13] viewpoint is:

> "As in today's office, the office of the future will be a people place - a world populated by human beings with increasing concern about job satisfaction, intellectual stimulation and the desire to participate in the essentials of the enterprise. How readily office employees will accept new technologies will depend on how responsive the new technologies are to peoples' needs, as they perceive those needs. Employees will welcome technology which they feel augments their capabilities. Conversely, they will resist technology that seems to automate both offices and office personnel."

Text processing is viewed not only as an aid to management but also a means of changing organisational and job structures to the benefit of the worker. This important aspect of administrative office management will be dealt with in detail in Chapter V.

2.4.3 Processing

This is the technology aspect - those factors necessary for administrative processing. The rapid advances in office technologies means that in future administrative office management will have to deal with a variety of technologies, each with its own characteristics. Electronic text processing will be one of these technologies for administrative processing - often viewed as the most significant recent development in office automation. The technological developments in electronic text processing offer administrative office management the opportunity to solve a number of problem areas achieving better cost-effectiveness.

2.4.4 Communication

Communication may refer to an improved contact situation between people. It may also refer to telecommunication - the ability of electronic equipment in different locations to communicate data, text or voice over direct or telephone lines. According to Connell[14] the primary function of the office is to process and communicate information. Electronic text processing is a means of facilitating the communication process, through the improved availability, accuracy and turnaround time of information.

2.4.5 Environment

This factor refers to the work environment in the electronic office of the future. Special requirements exist for office layout, energy requirements, protection of power source and security.

Within these functional areas lie the scope of administrative management. Text processing can be viewed as the starting point from where the development will take place.

2.5 TRADITIONAL OFFICE PROBLEMS IN THE LIFE ASSURANCE INDUSTRY

Waterhouse[15] refers to "traditional offices" as offices operating in the same way they have done for years. "Traditional" mostly refers to the type of office equipment and work procedures used before electronic text processing.

It is readily accepted that offices in general are paper- and cost-intensive, unproductive, inefficient and offer little job satisfaction. The office problems of the South African life assurance industry are mostly common to those of administrative offices in general. As was mentioned in section 1.1 (ii), active involvement in and close liaison with the South African life assurance industry also revealed a similar picture in the field of text processing.

These problem areas are often not properly researched or the statements are based on insufficient evidence. There often seems to be inconsistency in the sources used for basic information. Another factor to bear in mind is that research findings in this field are almost non-existent in South Africa. The American model will therefore serve as a basis for comparison whenever available. For some of the traditional office problems referred to there may not be specific references in the literature to substantiate the statements.

Cecil[16] is of the opinion that policies and procedures are often set when businesses are started. Through the years many factors affecting the organisation may change due to personnel turnover, government regulations, a more demanding business environment, increased costs and increased paperwork. Often office procedures stay the same, whilst everything else changes. The author predicts that the traditional office procedures will change drastically:

> "To meet the tremendous demand for processing more information in less time, offices are now isolating, defining and examining the problem. The answer seems to lie in the awareness that the office must be managed and organized to perform its business just as efficiently as the production line in the factory or the data processing department, which automatically handles payrolls, invoicing, budgeting, inventory control, and cost accounting."
>
> "Surveys of all types of offices point out that there are certain situations which interfere with smooth-flowing work performance and the control of costs."

The Life Office Management Association[17] in the U.S.A. reports a text processing project being undertaken in a large life assurance company to solve most of the traditional office problems. Their emphasis is on goals to be reached, rather than problem definition to determine the most critical areas for cost-effectiveness. These goals are depicted as follows:

TABLE 5

GOALS OF TEXT PROCESSING			
SUPPORT CORPORATE GROWTH WITH MINIMAL COST	IMPROVE DOCUMENTATION STORAGE & RETRIEVAL	PROVIDE CUSTOMIZED ADMINISTRATIVE SUPPORT	IMPROVE TURNAROUND & QUALITY OF OUTPUT
IMPROVE DISTRIBUTION OF DOCUMENTATION	REDUCE COSTS TANGIBLE & INTANGIBLE	IMPROVE INTERNAL COMMUNICATION	INCREASE PRODUCTIVITY OF USERS
PROVIDE GREATER USER SUPPORT	IMPROVE MANAGEMENT CONTROL	IMPROVE CAREER OPPORTUNITIES	IMPROVE JOB SATISFACTION

Source: LOMA : "System for a corporate office processing environment" : Operations and Systems Report No 52 : August 1979 : p.18.

The focus will now be on the extent of these office problems, whilst their effect in the large South African life assurance companies will be tested by a field study, the results to be reported in Chapter VII.

2.5.1 Increasing volumes of paperwork

Paperwork is associated with the main office problems and traditionally the assurance industry has paper-intensive operations -- probably the major characteristic. Paperwork communicates information on transactions for internal operational use, for decision-making, for informing the result of decisions, or simply to make known. It is often created and stored for possible future reference or to substantiate decisions made earlier.

Kuttner[18] sees clerical work as paperwork providing a service rather than producing a product. The preparation or delivery of papers is aimed at action or decisions or confirmation of action. Ash[19] claims that although it is the information that is needed, it is the paper that controls the process - the speed and cost.

There are many criteria that may be used in assessing and comparing life assurance companies, such as new business issued, total assets and premium income. From a paperwork point of view it is the number of policies issued and transactions handled in maintaining existing policies which are crucial. It follows that the larger an assurance company the bigger its filing systems are and the more policies will be issued and maintained. Each large South African life assurance company issues new policies at a rate ranging from 40 000 p.a. to well over 100 000 p.a.[20] It also follows that apart from growth in new business the volume of transactions pertaining to the maintenance of existing business increases as well. Increasing volumes of paperwork mean costly filing facilities, staff to file and retrieve text, the possibility of misfiling and lost information and slower response time for client-requests being answered. The way in which paperwork is handled in organisations may have a direct effect on decision-making and communication, at any of the levels as outlined in section 2.2.

2.5.2 Increasing cost structures

The increasing cost structure without corresponding increase in productivity is referred to in most recent overseas publications on business operations in general and assurance in particular. Information on the South African situation is not readily available - and for the life assurance industry assumptions have to be made. McGill[21] is of the opinion that, despite efforts by data processing in the assurance industry office, costs have increased as a percentage of virtually any measurement.

According to LOMA[22] the rise in office costs is directly related to the higher costs of salaries, benefits, services and facilities. Hodgdon[23] quotes the authoritive Stanford Research Institute's figures of 40 to 50% of total cost as administrative cost. Ash[24] and Zisman[25] predict that

office labour cost will increase by 6 to 8% per annum in the USA.

The Bureau for Economic Policy and Analysis (BEPA) of the University of Pretoria recently published research findings on human resources development in South Africa which have a bearing on this research. In this report, Van der Merwe[26] presents the indices of average earnings, employees' share, output per worker, implicit price and labour cost per unit of output in the non-agricultural sectors (of which the insurance industry forms part) for 1970 - 1977. These figures show that average earnings went up by 117% and that labour cost per unit of output increased by 112% over a period of eight years.

Statistics on the South African assurance industry (including short-term insurance) have been published by the Department of Statistics only since 1971. The figures published in the 1978 South African Statistics[27] reflect an increase of 3 442 (11,36%) in the work force for the years 1971 to 1977. During the same period salaries and wages increased by R113 661 000 (117,07%). This represents an average increase in labour cost of 16,72%, closely related to the average for the non-agricultural sectors over roughly the same period.

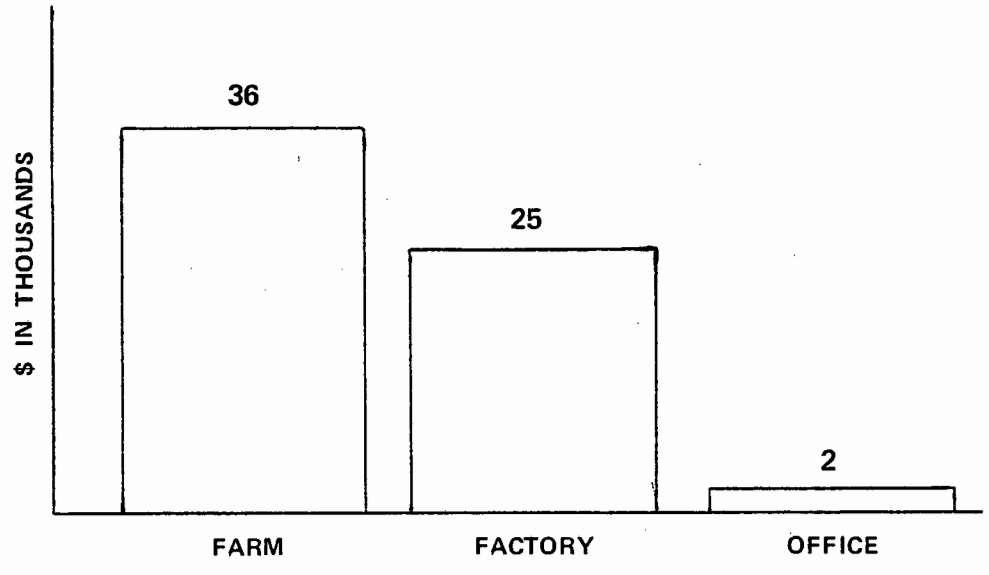
The life assurance industry uses predominantly white-collar workers. No authoritive figures are available in South Africa to measure productivity in this industry. The United States Department of Labour [28] estimates a 0,5 percent per annum increase in productivity for the white-collar group against 6 to 7% for the blue-collar group (industrial and agricultural).

Many arguments are offered for the almost static productivity level of office workers against factory and agricultural workers in the U.S.A.. Potter[29], Hodgdon[30], Zisman[31] and the Diebold Research Group are in agreement that it is mainly because of the relatively low investment in capital equipment per office worker against similar investment in the factory or on farms. According to Hodgdon[32] it is this lack of automation in the office which resulted in the processing and storing of paper becoming a major portion of the operating budget. There is a difference in figures quoted, but Table 6 - Diebold's[33]

findings on capital investment per worker clearly shows the differences.

TABLE 6

CAPITAL INVESTMENT PER WORKER/INDUSTRY IN THE USA



Source: Diebold Research Program – Europe : "Planning office automation MIS implications" : Research Report No E178 : June 1979 : p.20.

Mc Gabe and Popham[34] view the processing of words as predominantly a clerical function which is labour-intensive and which could be assisted by automation:

> "Although factory production costs were reduced significantly by eliminating inefficient operations through automation, little attempt was made until recently to automate the clerical or secretarial operations of the business office. With clerical salaries rising sharply, however, the cost of producing a business letter is increasing every year. Most business firms are desperately seeking ways to reduce costs. In fact, the single most important factor in bringing about the transition to word processing and eventual office automation is sharply-rising costs."

The Dartnell Institute of Business Research in the U.S.A. regularly carries out surveys on the cost of producing business letters. These figures vary considerably with the type of work, work procedures and types of industry. They determined that the cost of producing a business letter in the traditional way is increasing as salaries and wages go up. Figures for the U.S.A.[35], the U.K.[36] and South Africa[37] show a favourable comparison. Dartnell found a marked decrease in the unit cost where word processing was applied as an alternative. These findings are reported regularly by Dartnell and accepted by most leading periodicals.

Word processing may become an important aid in increasing office automation and by acting as the starting point from where total office support at decreased cost may be developed. The potential of word processing will become more evident in this research report and should be seen against the disproportionate growth of the white-collar work force in relation to the blue-collar work force and the present reported high cost of producing business correspondence. According to Biggs[38]:

> "The rate of increase in the cost of producing a letter, an average of approximately 4 percent per annum, is not in itself significant when viewed against the 5,6 percent average increase in the South African consumer price index over the same period. These figures would suggest that some slight gains in productivity are in fact being made in the production of letters. The cost of producing a letter, however, is still in itself considerable, and will continue to grow unless word processing principles and technology are applied to this activity."

2.5.3 The people problem in text processing

Cecil[39] mentions a number of problems which either directly or indirectly have a bearing on office personnel. These personnel may be managers (originators), secretaries (or other operators of office equipment) or clerks. The aspects may have a bearing on the two major problem areas outlined above.

(a) Inability to schedule work properly owing to fluctuating work loads.

(b) Uneven work distribution.

(c) Interruptions.

(d) Away-from-the-desk situations.

(e) Delays due to poor input.

(f) Retyping.

(g) Poor quality of produced documents.

(h) Lack of forms control.

(i) Lack of files control.

(j) Inability to measure productivity and analyse costs.

Two factors that are not included, but may have an influence are inability or even unwillingness to accept responsibility and a lack of individual or job standards.

Waterhouse[40] is of the opinion that many of the people problems caused by the use of traditional equipment and procedures are directly related to workflow, or the stages necessary in processing typewritten communications. Rosen and Fielden[41] quote the U.S.A. Department of Labour that the number of secretarial staff will double every 11 years, directly increasing existing people problems and contributing to an increased cost structure.

Simpson[42] summarises symptoms in terms of secretarial personnel in the traditional office emphasising uneven work distribution, circumstantial tasks prohibiting proper administrative support of management, poor filing systems, inadequate use of time-saving office equipment for written communications, lack of control and poor career opportunities.

Electronic text processing acknowledges these people problems. In systems design these problem areas are considered as of paramount importance.

2.6 SOLUTIONS TO PROBLEMS

From the outline of the traditional office problems it became clear that increased office automation seems viable for solving most of them. Electronic text processing was offered as a logical starting point towards achieving the goal of a highly productive, cost-effective office arrangement with the minimum of paperwork, facilitating decision-making and contributing towards a work climate where workers will find more job satisfaction and career opportunities. Mc Gabe and Popham[43] subscribe to this view and are of the opinion that:

> "The use of word processing equipment and modern work methods promises to bring under control the ever-increasing flood of paperwork and the rising costs of the office. Experts in the field of business administration and management are agreed in general that total office systems are coming. Word processing will provide the springboard from which executive and administrative offices will become automated. Within large and small corporations, organizations, institutions, and government agencies, word processing is responsible already for new, more efficient ways of organizing and completing office tasks."

Electronic text processing is not seen as the answer to all office problems or the only discipline for bringing about cost-effective offices. The approach is rather that electronic text processing will interact with electronic data processing systems, manual work procedures and personnel in such a way that interactive administrative support will be achieved through better text communication. Attention will also be directed towards other factors such as higher quality personnel, more formalised and scientifically involved systems which could solve some of the problems or alleviate them. The extent to which electronic text processing may facilitate solving the problems associated with the traditional office will be demonstrated practically by means of a pilot study in a large South African life assurance company, the results of which will be reported in Chapter VI.

2.7 CONCLUSION

This chapter outlined the organisational context of administrative office management and reflected the changing role of it as a result of increased office automation. Office automation was viewed as an evolutionary process with different stages. It was accepted that at present the discipline is still in the initiation phase and that a number of factors or development issues need attention in achieving the

fully automated electronic office. These factors, viz. management, people, processing, communication and environment were analysed and used to indicate the scope of administrative office management.

A number of problem areas in the life assurance industry were isolated and analysed in detail. The areas mainly affect paperwork, cost structures and the worker. The possible effect of electronic text processing was indicated where applicable. Subsequently solutions to these problem areas were offered. Electronic text processing was viewed as one of the most viable solutions. This alternative will be analysed in detail in the next chapters.

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CHAPTER III : TEXT PROCESSING

CHAPTER III

TEXT PROCESSING

3.1 INTRODUCTION

Recent advances in electronics technology have made computer components much smaller and cheaper. This leads to the ability to install cheap memory capability in a variety of devices, including office machines. As organisations grow bigger, their volumes of work demand systems for the automation of the processing of words or textual data to maintain effective business communications. This automation is predominantly referred to as word processing.

This chapter will focus on procedure aspects, whilst systems used in carrying out these procedures and the behavioural implications will be dealt with in the next two chapters. Text processing will be analysed in detail, including those activities not supported electronically at this stage. The areas presently supported electronically will be emphasised and also form the basis for the next chapter on text processing systems available. In Chapter IX the other manual activities will be included in a conceptual framework for total administrative support based on electronic information processing.

Section 3.2 will deal with the concept of text processing, scrutinising often used definitions to isolate the key factors as the basis for formulating a comprehensive definition. The approach will then be to indicate a number of related phases of text processing - each consisting of a number of sub-phases or activities.

Section 3.3 - 3.8 will each elaborate on one phase (with its sub-phases) of text processing. The phases to be covered will be: origination, production, reproduction, storage, retrieval and distribution. These phases will be schematically represented to further the understanding of the interrelated activities involved and also to facilitate the analysis of them. The analysis of the procedure aspects of text processing will reveal short-comings affecting costs and productivity, whilst alternative procedures will be evaluated.

3.2 THE CONCEPT

In this research "word processing" is considered to be an incomplete description of the activities involved and only part of a broader concept - that of text processing. It is necessary, however, to point out that often when the term "word processing" is used in the literature it in fact denotes a different meaning such as text processing or even electronic text processing. Definitions range from a narrow description, limited to the typing process, to everything connected with words in the widest sense:

International Word Processing Association

"Word processing is the application of computer technology to the typing process." (1)

Life Office Management Association

"The automation of the typing function, the retrieval of data for re-use, and the correction and updating of previously prepared text through the use of a storage medium." (2)

Waterhouse

"Word processing is a system of processing communications using standardized procedures, modern equipment, and specialized employee responsibilities to produce quality communications at rapid speed and low costs." (3)

McNamara

"Word processing is a method of producing written communication at top speed, with the greatest accuracy, the least effort, and the lowest possible cost through the combined use of proper procedures, automated business equipment and trained personnel." (4)

American National Standards Committee of Washington, D.C.

"Word processing is the transformation of ideas and information into a readable form of communication through the management of procedures, equipment and personnel." (5)

The majority of the above definitions do not specifically include the use of electronics technology, but scrutiny reveals that this is not excluded. Overseas the term "word processing" is often used to include traditional typing and associated functions, whilst the term in general is used in South Africa for automated typing systems.

If the given definitions are analysed, certain key factors can be isolated. They are:

- conversion of thoughts into meaningful written communication;
- information, procedures, equipment and personnel;
- accuracy, speed and lower costs.

The last two definitions can be adapted and used to advantage as the basis for formulating a comprehensive definition of text processing. The definition by the American Standards Committee of Washington, D.C. refers to "... the transformation of ideas ...". In text processing it is mostly word content (thoughts and known information) rather than ideas being converted into a readable form. From this follows that:

> Text processing is the conversion of word content into a readable form of communication with improved accuracy at increased speed and less cost through the combined use of proper procedures, automated business equipment and trained personnel.

In text processing the conversion of word content takes place through a number of connected phases, an analysis of which offers a clearer understanding of the areas included in day to day business communications. These phases may not all be involved at any given application of text processing nor in a particular sequence. In the earlier stages of development in equipment the interrelationship tends to be less, whilst recent developments tend to increase the integration. An approach to break up text processing in these phases is seldom followed in the literature, although it seems a logical way to analyse the effect on administrative office management and to determine those areas which need further attention. The six phases are:

origination: putting thoughts into text;

production: converting originated text into a final form;

reproduction: duplicating produced text;

storage: retention of text for future reference;

retrieval: extraction of required text from storage;

distribution: making available where text is required.

Each of these phases may consist of a number of sub-phases (activities) which are primarily those areas associated with the traditional office problems outlined in Section 2.5 and for which solutions are offered in Chapter VI. These phases and sub-phases are schematically presented in Table 7 and then analysed in that sequence. Source material abounds on specific aspects of these sub-phases and shows little deviation. For this reason specific references to the same information will not be made[6].

TABLE 7

THE PHASES OF TEXT PROCESSING					
ORIGINATION	PRODUCTION	REPRODUCTION	STORAGE	RETRIEVAL	DISTRIBUTION
• write • shorthand • machine dictation • amendments • electronically	• type • compose • microfilm	• copy - carbon - photo - duplicating - microfilm	• paper • paper tape • magnetic • microform	• per index - manually - mechanically - electro-mech. - electronically	• internal • post office • telex • electronically

3.3 ORIGINATION

In any organisation there is a flow of paperwork. Text on paper becomes documents. Documents contain information. The origination of text is therefore an important component of information processing. It can generally be accepted that world-wide handwriting constitutes the major element of text origination. From Table 7 can be seen that text origination can take place in five ways, i.e. handwriting, shorthand, machine dictation, through amendment of existing text or by electronic means.

3.3.1 Handwriting

Although handwriting is convenient, it is the slowest means of text origination - the average speed is 10 - 12 words per minute[7]. Handwriting may pose interpretation problems when production is required. The cost of originating a letter in longhand can be very costly especially in the case of senior management. This makes it one of the least desirable means of origination for business text.

3.3.2 Shorthand

This involves a stenographer. Shorthand is considerably faster than handwriting. Although 60 - 140 words per minute can be achieved, the actual output in a business environment tends to be 30 - 60 words per minute[8]. Shorthand is in fact a duplication of effort, since two people are involved for the same period of time, increasing the cost factor. Delays may also occur since the stenographer may not be available for shorthand owing to other activities.

3.3.3 Machine dictation

This is a means of recording words onto a magnetic medium for later transcription. The average dictation speed is 60 words per minute (according to Diebold[9] this is 5 - 6 times faster than handwriting and faster than the normal rate a business official will dictate to a stenographer). Machine dictation facilitates transcription as it eliminates readability and interpretation problems often associated with handwriting.

3.3.4 Amendments to existing text

No figures for the South African life assurance industry could be located, but it can be accepted that many manuals, reports, statistics and financial statements being originated contain text from a previous similar document. By using existing text and amending it, the origination of new documents will be speeded up considerably.

3.3.5 Electronically

Text can be originated electronically through parameters in computer programs which will test certain conditions and, if these are met, will originate letters or reports based on pre-programmed text. It is also common practice today to use video display terminals linked to computers or electronic text processing systems to originate text. Since this form of origination is most often carried out as an integral part of the production process, it will be analysed in the next phase of text processing.

Administrative office management should therefore focus on promoting the most efficient means of origination of text at the lowest cost.

3.4 PRODUCTION

The second stage in business communications is to produce originated text into a final format for further use. This is normally a conversion into typed script (including composition and one type of microfilming). This phase of text processing generally is time-consuming and costly.

3.4.1 Typing

Typing today is basically performed by means of manual or electric typewriters and word processors (automatic text-editing work stations with or without visual display terminals) linked to electronic printing devices.

A manual typewriter is one where all the functions must be carried out manually. Since the introduction of electric typewriters there has been a gradual changeover to these machines which offer easier handling and less effort resulting in higher productivity. A recent study by Diebold[10] shows that the total number of manual typewriters installed in Europe still exceeds the number of electric typewriters.

Little, if any, information given in the literature on typing efficiency is substantiated by scientific data. Equipment vendors tend to carry out surveys and their findings often become the norm. In the U.S.A. a number of consultancy firms specialise in word processing and have built up historical data to the extent that they can draw useful conclusions, or they may have valid figures for a particular type of industry. It seems as if there is a good correlation between these "industry standards" and the situation in general in South Africa and in the assurance industry in particular. There seems to be consensus that:

(a) Theoretical output (free typing rate) is much higher than standard performance. Interruptions and activities associated with the typing process, such as paper handling, setting-out of text and error corrections drastically reduce the theoretical output. The accepted average standard is 640 lines per day[11]. Very often actual output may even be lower than standard output as a result of inexperience or poor supervision. This leads to a high unit cost.

(b) According to Diebold[12] studies reveal that a typing error (e.g. striking a wrong key) occurs about every 600 keystrokes which as a percentage is marginal. It means, however, that on average at least one typing error may occur per page resulting in a time-consuming action of correcting it, especially if carbon copies are involved. If legal documents are typed no alterations are allowed, necessitating frequent retyping of documents with the same chance that an error may again occur.

(c) Texts are often of a repetitive nature with very few variations. The effect on actual production in terms of final documents is obvious. This process is slow and has a direct influence on cycle-times in dealing with business communications.

This situation means that the maximum production by means of typewriters depends on the optimum operator output - a factor which, once achieved, is not easy to improve on, since there is a direct relation between operator speed, machine speed and output. This means that unit cost is negatively affected by any increased cost structure due to increased salaries and/or cost of materials used.

An alternative is automated equipment with text-editing facilities mostly referred to as word processors. Different systems will be dealt with in the next chapter. In this context reference is merely made to the characteristics of word processors.

Word processors differ from manual and electric typewriters in four basic aspects:

(i) They use computer logics and software, with the exception of earlier models where the functions are hard-wired. These qualities mean that text, once entered, can be handled electronically and manipulated under program control. The machine operator uses keys to enter certain instructions to be executed electronically.

(ii) A storage or recording medium such as paper tape, magnetic card, magnetic tape, magnetic disk and/or internal memory is used. Any of these media offers the facility to store text for later revision without having to retype it. On equipment with internal memory only, the text will not remain when switched off.

(iii) The input (keying) function is separate from the output (printing) function, although the latter may be an integrated part in some systems. In typewriters output depends on how fast an operator can key in the text.

Word processors allow the operator to key in a particular document whilst another document originated or revised before can be printed at the same time. In practice an operator may print a long document and simultaneously prepare text by means of the keyboard where the memory capacity is large enough. Visual display terminals are increasingly being used as input devices for this purpose.

(iv) Text manipulation can take place and may be compared with proofreading of text on paper. Different signs are used in proofreading, inter alia to re-arrange paragraphs, change or correct words, insert additional text or delete some. Text-editing includes the insertion, deletion, amendment and selection of text. Function keys which perform these functions automatically are used. This means that the rekeying of text is unnecessary - just correcting or amending the original script.

Word processors store typed text for manipulation and repeated typing as desired and eliminate most of the disadvantages associated with manual or electric typewriters. They may lead to increased productivity, better turnaround time, higher quality, less proofreading by the end user and a reduction in cost. Ruprecht[13] indicates that production can be between 3 and 8 times more than on standard typewriters depending on the type of word processor used.

3.4.2 Composing

This activity is also known as typesetting. Typesetting is a means of text production with the purpose to provide high quality originals for reproduction. The needs in business for this type of material differ widely. Offices need forms, manuals, advertising materials, price-lists, directories, etc. These call for various type styles and sizes which cannot be produced on a typewriter. Most typewriters use a monospaced font where every character is equally spaced. In typesetting, each character has individual spacing which makes for better legibility and takes up less space. Reducing space may result in

fewer pages, saving paper, printing and storage costs. In earlier days preprepared characters in various styles and sizes were cast in an alloy and then manually arranged to form words making up the complete text. A later development for setting type was the use of a machine similar to a typewriter to arrange these characters to form the required text - a slow process calling for highly skilled labour and still being used by many printers.

The next development was that of the composing-typewriter for typing directly onto paper and with the facility to change fonts with various typestyles and sizes. This led to increased production, but the disadvantages of manual or electric typewriters were not eliminated. One added disadvantage is that fonts must be changed frequently where different typestyles are used extensively as, for instance, in forms. This type of equipment is also confined to a single size of characters that can be used, necessitating other additional processes. These composing-typewriters are used on a limited scale by printers. The largest user-base is organisations with in-house printing facilities.

The advent and scope of word processors greatly benefitted typesetting. The same principles of computer logic and software, storage media, separate input/output facilities and text-manipulation capability allowed slightly adapted equipment to be used as input devices, whilst a combination of electronics and optics allows text to be typeset by a photographic process, referred to as phototypesetting.

The advantages resulting from word processors now also apply to composing.

3.4.3 Computer output microfilm (COM)

As an alternative to producing text on paper when utilising electronic text processing equipment, microforms may be used. Technology allows text in digitised form to be transferred onto film by linking a filming unit with a computerised device using the required software. By utilising telecommunications

facilities with a computer, text originated by means of an automated typewriter can be transferred onto 16 or 35 mm roll film or 105 mm microfiche. This process is known as computer output microfilm.

3.5 REPRODUCTION

Reproduction is an integral part of business communications. The originator (author) of any particular text may want a reference copy or may want a number of copies for distribution to a group of people needing the information or having to be informed. By law certain copies of correspondence or transactions effected must be retained. Reproducing or copying text can be done in various ways depending on needs and quantities:

3.5.1 Carbon copying

When up to five legible copies of a document are required carbon paper may be inserted between the blank paper sheets and the strike-on action of a typewriter will imprint the text on each sheet. This is a cheap method of reproducing, since carbon paper can be used for a considerable number of documents before replacement is necessary.

The time spent on inserting and taking out carbon paper retards typing; it can cause dirty hands and dirty work; errors being corrected on the original (top copy) must also be corrected on the carbon copies. Carbon copying can be time-consuming and the final product may not be satisfactory. Certain typewriters are fitted with a correcting device by which the top copy can be corrected by first overstriking on a correcting ribbon and then typing the correct characters. Using this aid, involves the carbon copies showing up the corrections and being difficult to read.

The printing devices of word processors are faster than those of standard typewriters. The speed of these printers makes the use of loose carbon sheets impractical. Carbon sets or one-time carbon in between continuous forms is a better alternative.

If the document and copies prepared this way are correct it is the most economical means of reproduction. As pointed out in paragraph 3.4.1 (b) a typing error occurs about every 600 keystrokes, resulting in a considerable waste of copies prepared by means of carbon paper inserts if the work has to be retyped. These factors point to the fact that reproduction by way of carbon copying may not be an efficient and economical means.

3.5.2 Photo-copying

Before 1960 photo-copies were made by means of the zinc oxide coated paper process. In 1961 Xerox introduced a dry electrostatic process using plain paper. This is a fast, efficient and cost-effective process and is replacing the "wet process" copiers at a fast rate. Photo-copying is primarily used for internal business communications, but due to excellent quality available photo-copies often are distributed outside the organisation. Frequently letters which have been corrected are photo-copied and the copy then sent as a replacement for the original.

Reproduction by means of photo-copying is very convenient. Unit cost depends on total usage since different rates are charged per volume group. When the number of copies per original exceed 15 it is advisable to consider other means of reproduction such as duplicating (to be dealt with in 3.5.3).

Reproduction of typed text by means of photo-copying increases the cycle time and handling of documents. Someone will produce the original and if any copies are required forward it (or take it) to the nearest copy centre where the work must be handled again, the requirements determined and the copies being made before distribution to the author.

Word processors increase production dramatically. These outputs must be reproduced if required and be distributed with a minimum delay, otherwise the benefits of speedier completion will be forfeited. A need arose for interfacing this type of high-volume output equipment with reproduction equipment in such a way that the physical handling of paper (the original and the reproduction) could be handled electronically. This principle is

called "image printing" - i.e. reproducing the text (image) created electronically for as many times as necessary. In the U.S.A. at least two equipment manufacturers, viz. International Business Machines and Wang Computers, are marketing these systems.

3.5.3 Duplicating

When more than a certain number of copies of a document is required, duplicating equipment is the most suitable means. Manufacturers of this type of equipment focus on "in-house" reproduction operations and the equipment is easy to use.

High speed photo-copiers and duplicators are increasingly difficult to separate since operation and unit costs tend to become competitive. A combination of these with image printing may result in automated typewriter systems being interfaced to an "in-house printshop".

3.5.4 Microfilming

Microfilming is the process of making miniaturised copies of documents (text) on film. One can distinguish between computer output microfilm and conventional microfilming (also referred to as source document microfilming). Computer output microfilm is a form of text production (see section 3.4.3), whilst conventional microfilming means the reproduction of text on paper (whether typed, printed or handwritten) onto film. Both microforms, obtained through COM or conventional method, can again be reproduced in any required quantity for distribution. Since the main object of microfilming is to save storage space and facilitate information retrieval, it will be dealt with in more detail under the next two headings on text processing, viz. storage and retrieval.

3.6 STORAGE

Text must be classified, indexed, arranged and stored in a business environment in order to locate it when required. Text is stored for future reference. In the life assurance industry the practice is to open a correspondence file for every life assurance policy issued and to

maintain a complete history of transactions carried on between the assured and the assurer. In addition computerised files reflect the latest financial positions of policies.

Other storage requirements are for text which forms a natural part of activities associated with assurance and administrative office procedures. Text produced and reproduced must therefore be accommodated in a way to facilitate finding. These records normally can be classified as vital, important, useful and non-essential records. Text can be stored in paper form and by means of paper tape, magnetic media or in microform.

3.6.1 Paper records

Text stored in paper form takes up a great deal of space in filing cabinets, on strongroom shelves and in and around working areas. The cost of office space is increasing rapidly, calling for improved and minimised storage. Often information cannot be found owing to the volumes involved, files being used by other individuals, and the incidence of misfiling. The frequency of referencing, number of people using the files and length of time files will be referenced are determining factors in the location of records. Costs are involved for filing equipment, office space and clerical maintenance of the systems. It is estimated that the clerical cost can be many times that of the other cost factors. Text storage in paper form is therefore a costly activity to ensure the availability of information for effective business communication. Other means do exist which could be viable alternatives.

3.6.2 Paper tape

The need to capture text for later use without again having to input it, gave rise to the development of paper tape as a storage medium. The principle is that when text is being keyed in, a paper tape punch linked to the input system can again produce a paper tape containing the text keyed in for later retrieval onto the system. Errors cannot be corrected on the same paper tape. For this purpose a new paper tape has to be prepared. Paper tape is cheap but, with large text bases, very difficult to organise and handle effectively. Though still being used freely in

certain types of industry (e.g. typesetting by printers) it is no longer a popular medium. Paper tape is not re-usable and machines using this medium are normally sold at approximately the same price as that of more versatile media. Paper tape as storage media in text processing will probably be phased out before long.

3.6.3 Magnetic media

In 3.4.1 reference has been made to the facility of word processors to store text in magnetic form for later revision without having to retype it. Magnetic storage media generally used today are internal memory, magnetic cards, tapes, flexible disks and hard disks.

(a) Internal memory

The term "intelligent typewriter" is often used to describe the ability of the device to carry out certain logical functions. In computers data are processed in a central processing unit (main memory) and then usually placed in secondary storage on a magnetic medium, freeing the CPU for the processing of other data. In certain typewriters a memory capacity exists allowing text to be stored, manipulated, retrieved and when necessary to be printed out. The memory capacity available for EDP depended on technology and price performance. Previously memory was very expensive and the hardware associated with it bulky. Development of microprocessor technology led to minute electronic components with large automated capabilities. This development made memory capacity available at excellent price performance. This benefitted text processing since typewriters could be fitted with microprocessors and internal memory at reasonable prices. The text manipulation capabilities of the word processors with internal memory only, are very limited at this stage.

(b) Magnetic cards

They consist of oxide coated mylar film the same size as a standard computer punched card. This secondary storage medium usually has the storage capacity of one page of text.

This means that they are best suited for storing short documents, since large documents which may require permanent storage will take up a number of cards involving indexing and filing problems. Companies with large volumes requiring text to be stored permanently will find this a limited storage medium which is costly compared with other media available. This medium is still widely used all over the world.

(c) Magnetic cassettes/cartridges

This medium is oriented towards lengthy documents. The storage capacity is much more than that of magnetic cards. The capacity range between 20 000 and 600 000 characters depending on type and make. The price performance is much better than that of magnetic cards. This medium is utilised in a wide variety of text processing equipment, especially photo-typesetting (refer section 3.4.2).

(d) Magnetic disks

This storage medium is a relatively new innovation for automatic typewriters. It can be either removable flexible disks (also known as diskettes) or hard disks. Access to diskettes or disks is much faster than when magnetic tape is used. Diskettes are the preferred storage medium for the largest number of automatic typewriters released now. Disks are used for high volume on-line storage and vary in capacity according to user needs. Some are available with removable disk packs for off-line storage.

3.6.4 Microforms

Micrographics saves filing space by up to 98%[14], resulting in large savings on filing equipment and accommodation costs. Text is filmed in a sequence which becomes permanent and therefore facilitates finding with little risk of lost information. Text in microform is viewed on a reader which enlarges the miniaturised copies to approximately the original size. By using

a reader-printer any particular portion from the film can also be copied on paper if required. The compactness of text in microform and cheap reproduction allow workers to keep large files of information in the immediate vicinity of their work location resulting in a considerable saving in handling cost and less delays.

Roll film (often contained in a cassette for easier handling) is mostly used for the storage of lengthy documents, address lists and general records where no updating is required. This is ideal for historical data. It is also possible to prepare microfilm jackets by inserting roll film in transparent pockets on a plastic card. These film-strips can be taken out and replaced by others with the latest information. This type of microform can be compared with a loose-leaf catalogue where replacement pages can be inserted to ensure that the information remains up to date. Another type, microfiche, is the end result of computer output microfilm (see section 3.4.3). Microfiche is the ideal storage medium for financial transactions, reference lists and catalogues.

Microforms are widely used in the paper-intensive life assurance industry. How word processors can enhance micrographics will be dealt with in the next chapter.

3.7 RETRIEVAL

Any filing system, whether paper, magnetic or microform must essentially be a "finding" system. Filing must be planned, organised and indexed in such a way that it facilitates easy retrieval when information contained in it is required. Many different indexing systems are in use for this purpose. In the case of magnetic media a numerical reference is usually used to locate required text.

Text can be traced according to indexes and retrieved by hand, mechanically, electro-mechanically or electronically. Mechanical and electro-mechanical systems are mostly used for paper cards and microforms such as jackets and fiche. Electronic retrieval is used in automated typing systems. The operator of a word processor keyboard could either search for a particular identifying number or, should it be unknown, for the document name. The required text will then be located

electronically and could be displayed on a screen or be printed out. This form of retrieval has many advantages such as speed, accuracy, easy operation and no danger of loosing the information or misfiling it after use. The electronic retrieval facility of word processing systems has many advantages for present day text processing, especially in the life assurance environment.

3.8 DISTRIBUTION

Once text has been originated, produced, reproduced, temporarily been stored and retrieved, it must be distributed to communicate to a certain group of people. If urgent outside messages need to be distributed, it can be done by telephone, telex or electronically.

Internal written communications are generally distributed by an internal messenger service physically transporting them from point to point. Some mechanical conveyer systems exist for internal distribution, but require proper building design. Outside distribution is done by the post office, which could also result in loss of information and delays.

Newer developments in text processing offer facilities for electronic distribution. It is known by different names such as "electronic mail", "message-switching", or electronic message systems by which text is distributed from one point to another through an electronic communications system, cutting out unnecessary handling and decreasing the error rate. Facsimile machines, or telecopiers are used to send and receive messages in picture form instantly. In this way it is possible to distribute graphs, pictures and other forms of text. Electronic distribution will be widely used in South Africa once the post office converts to electronic telephone systems and communication facilities. Even the telephone can then be used as an important tool in text processing. Electronic distribution will increase the impact of text processing on administrative office systems.

3.9 CONCLUSION

This chapter has focussed attention on the procedure aspects of text processing. The concept of text processing was dealt with in section 3.2, scrutinising various definitions which led to the formulation of a comprehensive definition. In terms of this definition, text processing mainly refers to the conversion of word content into a readable form of

communication, aiming at quicker and cheaper means at an accepted standard. Section 3.2 also outlined the phases and sub-phases involved in the conversion of word content into a readable form of communication.

The different phases (and sub-phases) were subsequently dealt with in sections 3.3 - 3.8. Shortcomings affecting production and costs were revealed and alternative action offered.

One of the aims of this research is to broaden the perspective of text processing as being something more than just the automation of the typing process. This has been achieved in this chapter. In this respect the analysis corroborates Holt's[15] viewpoint:

> "If anything, the current perspective of word processing and administrative support is too narrow. It must be more than just a better way to type. It will soon grow to be a managers prime resource of support for all offices services. The management of the word processing and administrative support system will be responsible for providing a high-quality, cost-effective office system capable if interacting with all aspects of the organization."

CHAPTER III - FOOTNOTES

(1) Official definition by this institution.

(2) LOMA: "Word processing in life insurance companies" : Operations and Systems Report No. 52: August 1979: p.2.

(3) WATERHOUSE, S.A.: Word processing fundamentals: San Francisco: Cranfield Press: 1979: p.2.

(4) McNAMARA, J.J.: Word processing and administrative support: Unpublished M.B.A.-thesis: Warner College: New York: June 1973: p.8.

(5) ROSEN, A. & FIELDEN, R.: Word processing: New Jersey: Prentice-Hall, Inc.: 1977: p.9.

(6) The number of text books on text processing published are limited and they seem to convey very similar information. The same information appears from time to time in magazine articles or in research reports from leading business consultants and in survey reports from research groups. For this reason the basic framework as followed by CECIL, P.B.: Word processing in the Modern Office; California, Cummings Publishing Company: 1976 was chosen.

(7) ALTMAN & WEIL, INC.: Average acceptable standards in word processing: U.S.A. Fact sheet: Minnesota : 1979.

and

CECIL, P.B.: Op cit: p.18.

(8) CECIL, P.B.: Op cit: p.19.

(9) DIEBOLD RESEARCH PROGRAM - EUROPE: "Word processing": Research Report No. E134 : April 1976: p.7.

(10) DIEBOLD RESEARCH PROGRAM - EUROPE: Op cit: p.8.

(11) DIEBOLD RESEARCH PROGRAM - EUROPE: Op cit: p.22.

(12) DIEBOLD RESEARCH PROGRAM - EUROPE: Op cit: p.25.

(13) RUPRECHT, M.M.: "Evaluating existing installations": Expo '79-seminar: Wisconsin, U.S.A.: March 1979.

(14) WATERHOUSE, S.A.: Op cit: p.151.

(15) HOLT, R.G.: "Word processing and administrative support are the basis of future offices": The Office : June 1977 : p.66.

CHAPTER IV : ELECTRONIC TEXT PROCESSING SYSTEMS

CHAPTER IV

ELECTRONIC TEXT PROCESSING SYSTEMS

4.1 INTRODUCTION

In the comprehensive definition of text processing (section 3.2) automated business equipment is regarded as a major component in achieving the objective of improved accuracy at increased speed and less cost. The two other components are procedures, as dealt with in the previous chapter, and people. The next chapter will focus on the people aspect.

Text processing also makes use of non-automated equipment. This chapter, however, will emphasise electronic text processing systems and how they can facilitate cost-effective procedures.

According to Dataquest Incorporated[1] the compound annual growth rate of text processing workstations in the USA between 1978 and 1983 will be 35 percent compared to 27 percent the previous five years. Experience gained from data processing applications and hardware facilitates the development of text processing. Text processing can therefore develop much faster than data processing did in its earlier days.

Burns[2] states that a continued reduction in the cost of electronics will take place and that microprocessors will expand and affect electronic text processing systems. Developments in circuit integration and software assist in converging previously independent products in the computer, office equipment and communications fields.

Equipment may be available to solve any particular problem in the administrative office management field, but may not suit organisational needs. Miller[3] quotes the viewpoint of Phillips:

> "Every organization is unique and each piece of the system must be so finely tuned that the automated office system becomes transparent to organizations that use it."

Section 4.2 gives an outline of electronic text processing systems used in the procedural phases of text processing, viz. origination, production, reproduction, storage, retrieval and distribution.

The concept "system" will be defined and the logical components of a system analysed and be related to electronic text processing systems. It is possible to produce a text processing cycle schematically. This cycle can be sub-divided into three broad categories - those of input, throughput and output.

Input systems will be dealt with in section 4.3. Reference will also be made to means of origination other than electronic.

There are various categories of electronic text processing systems. The available types of systems, ranging from the electronic typewriter to computerised processing, will be dealt with in section 4.4. Each type will be analysed for its possible contribution to business communication with improved accuracy at increased speed and less cost. To promote the understanding of the differences between the various systems and to minimise detailed descriptions schematic representations will be offered.

The approach in section 4.5 is to indicate which electronic output systems are available and their possible contribution in facilitating the decision-making process.

Selection criteria for electronic text processing systems are offered in section 4.6.

The appendix at the end of this thesis (pp. 284 - 287) will clarify certain terminology used.

4.2 SYSTEMS USED IN THE TEXT PROCESSING CYCLE

An effective system is defined in Table 1 (see page 6). Optner[4] defines a system as some ongoing process of a set of elements, each of which is functionally and operationally united in the achievement of an objective. The sub-division of text processing into related elements or phases in Table 7 (see page 42) meets the requirements of this definition. Since text processing involves procedures, people and equipment it is a system. Whenever text processing equipment is dealt with it will always relate to a system. According to Jenkins and Youle[5] a system has five important properties:

"(a) It is a grouping, possibly complex, of human beings and machines.

(b) It can be broken down into sub-systems which interact with each other.

(c) The system being studied will usually form part of the hierarchy of such systems.

(d) To function at all, a system must have an objective, no matter how vaguely defined.

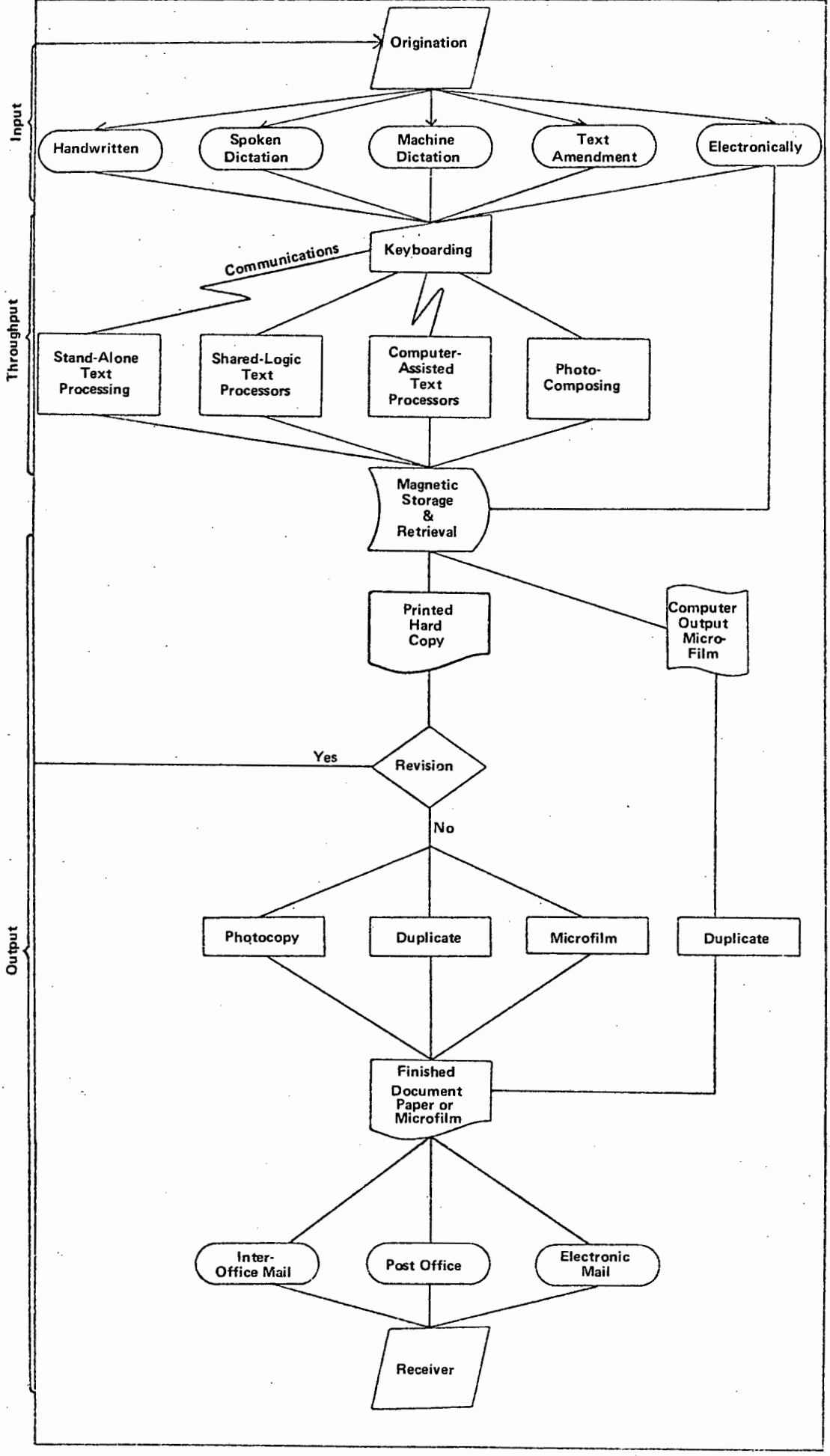
(e) To function at maximum efficiency a system must be designed in such a way that it is capable of achieving its overall objective in the best way possible."

Electronic text processing satisfies these properties. Firstly electronic text processing creates a relationship between worker and equipment as a means of improving productivity. Such a grouping can be complex, from the point of view of the systems hardware involved or the new job requirements arising from it. It has already been indicated that text processing consists of systems and sub-systems interacting with each other. This chapter will indicate which electronic text processing systems exist, and that individually they form part of the hierarchy of such systems. The particular organisational need determines the level in the hierarchy. The objective of text processing has been outlined in the comprehensive definition in section 3.2.

It would be useful to list the main South African suppliers of electronic text processing systems per category to serve as a reference framework. Rapid technological changes, however, result in frequent modifications to systems often with corresponding name changes. Any reference framework will therefore soon be outdated. For this reason no such reference framework is offered.

In any system three definite stages can be distinguished, viz. input, throughput and output. Menkhaus[6] presented a word processing cycle with these three stages, which served as a useful basis for developing a more complete framework. Table 8 depicts a text processing cycle which is an extensive adaptation of Menkhaus' model. From this text processing cycle the role of electronic text processing systems in each of these phases needs to be scrutinised.

TABLE 8 : THE TEXT PROCESSING CYCLE



Adaptation of Menkhaus' word processing cycle ;
from Cecil, P.B. : Word processing in the modern office : California :
Cummings Publication Co. : 1976 : p. 51

4.3 ELECTRONIC INPUT SYSTEMS

Electronic input systems are used in the origination phase of text processing. The procedural aspects have been covered in section 3.3. This area is the input stage as depicted in Table 8.

Input can be by means of handwritten documents, spoken and machine dictation, amendments to existing text and electronically under software control. Electronic input of handwritten documents, i.e. digitising handwriting so that it can be manipulated, stored and produced without rekeying, is still in the experimental stage. Optical character reading devices (OCR) can digitise handwritten characters if they are clearly written in a prescribed format. Even then a high rejection rate is experienced. Within the framework of the transitional office, and for the purpose of this research, electronic input systems for handwriting remain in an experimental stage. The same applies to spoken dictation where attempts have been made towards electronic voice recognition. It is currently possible but not economically viable in the business environment. Further reference is made to electronic voice recognition in section 4.5.3 (b), where message-switching systems are dealt with, and in Chapter IX where a conceptual framework for integrated administrative support is offered. The focus will therefore be on the remainder of the input systems.

Cecil[6] has no doubt that machine dictation has become an accepted and necessary part of doing business today. Dictating machines in themselves are not electronic devices, but often include electronics which facilitate the input process. Dictation equipment uses magnetic media for storing the dictation for later transcription. Dictation equipment ranges from portable and desk models to central systems. Portable equipment is ideal for low dictation needs or whenever a need exist for dictation in an "away from the desk" situation, whilst the desk models are used in a fixed work environment with fairly heavy dictation needs. Centralised dictation systems pool recording and transcribing equipment in one central location. The input is normally via remote microphones connected with wires to the central system or via the telephone. South African businesses may not at present utilise PABX-telephone systems as input media to centralised dictation systems as this is prohibited by the South African Department of Posts and Telecommunications[7]. Centralised dictation systems accommodate many dictators at low unit cost, eliminate the physical handling of the transcription media, improve turnaround time and offer electronic controls.

In certain available machine dictation systems electronics facilitates machine dictation in many ways. One example is electronic signal processing. This is the capability of compressing and expanding time on a magnetic media. Recorded text can be played back at different speeds without affecting the pitch of the recorded voice. This assists in correct transcription. A second example is that of electronic cueing which replaces the use of an index strip for marking the length of letters, and provides special audible signals to indicate instructions to the transcriber. This assists productivity since it is possible to add instructions to dictation at any time and these instructions will then be related to the correct text in the dictation. The control systems of centralised dictation equipment are normally electronic devices for monitoring text and allocating it to transcribers.

Electronic text amendment forms a very important part of the throughput phase of text processing, since magnetic storage makes this possible. For this reason this form of input will be dealt with in section 4.4. As is the case with handwritten text, OCR can be used for inputting existing typed text for electronic amendment.

Text can be originated electronically under software control in computer and text processing systems. This also takes place predominantly as part of the production phase and will be treated as such.

4.4 ELECTRONIC THROUGHPUT SYSTEMS

In section 3.4 was referred to typing and the limitations applicable to non-automated systems. The main differences among automated typewriters have also been specified in that section. The basic components of electronic throughput systems will be analysed in various configurations of electronic throughput systems.

As is the case with electronic data processing systems, text processing systems use four basic equipment components in the throughput phase. These are for inputting, processing, storing and communicating text. Another phase, outputting text, forms part of electronic output systems. These electronic throughput systems in the text processing cycle are developed for specific needs. The prospective user must determine what his needs are, what capabilities are required and the minimum systems configuration that can meet these requirements. Since the more sophisticated text processing systems are software-orientated,

it means that the scope of text processing increases with each software enhancement.

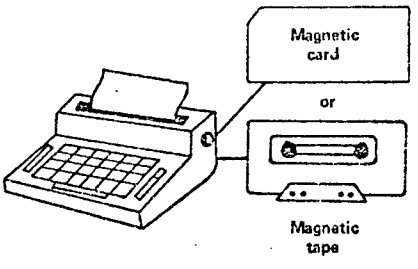
Table 8 (see section 4.2) reflects four categories of electronic text processing systems, viz. stand-alone, shared-logic, computer-assisted and photocomposing. A classification like this is theoretical since the boundaries between these categories cannot be firmly delineated. Some of the categories may consist of a number of different electronic text processing systems, e.g. the stand-alone range which can be subdivided into non-display and display text processors.

4.4.1 Non-display stand-alone text processing systems

This category is often referred to as hard-copy systems as opposed to the visual display units. Like typewriters, hard-copy systems work on the principle of a combined keyboard/print operation. The development of these systems closely followed the progress in magnetic storage media.

The need arose to store text produced on typewriters for correction or later use instead of re-keying and re-checking. This need led to the introduction of "memory typewriters" with fixed magnetic media. This development was followed by the introduction of off-line storage media such as magnetic tapes (in cassette form) and cards. Text is recorded on these media as it is typed. Both types of systems are depicted in Table 9.

TABLE 9

NON-DISPLAY STAND-ALONE TEXT PROCESSING SYSTEMS	
INTERNAL MEMORY ONLY	INTERNAL MEMORY & OFF-LINE STORAGE
	
• Keyboard • Integrated printer • Internal memory	• Keyboard • Integrated printer • Internal memory • Off-line storage (magnetic card of tape)

These text processing systems are the least expensive and are mainly used for automated typing of repetitive letters, merging of pre-recorded paragraphs and revisions of short documents. Non-display stand-alone text processors can facilitate text processing applications, but have limitations when user needs expand. The memory typewriter's internal memory is often too small to satisfy the office needs of revision and even temporary storage for later revision. Off-line storage on magnetic tape or cards aids in this process. Productivity is hampered by the fact that typing and printing cannot take place at the same time. If a number of repetitive documents are produced, the operator is unproductive since she must wait for the printer to finish the task.

The volume of the magnetic cards or tapes expands with growth in company operations and often poses filing and subsequent location problems.

Non-display stand-alone text processing systems do increase typing output if the applications are as such. Since this type of system costs between 4 and 12 times more than electric typewriters and often not much less than display stand-alone electronic systems, it is necessary to determine the output and unit cost of the systems and compare the results.

4.4.2 Display stand-alone electronic text processing systems

These types of electronic text processing systems can be basically subdivided into two categories, viz. electronic typewriters with one line display, and visual display units (VDU) with up to 66 lines of text linked to other components to form what is widely known as a word processing system.

Electronic typewriters are very similar to memory typewriters as analysed in section 4.4.1, except that some systems provide higher speed integrated printers. The electronic typewriter usually provides a one line visual display (maximum 32 characters) so that the operator can see what is being typed.

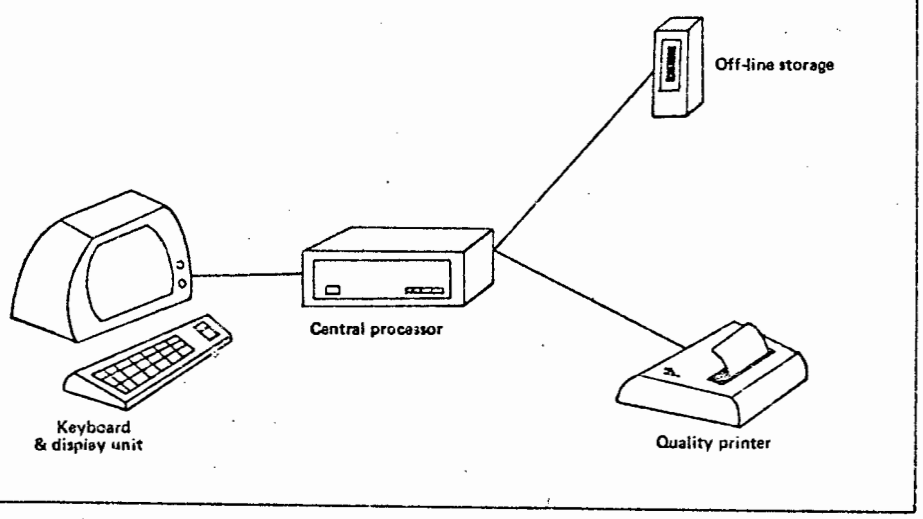
Electronics also allows the use of special function keys to perform text and document handling under limited program control. Some models also allow point-to-point communication to take place. The electronic typewriter can increase productivity and accuracy, and decrease cost. The size of the memory limits program storage so that functional limitations apply. Some developments on electronic typewriters have already led to the introduction of off-line storage on magnetic media. Table 9 depicts basically the same configuration as applying to electronic typewriters. The only differences are the change to electronic memory and a visual display feature of one line.

The development of smaller and cheaper electronic devices determines whether or not a particular component would be used as part of a text processing system. From the point of view of increasing productivity, the separation of the keyboarding and printing functions in text production was a major breakthrough. These systems are generally referred to as stand-alone word processors, distinguishing them from automated (hard-copy) and electronic typewriters with integrated keyboarding/printing.

According to Parkinson[8] a display stand-alone word processing system comprises a keyboard, a visual display, a storage device, a printer, and control electronics and software. This configuration is depicted in Table 10.

TABLE 10

DISPLAY STAND-ALONE ELECTRONIC TEXT PROCESSING SYSTEM



Referring to stand-alone word processing systems Wohl[9] implied:

> "Such equipment may have its text editing and other functions hard-wired or it may, in fact, be a small computer. Many systems use a combination of soft and hard functions and extensive use is made of read/write, read-only, and programmable read-only memory."

The keyboards are typical typewriter layout keyboards. Additional function keys are added for text editing and text manipulation under program control. These systems offer increased output as a natural result of successful text manipulation - in hard-copy systems the emphasis is on fast keyboarding.

The visual display is normally a cathode ray tube (CRT) similar to those used in television sets. Display areas vary from only a few lines of text to a full A4 size page of text. An average visual display is 24 lines. The principle is that text keyed in on the keyboard will be displayed and can be manipulated at will until the operator is satisfied with the end result.

The central processing unit (CPU) functions under software control. The software is normally supplied by the equipment distributors, although some systems offer user programming facilities. If the latter applies, users can program special applications not normally provided for in the standard software.

It is common practice to use diskettes as storage devices (see section 3.6.5 (d)). Two disk drives are normally used. This medium stores more text than magnetic cards and tapes, the storage costs are considerably lower and they facilitate indexing and handling.

The storage facility allows lengthy documents to be retrieved and revised with minimum keyboarding. The required output can be prepared in a very short time and it will only be necessary for the author to proofread changes in the text. Word processing systems like these increase production and cut down on administrative costs.

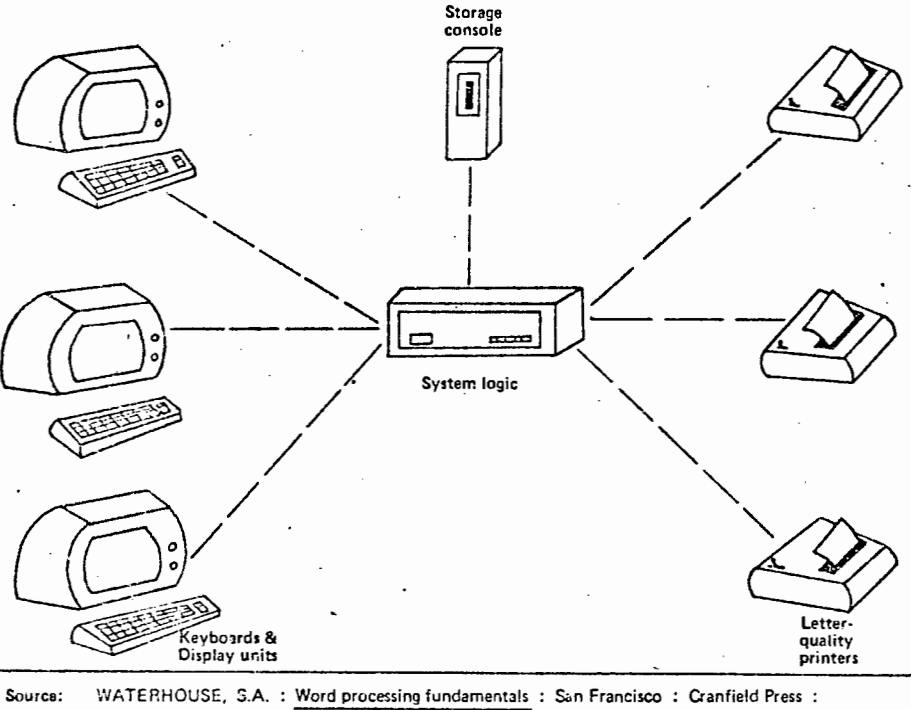
Printers can be linked as peripherals to these systems for hard-copy output. These printers work independently of the keyboard and once a print-request has been routed to the printer, the operator can continue with text manipulation of any other document, whilst the previous document is being printed out simultaneously. Compared to hard-copy systems and electronic typewriters this leads to more productive use of operator time. Electronic production systems for hard-copy output will be dealt with in section 4.5.1.

4.4.3 Shared-logic electronic text processing systems

These systems are effectively an extension to the concept of stand-alone systems with the same objective i.e. text preparation and production. They do, however, employ a much more sophisticated logic system. Shared-logic systems, or more correctly, perhaps, shared-facility systems, attempt to achieve economy by sharing facilities which will normally be duplicated in each stand-alone system. Table 11 outlines the basic components of a typical shared-logic text processing system.

TABLE 11

SHARED LOGIC ELECTRONIC TEXT PROCESSING SYSTEM



Source: WATERHOUSE, S.A. : Word processing fundamentals : San Francisco : Cranfield Press : 1979 : p. 133

With the introduction of shared-logic electronic text processing systems a number of essentially non-display terminals without any logic or memory share the capability and storage of a central processing unit. It is expensive to duplicate stand-alone electronic text processing systems as the need for increased input or production arises. Shared-logic systems can decrease cost per workstation considerably, since multiple workstations can lead to considerably lower unit costs than the equivalent stand-alone systems. It also offers the advantage of being able to start off with a small system, expanding as needs grow.

More recent developments in the shared-logic approach to electronic text processing systems are that of distributed logic where some logic and memory resides at the terminals (which are usually visual display units). The central processing unit, software and disk storage are shared by the various peripherals that can be linked to the system. Peripherals can be "dumb" terminals (with or without visual display) or "intelligent" visual display units, different types of printers (e.g. impact or matrix), telecommunication facilities with main-frame computers and other types of electronic text processing systems.

The sharing of facilities may pose problems. If the CPU or disk should be out of order at any given stage in the production process no input, throughput or output would be possible. Back-up systems or service arrangements are essential when using this approach in text processing.

Apart from the lower cost per workstation the advantages of shared-logic systems for electronic text processing are numerous:

- The potential of sharing a common base of text files means that operators can manipulate the different text files independently of one another, but at the same time it allows for cross-referencing so that more than one operator can work with the same information simultaneously. This multiple access to the same text simultaneously is of particular advantage when lengthy documents which are urgently required, must be prepared.

- From a control point of view it also means that various types of work dealt with can successfully be monitored at one point, resulting in even work distribution.

- Shared-logic systems facilitate the updating of master records, such as prerecorded text. If uniform text is used at different locations using stand-alone systems, any update of text calls for strict control and considerable effort to ensure that the text used at each location is correct.

- Stand-alone systems have dedicated peripherals. Shared-logic systems allow the sharing of peripherals such as printers. Depending on specific needs, a number of workstations may share one printer, or where heavy output needs exist, a number of printers may be linked to one workstation.

- Shared-logic systems generally have more central computing power available, allowing applications that are not possible with the more limited capacity of stand-alone systems.

- Whereas stand-alone systems are utilised on a decentralised basis in organisations, shared-logic systems normally start off as centralised installations. These decentralised stand-alone systems could be placed in various departments in the same location or in geographically completely different areas (e.g. Cape Town and Johannesburg). Once the procedural and systems aspects allow optimum workflow it is possible to decentralise some of the text processing at the points where it originates. This form of decentralisation is limited to the maximum distance allowed for cable connection ($\pm$ 600 meters). Any other connection would have to be by means of telephone lines, presently infringing on Port Office regulations. These decentralised locations will use, depending on the needs, either visual display units alone or in combination with quality printers, sharing the processing and storage facilities. Shared-logic systems on a decentralised basis offer many advantages for a broad spectrum of applications.

4.4.4 Computer-assisted text processing systems

This type of electronic text processing works on the same principle as that of shared-logic systems (section 4.4.3). For the purpose of this research computer-assisted text processing systems will be divided into in-house and time-sharing systems.

(a) In-house systems

This first category can be sub-divided further into direct connections and indirect connections to in-house computers.

Text processing through direct connection to an in-house computer used for automated data processing is not merely just another terminal application. According to Diebold Research, Europe[10] it is a matter of providing software that will support text processing functions and conceal the complexities of the general purpose operating system under a single command language. Some of the computer manufacturers or specialist software houses provide text processing software.

A computer terminal is generally considered to be an on-line terminal and computer time used is dependent upon the input speed of an operator and the speed of the print-out device. High speed processing takes place in the computer, whilst the input and output devices are slow. This led to the development stage where magnetic media were added to the input/output side to facilitate data and text capturing, which could be transmitted in batch to the computer.

Compared with dedicated text processing systems, computer-assisted text processing offers the advantage of large, relatively cheap on-line file storage on the disk. This means that the computer must be able to provide the extra memory needed.

Text processing makes typically greater demands on processor time than data processing. Often arguments are raised by computer suppliers and users alike that if spare capacity is available on in-house computers it is paid for whether used

or not. For this reason they claim that text processing can be incorporated as a very inexpensive operation. This argument proves to be wrong when analysed critically. Because of text processing operations other data processing applications can perhaps not be handled unless the computer system is expanded at a high cost. If text processing requirements are sufficiently important it can also force a user to expand computer systems long before it is really necessary to do so.

Indirect in-house connections can be used as alternative computer-assisted text processing systems. This approach to electronic text processing is currently referred to as distributed processing. The difference from direct in-house connection is that an intermediate controller is used to process text, accessing the in-house computer only when required. The approach is one of using a mini-computer to do the work while permitting the main system to operate unimpeded until needed. This approach is advocated by some of the leading computer manufacturers. IBM considers this the starting point for the electronic office as it allows easier converging of existing disciplines.

(b) Time-sharing systems -- service bureaux

Service bureaux often provide time-sharing services for electronic data processing. These service bureaux can either write their own software for text processing or buy it from their computer supplier. In this way it is possible for users to avail themselves of text processing facilities by acquiring (often on a rental basis) terminals and, if required, printers which are connected to a bureau's processor via lines provided by the South African Post Office.

Charges for time-sharing systems with a service bureau are based on access and file storage and are very similar to those applying to data processing. These systems are useful for the user with periodic text processing needs already using the time-sharing facility for data processing. An organisation wanting to get some practical experience before making a final decision on electronic text processing may also find this

approach useful. Apart from the ability to handle any number or complexity of revisions, these systems offer other facilities such as phototypesetting, which normally requires a large capital outlay.

4.4.5 Photo-composing

The procedural aspects of photo-composing were dealt with in section 3.4.2. Photo-composing is a means of electronic text processing throughput. It is possible to create text in different typestyles and type sizes through this means. Photo-composing systems can fall into any of the categories listed in sections 4.4.1 to 4.4.4. Photo-composing systems are often used as peripherals to electronic text processing or computer-assisted text processing systems. The objective is to avoid rekeying of text by utilising a magnetic storage medium. Photo-composing systems were developed in isolation from word processors. It was soon realised that technology can benefit both types of systems, and offers many benefits if these systems could interface with each other. This development is slow and only recently has the situation improved. There is a world-wide trend for larger organisations to use photo-composing systems and to provide for an in-house print shop. Photo-composing requirements are more demanding than those of "word processing" with resulting more complex software and more computing power requirements for sophisticated text composing.

4.5 ELECTRONIC OUTPUT SYSTEMS

Electronic output systems for text processing can be divided into three categories, viz. for production, reproduction and distribution. If these are related to the text processing cycle depicted in Table 8 (see section 4.2), the production requirement is the start of the output phase.

Reference is often made to the paperless office and a number of experimental installations have been reported. These approaches aim at eliminating the production of paper as an intermediate step for distribution and are reported in more detail in section 4.5.3.

Organisations are, however, still mostly in need of printed hard copy as part of their normal administrative activities. As an alternative to paper for selected applications computer output microfilm may be produced. An added need may be for a number of identical documents which can then be reproduced, either on paper or microforms. To complete the text processing cycle, and to achieve the objective of text processing in general, finished documents will be distributed to the point where the information is required.

4.5.1 Production systems

Non-display and some display stand-alone electronic text processing equipment do not offer the ability to use different printers for the production of hard-copy. Many of the electronic text processing systems dealt with in this chapter, however, offer this ability. Two important criteria exist for selecting the relevant production system, viz. acceptable quality and print speed. Printers used for text production can be electric typewriter printers, line printers, daisy printers, ink-jet and image printers.

(a) Electric typewriters

The quality of print of an ordinary electric typewriter normally is accepted as the ideal - a quality not yet met by high speed computer printers. The current maximum speed of 20 characters per second of an electric typewriter is too slow if the cost of electronic text processing systems is compared with non-automated typing. These typewriters are electro-mechanical with many moving parts. If used in association with high production electronic systems they are prone to mechanical failures interrupting or delaying the production process.

(b) Matrix and line printers

Computer printers, either matrix or character type, are either not producing an acceptable print quality meeting normal text processing requirements or are too costly. Some of these at the lower cost end may be used for draft copy

purposes. The main advantage is the high output speed. Recent developments in matrix printing resulted in better print qualities which may be of an acceptable standard for many users.

(c) Daisy printers

The shortcomings associated with selectric typewriter and line printers motivated the development of electronic impact printers (currently 45-55 characters per second) restricting the use of mechanical parts. The typing element used in this type of printer is a flat circular printwheel, generally known as a daisywheel. These printers are capable of bi-directional printing. Daisywheel printers have become the most widely used production devices for electronic text processing systems where quality output is required.

(d) Ink-jet printers

The ink-jet printer is a non-impact printer based on the electrostatic deflection of ink droplets onto paper. The process is quieter than that of any impact printer. The quality is better than that of a line printer but not as good as that of daisy printers - especially when the final document has to be reproduced. The paper transport system on an ink-jet printer makes for easier paper handling as single sheets only are used. The present price/performance of an ink-jet printer it not competitive with that of daisy printers.

(e) Image printers

Image printers combine cathode ray tubes and fiber optic technology with a plain-paper, dry-toner copying process. Very high speed is achieved and quality output is generated.

The image printers work like photo-copiers and cut down the physical handling of paper. The process is estimated to be 30 - 50 times faster than electronic typing. Image printing can facilitate electronic text processing as a fast means of producing quality output.

It may be feasible to produce microform as output from electronic text processing systems where hard copy is not required. This process has been covered in Section 3.4.3.

4.5.2 Reproduction systems

The procedural aspects of reproduction systems were dealt with in section 3.5. Reference was inter alia made to photo-copying, duplicating and microfilming. This research focuses on electronic text processing. The available reproduction systems at this stage do not support electronic text processing systems directly. The only machines being used in experimental installations are sophisticated photocopiers (e.g. the Xerox 9700 copy system).

If very high speed, high quality output can be produced by production systems linked to electronic text processing, it may mean that some volumes of reproduction may be done on these systems. Image printers referred to in section 4.5.1 (e) may satisfy this need if large enough volumes of text can be handled practically to result in a unit cost which compares favourably with that of current reproduction systems. It may be in the foreseeable future a viable proposition for electronic text processing.

4.5.3 Distribution systems

Distributing final documents (in paper or microform) is the final link between the office that has prepared the document and its recipient. Three alternative distribution channels presently exist, viz. inter-office (and inter-company) mail, the post office service and electronic mail.

The advantages of electronic text processing equipment as regards production in less time, may be forfeited if the distribution takes too long. The inter-office and post office mail services mean physical handling and transporting. Rising energy and salary costs lead to higher distribution costs. Electronic mail systems can be considered as alternatives.

Telecommunication systems allow text to be transmitted via telephone lines or satellites from the sender to a recipient in a different location (sometimes very far away). This facility is known as electronic mail. Telecommunication systems include teletypewriters (telex), computer-based message switching systems and facsimile machines.

(a) Teletypewriters

These devices can send and receive messages (text) via telephone lines. The process is activated by dialling the number of the receiving party who must also have a teletypewriter. This is a reasonably slow process. The operator types the text (which was most probably typed before at a different source) which is transmitted and at the same time printed out on paper. Teletypewriters have no text manipulation facilities with the result that errors are transmitted and have to be corrected at additional expense. If the same text has to be sent to different locations it can be captured on paper tape. The paper tape is then routed through a teletypewriter. This speeds up transmission considerably. Systems do exist whereby the input can be done on electronic text processing equipment. Only when the text is correct, or when more than one message to the same recipient must be transmitted is the text captured on paper tape and routed through a teletypewriter. The savings resulting from this can be even bigger and distribution be speeded up if text is dictated by the author into a centralised dictation system (see section 4.3) forming part of a word processing system linked to teletypewriters. Future developments in electronic voice recognition systems may facilitate the process further. Text processing can in this way enhance distribution by eliminating physical handling.

Efforts are now under way worldwide to upgrade the international telex service. A new service, teletex, is envisaged. Panko[11] reports that the development of teletex as an electronic message system (EMS) is being done under sponsorship of the Consultative Committee for

International Telephone and Telegraph (CCITT) and that some countries such as West Germany and Sweden plan to offer the facility by 1982 to 1983. He is of the opinion that:

> "If teletex achieves its full promise, it could make a fairly sophisticated EMS available worldwide before the end of the decade"(12)

(b) Message-switching systems

Electronic data processing often uses telephone lines for data transmission from one city to another in South Africa. Communication systems under computer control allow high speed transmission of messages (data and text) which are considerably cheaper than using teletypewriters.

Satellite communication is faster, more reliable and more economical than transmission by means of telephone lines. A satellite system works on the principle that a satellite is located high up in space and messages are beamed to and from it. This is a future growth area and research being carried out in the U.S.A. points to great capacity for carrying voice, data and graphics on the same channel at much higher speed than telephone lines.

The development of message-switching systems (or the new favoured term "electronic message systems") is part of the drive towards the so called "paperless office". Organisations are in need of the faster distribution of information for decision-making and improved communication. The advantages of the distribution of digitised messages (whether originated by voice or electronic means) rather than in paper form are numerous. (See section 3.8) Pako(13) reports a number of successful inhouse developments in the U.S.A. at Continental Bank, Texas Instruments and Hewlett-Packard, and also notes that most major office products companies are now offering or have announced plans for EMS.

Electronic text processing systems can be adapted to become communications devices. Electronic message systems are therefore possible if two of these devices are placed at geographically different locations. This principle has applied for many years in data transmission, but has not yet been approved for text by the post office.

(c) Facsimile systems

Facsimile systems can transmit and receive replicas of text (whether handwritten, typed or printed) over telephone lines. An exact copy of a document such as a building plan or a contract is often required by companies before a final decision can be made.

Facsimile works on the principle of audible signals being converted into black marks. The total number of marks, makes up the picture. These systems come in two categories, viz. low-priced slow speed and higher-priced high speed. Since telephone usage costs are high, it often pays organisations to acquire the more expensive equipment depending on the volume of documents handled.

Biggs[14] is of the opinion that:

> "Facsimile transmission is effective where non-print characters are included in a communication requiring fast distribution, or where a communication was documented by equipment which is itself incapable of electronic mail transmission."

4.6 SYSTEM SELECTION GUIDELINES

It is no easy task for the would-be user to decide on the best system for electronic text processing. Individual user needs determine this. How this was done in practice in one large life assurance company will be outlined in Chapter VI. An understanding of document classifications is necessary since the types and quantities of documents processed determine the type of system to be used. It is further important to have selection guidelines for deciding which system in a particular category should be chosen.

Waterhouse[15] classifies documents for text processing into five major categories:

- Original: Any typewritten page such as letters, memos and forms.
- Repetitive: Original documents containing duplicate information such as form letters and mass mailings.
- Revised: Typed documents that must be retyped owing to author changes or typing mistakes.
- Prerecorded: Standardised or prestructured paragraphs and letters.
- Lengthy: Documents over 10 pages long, such as specifications and manuals.

Cecil[16] offers a very similar document classification and schematically presents a comparison of the suitability of various text processing systems to these various applications. This is reflected in Table 12.

TABLE 12

A COMPARISON OF THE SUITABILITY OF TEXT PROCESSING SYSTEMS TO VARIOUS APPLICATIONS

Use / Type of system/medium	Letters, small documents (Original)*	Form letters with name and address (Repetitive)*	Minimum editing, no retention (Revised)*	Minimum editing, with retention (Prerecorded)	Maximum editing, with retention (Lengthy)
Magnetic card	good	good	good	poor	
Magnetic tape (cartridge)	good	good	good	good	poor
Magnetic tape (cassette)	good	good	good	good	poor
Memory with unremovable storage	good	good	good	fair	
Memory with removable storage	good	good	good	good	fair
Minicomputer system	fair	fair	poor	poor	poor
Micro-processors	fair	poor	poor	poor	poor
Time sharing (in-house)	poor	fair	poor	poor	poor
Time sharing (outside service)	poor	fair	poor	poor	poor

* Corresponding with the classification of S.A. Waterhouse.

Suitability: good, fair, poor

Source: CECIL, P.B. : Word processing in the modern office : California : Cummings Publishing Company : 1976 : p.51.

It is very difficult to present selection criteria for electronic text processing systems since they may change frequently as a result of software developments. For the purpose of this research it is considered important to have selection guidelines and to update them when systems expansion is planned. Table 13 is a list of considerations compiled from the systems specification sheets of some vendors of electronic text processing systems. This list can serve as a selection guideline.

TABLE 13

SELECTION CONSIDERATIONS FOR ELECTRONIC TEXT PROCESSING SYSTEMS	
EASE OF OPERATION: • Ease of learning • Operator guidance by system itself • Multiple functions of keyboard	**DOCUMENT HANDLING:** • Copy portion of file • Supercopy • Replace or move text blocks • Locate specific text and replace • Insert/delete text • Merging of text • Batch filing/retrieving
DOCUMENT FORMATTING: • Easy formatting and reformatting • Automatic word wraparound • Automatic text centering • Automatic hyphenation • Automatic indentation • Automatic page numbering • Automatic index/table of contents • Automatic cursor positioning • Decimal alignment • Automatic letter writing (merging addresses and text) • Automatic headings/footings	**SYSTEMS ARCHITECTURE:** • Modularity • Simultaneous input and output • Standardised procedures • Media compatibility • Storage medium • Document security • Telecommunications • Interfacing to microfilm/photocomposing and OCR **OFFICE SYSTEMS OPERATIONS:** • Text sorting • Computations • Production statistics • Dictionary look-up • Security
TEXT OUTPUT OPTIONS: • Several printers simultaneously • High quality and proofreading printers • Proportionally spaced	**VENDORS:** • Longterm commitment to WP • International service and support • Satisfied customer base

Ease of operation allows operators of electronic text processing systems to be trained rapidly. This and multiple keyboard functions increase document handling productivity.

Document formatting and reformatting facilities save up to 80% of the time needed by other means of processing to prepare documents to specification. Improved document handling facilitates the creation, alteration, duplication, storage and retrieval of text with a reduction in cycle time. The greater the number of features available the greater the speed and accuracy with which copy is processed.

Systems architecture is an important consideration. Modularity allows upgrading or expansion of electronic text processing systems as company needs grow or change. It ensures compatibility of magnetic media. Telecommunication allows separate text processing equipment to be linked into an electronic text processing system catering for the broader organisational needs. Proper systems architecture allows for rapid response to organisational needs, assists in training and leads to maximum staff productivity. Systems architecture is supplemented by office systems operations.

Text output options abound. A wide range of high quality, high speed printing options enables users to maximise output with printers working simultaneously. Most systems allow for proportionally spaced output.

Office systems operations are those facilitating text processing and/or ensuring security. Data processing functions such as sorting and computing are useful for certain advanced text processing applications. These functions can also be very useful in maintaining and analysing production statistics. A recent software enhancement is a dictionary look-up which allows users to automatically scrutinise text for spelling errors. Thorough attention must be given to operations pertaining to the security of equipment and text. A detailed analysis of these security considerations for one organisation is given in section 6.7.5. The major areas for consideration are:

- A controlled environment is required for the optimum functioning of electronic text processing equipment. Restricted entry to the physical environment of the equipment is beneficial.

- Correct start-up and running procedures.

- Document identification and indexing to locate documents filed on a magnetic medium.

- Strict adherence to sound document archiving procedures. Archive magnetic media should contain the latest version of text or else the wrong text may be used for final documents. Systems breakdowns may also result in loss of text, which necessitates the regular archiving of text.

- Magnetic media security. Back-up on software and essential text (mostly referred to as master documents) has to be provided. This calls for the duplication of magnetic media. Storage away from the normal working area should be provided - preferably off-site.

- Systems maintenance as prescribed or performed by the equipment suppliers. This should include certain testing procedures on a regular basis.

- Selecting and maintaining the right calibre staff. This does not only apply to confidential work, but to tasks in general. Well-trained, motivated and responsible workers are a security measure in itself.

- Properly understood and documented procedures for equipment and text handling.

The vendor selected for a particular electronic text processing system should have certain corporate capabilities beyond just a product. Experience, service and support must also be available.

A list of considerations is useful to the would-be user, since the basic features required for any particular application can be isolated and systems design then be carried out.

4.7 CONCLUSION

Electronic text processing systems are available for the handling of the procedural phases of text processing. At this stage of development these systems are mostly functioning as separate entities. Where warranted, especially in large organisations where user expertise exists, the separate entities are converging rapidly to become interactive systems.

The concept "system" has been defined and divided into three broad categories - input, throughput and output. This approach was then used to determine a text processing cycle within these categories. Electronic text processing systems were discussed in each category. To promote further understanding of these systems, schematic representations were offered where deemed necessary.

Electronic input systems are in limited supply. Mostly this boils down to electro-mechanical equipment facilitated by electronics. Electronic voice recognition is still in a development phase. Dictation equipment was emphasised as an important aid in the input phase of the text processing cycle.

Electronic throughput systems were dealt with in detail. These systems will make a considerable impact on decreasing costs of office operations. The different types of electronic text processing throughput systems available for facilitating office problems were categorised with indications of their suitability for practical problems.

Electronic output systems were dealt with in three categories, viz. production, reproduction and distribution. Various alternative systems for practical needs were offered and an indication given of the expected impact of electronic distribution systems - a first step towards the "paperless office".

Selection guidelines were formulated for choosing the most suitable electronic text processing system for user requirements. As an essential first step document classification was dealt with and a comparison drawn of the suitability of text processing systems to various applications.

From this chapter it becomes clear that the required technology (systems) for solving most of the traditional office problems outlined in Chapter III is available. The systematic presentation of systems available will further this knowledge and serves as a reference framework for selecting the correct system for the particular problem.

CHAPTER IV : FOOTNOTES

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(2) BURNS, J.C.: "The evolution of office information systems": Datamation: April, 1977 : pp.60-62.

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(4) OPTNER, S.L.: Systems analysis for business management: New Jersey: Prentice-Hall: 1968 : p. 5.

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(9) WOHL, A.D.: "What's happening in word processing": Datamation: April 1977 : p.66.

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(11) PANKO, R.R.: "The EMS revolution": Computing: 27 August, 1980 : pp. 14-19.

(12) PANKO, R.R.: Op cit.: p.14.

(13) PANKO, R.R.: Op cit.: p.14.

(14) BIGGS, G.L.: Op cit: p.32.

(15) WATERHOUSE, S.A.: Word processing fundamentals: San Francisco: Cranfield Press: 1979 : p.118.

(16) CECIL, P.B.: Op cit: p.108.

CHAPTER V : ELECTRONIC TEXT PROCESSING: STRUCTURAL AND BEHAVIOURAL IMPLICATIONS

CHAPTER V

ELECTRONIC TEXT PROCESSING: STRUCTURAL AND BEHAVIOURAL

5.1 INTRODUCTION

Electronic text processing affects structural and behavioural aspects of organisations. According to Leavitt, Dill and Eyring[1]:

> "People see themselves as people - individual, unique, irreplaceable. Organizations see people more as resources - substitutable, trainable, usable for many very different purposes. A major problem, perhaps the major human problem, of organizations, lies at that interface. Can humans be humans and resources?"

These authors are also of the opinion that large organisations consist of four basic parts, viz. tasks, tools, structure and people. The tasks refer to the procedural aspects in reaching organisational objectives. The tools refer to technological advances, whilst the structure indicates the orderly relationship of resources in a hierarchy. The remaining part has to do with results through people. In the two previous chapters the organisational implications of tasks and tools as related to electronic text processing were dealt with. This chapter focuses on the structural and people aspects, which are often difficult to separate and some overlapping can be expected.

Organisations differ extensively as a result of management philosophy, nature of business, size, service orientation and quality of staff. This also applies to the large South African life assurance companies. It is therefore not valid to generalise on the effect of electronic text processing on organisations. For this reason a number of commonly known aspects only will be isolated as regards the structural and behavioural implications of the introduction or expansion of electronic text processing. In the following chapter, one large South African life assurance company will be dealt with, indicating the structural and behavioural implications through the stages of feasibility study, pre-implementation, implementation, review and evaluation. This

will serve a useful purpose in furthering the understanding of these organisational aspects of electronic text processing in addition to a theoretical approach.

Section 5.2 deals with the various office structures for text processing, whilst the structural aspects affected by the introduction or expansion of electronic text processing will be covered in section 5.3. In this respect, Englund[2] warns that:

> "Changing systems and equipment alone won't solve all of a company's problems. If not implemented correctly, the new innovations can actually create problems as serious as those they were intended to alleviate."

This section will cover the present and changing role of management and secretarial staff owing to electronic text processing and the structural changes deemed necessary.

Section 5.4 will consider the behavioural implications of introducing electronic text processing systems. The approach followed will go along with Connell's[3] way of thinking:

> "The aim is not to automate the office but to use machinery to help people perform better. Properly designed technology can be a flexible tool."

5.2 OFFICE STRUCTURES FOR TEXT PROCESSING

Four different types of office structures for text processing can be identified:

5.2.1 One-for-one relationship

Traditionally most offices function around the one-for-one relationship of a manager to a secretary. It often is a status symbol for managers to have a private secretary. Similarly a secretary's seniority depends on that of the manager she works for. Apart from production typing, administrative duties of a general nature are assigned to the secretary. Receiving visitors, filing, copying and making appointments are examples of these duties. The success of office structures based on the one-for-one

relationship depends on how the manager manages his secretarial assistance. If used as "personal assistant", with delegated powers, a competent secretary can help the manager to increase his productivity at higher creative levels. On the other hand the secretary may be unproductive as regards typing as a result of being away from the desk for other duties or waiting for work - also affecting the performance of the manager she works for.

Cecil[4] is of the opinion that a lot of time is wasted in an office structured on this basis. She divides secretarial work into four categories and reports the results of a survey by Geyer-McAllister Publications of New York of the average time spent on each of the categories in a one-for-one structure. Table 14 reflects this.

TABLE 14

TIME SPENT ON DIFFERENT SECRETARIAL WORK CATEGORIES			
55%	22%	18%	5%
Administration: • Reception and phone • Filing • Mail distribution • Copying • Research • Bookkeeping • Office maintenance • Services (refreshments)	**Production:** • Letters and memos • Reports • Large documents • Statistical documents • Standard letters • Forms • Miscellaneous	**Away from the desk.**	**Waiting for work.**

Source: CECIL, P.B. : Word processing in the modern office : Cummings Publishing : California : 1976 : p.163.

Different managers lay down different standards and criteria for their secretaries. This results in different procedures, uneven work loads, lack of training and unawareness of office technology that may facilitate the production process.

Electronic text processing systems are seldom justified for the small typing work load in the average one-for-one structure. The basic premise of a text processing system is the division of work. In text processing division of work can be between the correspondence and the administrative support activities. Developments in the field of electronic

text processing and its cost/justification favour the complete separation and division of typing and non-typing tasks. It is only in large organisations that this approach can be implemented and cost justified. The assumption is that the most productive system is also the best system. This premise is not always applicable since organisational and human needs differ.

5.2.2 Single-unit office structure

Sometimes the typing requirements and administrative support needs of managers in certain work activities do not justify the one-for-one structure. One secretary is then used to support more than one manager administratively and with typing. It has now become common practice for three or more middle managers to share one secretary. Depending on the nature of the work (e.g. statistical analysis) it sometimes happens that the secretary is being assisted by a clerk.

5.2.3 Work-group structure

Organisations are mostly structured by function or application. These functions normally form the basis for departmentalisation. Each department deals with different activities in the organisation and after a while becomes an entity with specific characteristics, needs and terminology. A number of managers may work with related aspects of these functions. Secretarial services can then be allocated on a work-group basis where several secretaries are grouped to perform production and administrative tasks for a department on a specialised basis. Some secretaries will specialise in production for which electronic text processing equipment may be justified, others in administrative support. This means that managers are supported by a number of secretaries which leads to even work distribution, shorter completion times and better quality through specialisation of secretaries. It is

important to note that the work-group structure changes the reporting structure. The individual secretary still serves a manager but does not report to him or is not supervised by him. This function may then rest with a senior secretary or supervisor.

5.2.4 Centralised unit

A centralised text processing unit specialises in production, freeing secretaries in the various departments to devote their time exclusively or to a large extent to administrative duties. This is the ideal arrangement for implementing cost-effective electronic text processing systems. This is a typical supportive function with its own structural characteristics and behavioural implications.

The ideal structure is the one which satisfies structural, worker and managerial needs. Increased text processing productivity is very desirable, but it is only one of the several important performance criteria of a good text processing system. The individual management needs differ from organisation to organisation and may result in a combination of structures. According to Rosen and Fielden[5]:

> "A successful system, then, is one that satisfies the needs of the principals and the organization it supports, and the key to a successful system is to provide the right combination of components that will meet these needs."

5.3 STRUCTURAL IMPLICATIONS

In analysing the "automated office" one research group[6] in the United States of America argues that the purported reason for this venture is increased office productivity - especially that of managers. They claim that management's mode of gathering and disseminating information and decision-making has so far not been much affected by computers. A demanding business environment calls for quick information-flow and decision-making. Top managements are often not aware of or concerned about the processes involved in presenting them with required information - they are more interested in the end result. Chapters III and IV outlined text processing procedures and systems. Attention was drawn to the

advantages of electronic text processing compared to traditional means. According to Quible[7] electronic text processing will affect office structures in that there will be greater emphasis on centralisation and centralised control, the secretarial function will be restructured, fewer personnel will be required and they will specialise to a larger extent. A number of other structural implications are also important:

5.3.1 Increased centralisation

The one-for-one relationship and the single-unit office structure approaches have been followed world-wide to increase job satisfaction and to get secretaries away from work-group structures and centralised typing pool arrangements. This was often not done to benefit the secretary but for the convenience and status of the manager. According to Cecil[8]:

> "Many secretaries have enjoyed this type of job: a variety of tasks, lack of boredom, involvement in all aspects of office action and decisions, and personal contact with principals. Originators of work have liked this type of system because they can communicate easily and quickly with the people who do the work and receive immediate response to their office needs."

The cost implications of this situation as outlined in section 2.5.2 and associated problem areas (section 2.5.3) necessitate a change to this approach. Any change will deprive the particular manager of an exclusive relationship with one secretary - a change in inter-personal relationships. To share a secretary as in the single-unit or work-group approach means a loss of prestige to the manager and to the secretary. It is doubtful whether Kleinschrod's[9] opinion that these behavioural implications soon change because of the quick return of typed copy as a result of text processing holds ground. Rather as a result of these advantages some managers would support the discipline. Electronic text processing is ideally suited for work-group structures as well as for centralisation and centralised control. The discipline often leads to increased productivity and more efficient time management.

5.3.2 Restructuring of secretarial posts

The National Secretaries Association[10] of the U.S.A. defines a secretarial post as follows:

> "The secretary is an assistant to an executive, possessing mastery of office skills and ability to assume responsibility without direct supervision, who displays initiative, exercises judgement, and makes decisions within the scope of her authority."

This definition is very generalistic in nature and would probably fit a great number of clerical positions in organisations. Traditionally the secretary has performed a combination of administrative and production tasks - a generalist. A selected number of senior secretarial positions normally exist where experience is required, confidential matters have to be dealt with and where a knowledge of special terminology is essential. For the most part the post of secretary is a general one. The required skills can normally be acquired and used in different departments or organisations in a short time span.

A separation of tasks as a result of electronic text processing requires greater specialisation from the secretary and leads to different work structures. Increased job content can be envisaged.

(a) The administrative support secretary will have to be trained in overall company policy, procedures and organisation. She should be able to respond intelligently to the outside sphere. This group will have very little typing to do - instead they may become word originators as they mature in their posts. Nothing prohibits an administrative secretary from progressing in line management or in a supervisory capacity in the administrative support group. According to Petrovich[11] word processing represents a major change in clerical operations that restructures the way people work together and the way work is done, which calls for a different work philosophy.

(b) The nature of production typing in the work-group structure or on a centralised basis by means of electronic text processing equipment will change considerably. It can be reasoned that the job content will change as a result of procedures to be followed which show a marked similarity to those associated with data processing. Advanced functions of electronic text processing as a result of software capabilities (records processing and the compilation of own programs) may increase job content and responsibilities. Expertise is required on aspects such as start-up procedures; equipment and file maintenance; system and text security; back-up; work measurement standards and production control; software capabilities; and applications which may be much more sophisticated than those forming part of traditional text processing. As a result these factors offer higher job levels which could change the internal structure of secretarial posts and the functional relationship to other structures in an organisation.

5.3.3 Decrease in secretarial staff

Electronic text processing greatly increases typing output per worker. For this reason fewer people can be used to handle a given work load, which could mean redundancy. Labour turnover in secretarial positions tends to be high. This is often the result of normal conditions prevailing in a purely female group such as marriages, pregnancies or transfers of husbands to different locations. This means that "redundant" staff can be accommodated. Normally work loads grow with company operations and so does the text processing need. Electronic text processing rather contains staff expansion than leads to redundancy. This situation affects the organisational structure.

5.3.4 Creation of support functions

Electronic text processing paves the way for line managements to avail themselves of records processing facilities combined with text manipulation. Any new text

processing application needs scrutinisation to determine the most cost effective approach - which could be computerisation or adherence to manual procedures. Depending on the size of organisations and the capacity of electronic text processing systems used, the function of procedural analysis can be performed by a senior text processing systems operator or if the volume justifies it, by an administrative support official or group. Administrative support is also necessary as a result of expertise required on systems, software and text integrity; telecommunications; interfaces with peripheral equipment; and cost centre management. In some organisations systems analysts from data processing will accept this responsibility, some may use a member of the Organisation and Methods functions, whilst others may second a line official or someone from the Office Administration function. In very large organisations in the U.S.A. electronic text processing is managed as a separate department on par with data processing.

5.4 BEHAVIOURAL IMPLICATIONS

Traditional text processing is still widely in use. This means repetitive manual work, low-classified in terms of job values with short career paths from the operational point of view. Managers can only get a limited maximum output per day, long cycle times and time consuming proof-reading of lengthy documents and contracts apply. Electronic text processing can change this situation. Productivity can increase dramatically and unit cost be decreased while managers can get final documents sooner and have to do the minimum proof-reading.

The behavioural implications resulting from the introduction of electronic text processing systems may differ from organisation to organisation. In order to evaluate the behavioural implications resulting from the introduction and/or expansion of electronic text processing systems an understanding of the factors determining job performance is essential.

An important function in the managing process is the directing of workers' efforts to achieve desired goals. Managers are

responsible for their own performance and that of the people who work for them. Many factors determine performance - e.g. technological advances in the field of electronic text processing, only one of many examples. The abilities and skills of workers are others. Competitive organisations with seemingly no differences between them may show marked differences in performance. Research to find the answers to these deviations abounds and points to worker motivation as the missing factor. Worker motivation can and does have a direct impact on performance.

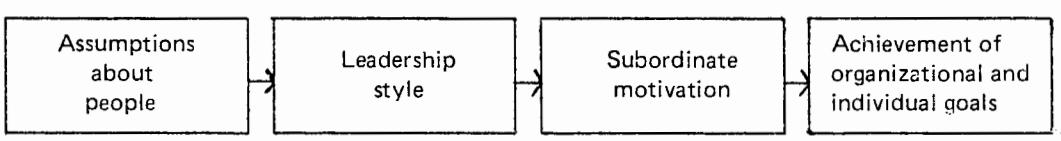
Worker motivation is a complex and diverse field. It is not the purpose of this research to offer a complete understanding of motivation as a factor in worker behaviour. The results of empirical research by behavioural scientists offer guidelines which allow greater perspective on the behavioural implications of electronic text processing. According to Hackman[12]:

> "An employee will work because the work interests and challenges him and when he performs effectively will reward himself for doing well."

The process of directing and the role of subordinate motivation are reflected in Table 15.

TABLE 15

THE PROCESS OF DIRECTING



Source: BRACEY, H.J. & SANFORD, A. : Basic Management — An experience — based approach : Dallas, Texas : Business Publications, Inc. : 1977 : p.111.

Managers make certain assumptions about the work behaviour of people and in line with these choose a particular approach to the directing of efforts. Bracey and Sanford[13] are of the opinion that there are probably as many different assumptions about people's work behaviour as there are managers, but research indicates a pattern of similarities. They consider Mc Gregor's "Theory X" and "Theory Y" assumptions[14] as the most meaningful statement of the range of assumptions. (See Table 16)

TABLE 16

McGREGGOR'S ASSUMPTIONS ABOUT HUMAN BEHAVIOUR

Theory X assumptions	Theory Y assumptions
□ People are basically lazy and will avoid work if they can.	□ Work is as natural as rest or play.
□ People are not ambitious, do not want responsibility, and prefer to be directed.	□ People will not only accept responsibility; under the proper circumstances, they will actively seek it.
□ People must be closely controlled and often forced to work toward organization objectives.	□ People will exercise self-control and self-direction when working toward objectives to which they are committed.
□ Most people are unwilling and unable to help solve organizational problems.	□ People are generally willing and able to help solve organizational problems.

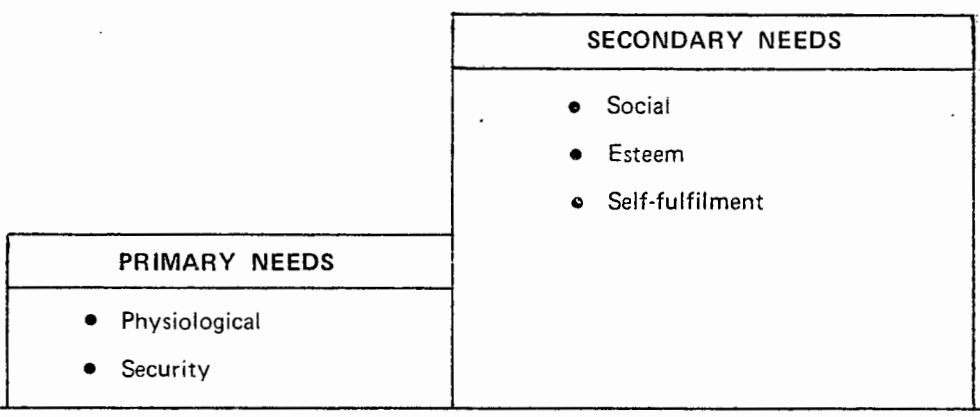
Source: JOHNSON, T.W. & STINSON, J.E. : Managing today and tomorrow : Massachusettes : Addison-Wesley : 1977 : p.30.

The assumptions presented by Theory X are a negative view of the work behaviour of people, whilst Theory Y assumptions imply that work is not undesirable to most people and can be very satisfying. As can be gathered from Table 16 assumptions affect leadership style. Managers have the right to form their own assumptions under varying circumstances. An approach based on Theory Y assumptions is believed to be the most effective. Electronic text processing as an integral part of interactive administrative services supports Theory Y assumptions. It positively promotes a work climate where these assumptions can be fulfilled - a climate where the uniqueness of workers is accepted and action is taken accordingly.

To fully understand worker behaviour it is necessary to evaluate what motivates them. According to Maslow[15] needs are arranged in a hierarchy. Phsysiological needs are at the lowest level, followed by security, social, esteem and self-fulfilment needs. The latter need is a drive towards self-realisation or self-actualisation, making the best of one's potential and capabilities. As long as a particular need is unsatisfied it will dominate behaviour. People tend to satisfy their lowest-level needs first and as soon as these become satisfied their motivational power decrease and the next higher level will become dominant. There is no rigidity in the order in which the needs become stronger. Johnson and Stinson[16] indicate that a two-level hierarchy, containing primary needs (physiological and security) and secondary needs (social, esteem, self-fulfilment and others), is more accurate. This viewpoint is schematically presented at Table 17.

TABLE 17

MASLOW'S HIERARCHY OF NEEDS



Adaptation by: Johnson, T.W. & STINSON, J.E. : Managing today and tomorrow : Massachusettes : Addison-Wesley : 1977 : p.34.

A study of human needs does not provide a complete understanding of motivation, but facilitates the directing of worker behaviour. Johnson and Stinson[17] conclude:

> "People have many needs. For most people physical and security needs are fundamental. Once these needs are mainly satisfied, secondary needs become a dominant motivating force."

There seems to be a definite relationship between Maslow's hierarchy of needs and the Theory X and Theory Y concept of Mc Gregor. Theory X assumptions focus on the primary needs, whilst Theory Y assumptions support the secondary needs.

The desired end result of the directing process is the achievement of organisational and individual goals. The challenge of directing is to create a motivational climate where workers can achieve their own goals (satisfying individual needs) and those of the organisations they work for. For this reason it is essential that managers should know what workers want from their work. Herzberg[18] developed the Satisfier - Dissatisfier Theory with the basic assumption that workers are motivated to perform a good job to the degree that they achieve their own goals from doing the job. The factors relating to this theory are:

TABLE 18

HERZBERG'S SATISFIERS – DISSATISFIERS	
SATISFIERS	**DISSATISFIERS**
1. ACHIEVEMENT – Seeing the outcome of one's work.	1. SALARY – Adequate for work done.
2. RECOGNITION – Valid feedback on performance.	2. COMPANY POLICY AND ADMINISTRATION – Adequacy of the organisation's policies.
3. WORK ITSELF – Interesting, varied and challenging.	3. SUPERVISION – Technical competence.
4. RESPONSIBILITY – Accountability for own work.	4. INTERPERSONAL RELATIONS – Get along well with superiors and co-workers.
5. GROWTH AND ADVANCEMENT – Opportunity to grow in terms of ability.	5. WORKING CONDITIONS – Desirable physical conditions.
Summary from: BRACEY, H.J. & SANFORD, A. : Basic Management – An experience based approach : Dallas, Texas : Business Publications, Inc. : 1977 : pp. 134 – 135.	

The satisfiers will have the greatest effect on motivation to perform well and are generally referred to as motivational factors. The dissatisfiers (also referred to as maintenance or hygiene factors) in themselves will not motivate but their absence

or specific shortcomings may have an adverse effect on motivation. Herzberg's theory relates to both those of Maslow and Mc Gregor. Primary needs, Theory X and Dissatisfiers match well and so do Secondary Needs, Theory X and Satisfiers. Bracey and Sanford conclude[19]:

> "Job satisfaction and high levels of motivation tend to be influenced by the work and jobs that people do, while dissatisfaction and poor performance tend to be highly influenced by the conditions under which the job is done."

Job enrichment is the practical application of motivation theories. It is the changing of work content (restructuring of jobs) in such a way that more of the motivating factors become an inherent part of the job. The introduction of electronic text processing systems in organisations calls for an awareness of these factors in evaluating the behavioural implications:

5.4.1 Changed work procedures

Basically electronic text processing is the automation of procedures previously done manually. Adaptation is therefore necessary for the originator (manager) and producer (operator of an electronic system) who must conform to certain prerequisites characteristic of the system. Where administrative support is organised separately the work procedures also change. It may seem as if systems are the determining factor of work procedures and that the worker is forced to adapt to that. In contrast, electronic text processing does not impose a rigidity in terms of following prescribed steps but offers ample opportunity for flexibility and allows the users and operators more scope in deciding the procedures to be followed to achieve a desired end result. Electronic text processing automates the routine processing and enlarges on those aspects that create a meaningful work experience - interesting, varied and challenging work, which, according to Herzberg (See Table 18), is motivational.

5.4.2 Revised skills

If one refers to sections 4.3 to 4.5 on electronic text processing systems it becomes evident that managing and

operating these systems require certain additional and specific skills. Some of these skills are closely related to those required in an EDP environment.

The manager responsible for electronic text processing must acquire systems and operational knowledge. Basic skills are needed for defining systems requirements, to enable him to guide implementation successfully, to evaluate progress and to select the best equipment. The supervisor of a work group or central unit utilising electronic text processing equipment must be familiar with systems and operational aspects to co-ordinate training and to ensure the efficient running of the systems. The operators learn to handle equipment that is completely different from manual procedures or mechanical equipment used before - e.g. visual display units under software control in the throughput phase of the text processing cycle.

Some systems used for electronic text processing are programmable, requiring specialised knowledge from the operating or supervisory level to compile and change programs. As pointed out in section 5.3.2 electronic text processing means specialisation whilst traditional processes use a general approach.

Inexperienced workers may view electronic text processing as a very difficult discipline and may wonder whether they will succeed. Workers with many years experience in a traditional office environment, even centralised, may be hesitant to obtain the required skills. Training programmes facilitate the acquisition of necessary skills by the workers.

Rosen and Fielden[20] are of the opinion that selecting the right person, training that person and striving towards job enrichment will be important people factors.

McNamara[21] feels that employees should be fully informed, properly assigned, encouraged in their progress, and justly rewarded. Personnel should be selected early in the program and where possible should participate in the

survey or study-phase of implementation. Positive contribution is the core of working teams.

The revised skills as a result of electronic text processing lead to a sense of achievement in completing jobs successfully and solving problems. It also increases responsibility levels. In terms of Maslow's hierarchy of needs (see Table 17) higher esteem and self-actualisation are experienced.

5.4.3 Expanded career opportunities

According to Waterhouse[22] electronic text processing has created many new job titles and the greatest variety of positions can be found in companies with centralised text processing facilities. The post structures are typically divided into management, correspondence and administrative positions. The job titles differ from one country to another, and from one organisation to another. The implementation of electronic text processing systems often results in a smaller work force with increased job content and extended managerial requirements. Compared to traditional methods career opportunities now exist for workers to advance to much higher levels than before. On managerial level job opportunities are also created for the co-ordination of text processing activities. The scope for advancement has become much bigger and career paths exist to a larger extent than before. Growth and advancement are viewed as motivational for performance by Herzberg (See Table 18).

5.4.4 Greater recognition

Electronic text processing contributes towards decreased costs in offices. Management learns about this through management reports and which particular group of people is responsible for the results. Traditionally text processing is an ever increasing cost structure where management attention can do very little. With the introduction of electronic text processing this situation changed markedly.

The benefits for middle management arising from electronic text processing are numerous, e.g. less proof-reading, shorter turnaround times and greater accuracy. These lead to increased use of electronic text processing facilities and recognition of the people involved in it. Recognition not only comes in the form of advancement and what goes with it, but also in regular feedback on the marked effect on administrative performance.

An adverse effect on inter-personal relations was envisaged in section 5.3.1 owing to greater centralisation as a result of electronic text processing. It is also true that a marked improvement on the other hand takes place in inter-personal relations between secretaries and user departments on a centralised basis. In the one-for-one or single-unit structures inter-personal relations are restricted to a particular manager or a small group of people, whilst in a centralised environment contact can be established and maintained with a larger group of people. Knowledge of an organisation's activities may increase to a larger extent and may create promotional avenues.

5.4.5 Increased job satisfaction

With the introduction of electronic office systems the aspect of job satisfaction receives increasing attention. Casady[23] found a short form of the "Minnesota Satisfaction Questionnaire" with a five-point rating scale in a study attempting to measure job satisfaction of a particular group of word processing operators highly successful.

The degree of job satisfaction inter alia depends on the organisational structure, management philosophy, a climate of worker-orientation and office structures for electronic text processing. Generally electronic text processing is viewed as a discipline which could affect job satisfaction positively.

The behavioural implications of electronic text processing as outlined are favourable for the creation of a motivational climate for optimum worker performance. A leadership style based on Theory Y assumptions will bring the best results. In terms of Maslow's hierarchy of needs, staff involved in electronic text processing activities can satisfy their social, esteem and self-realisation needs. A well managed electronic text processing function offers the opportunity to do challenging work, for achievement, recognition, greater responsibility, and for growth and advancement (Herzberg's Satisfiers). It is also possible to maintain a high level of motivation with proper attention to the dissatisfiers. Salaries normally increase at a higher rate as a result of advancement and higher job responsibility. The higher productivity achieved by means of electronic text processing also makes it easier to cost justify increases in salary. The success of electronic text processing correlates with the degree of management commitment and because of this company policy and administration seldom pose any problems. Similarly the success of the function is directly dependent on the way it is managed. Supervision by technically competent officials should not be a problem if the feasibility study and implementation were performed by competent people. Inter-personal relations have been dealt with in the previous section, whilst a centralised physical environment often offers more scope for the planning and implementation of superior working conditions.

Electronic text processing offers a high degree of job satisfaction to those committed to the managing and operation of it. It can bring a new positive dimension to working life.

5.5 CONCLUSION

This chapter furthered the understanding of the effect of electronic text processing on the "people" factor of organisation. It became clear that the procedural and technological changes to be brought about by electronic text processing will influence organisation structures and the behavioural patterns of management and the worker.

Section 5.2 identified the four different types of office structures for text processing. Section 5.3 indicated the structural implications. The emphasis will in future be on cost-effective centralised work units with fewer personnel and quicker response time.

The behavioural implications of electronic text processing were outlined in section 5.3. It is obvious that certain established behaviour patterns will change but that overall the introduction of electronic text processing will be beneficial over a wide spectrum. The sense of achievement and job satisfaction will be higher. Workers will become more skilled and specialised. Greater recognition as a supporting management function, will be given. It became evident that the question, "Can humans be humans and resources?" can be answered in the affirmative. People are considered to be as important as procedures and systems in bringing about the "office of the future".

CHAPTER V : FOOTNOTES

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CHAPTER VI : THE FEASIBILITY, IMPLEMENTATION AND IMPACT OF ELECTRONIC TEXT PROCESSING IN ONE LARGE SOUTH AFRICAN LIFE ASSURANCE COMPANY

CHAPTER VI

THE FEASIBILITY, IMPLEMENTATION AND IMPACT OF ELECTRONIC TEXT PROCESSING IN ONE LARGE SOUTH AFRICAN LIFE ASSURANCE COMPANY

6.1 INTRODUCTION

One of the objectives of this research is to gauge the feasibility, implementation requirements and impact of electronic text processing in a large South African life assurance organisation (to be referred to as Company A) and to determine the extent to which it will facilitate the administrative processes (see section 1.4.1(v)). Since electronic text processing is a relatively new concept to the South African life assurance industry head office operations only will be dealt with. (See section 1.4.3).

Section 2.5 dealt with traditional office problems in the life assurance industry. This study will survey Company A for the presence of these and other problem areas affecting the five functional areas as outlined in sections 2.4.1 to 2.4.5, viz. management, people, processing, communication and environment. In this chapter electronic text processing will be offered as a viable solution to a number of these problem areas and be tested as a starting point for interactive administrative support.

Section 6.2 will account for the factors which led Company A to consider electronic text processing as a possible aid in dealing with administrative office problems.

Section 6.3 gives an account of the situation in Company A prior to electronic text processing. It deals with structural relationships and expected company growth.

Section 6.4 deals with specific problem areas in the field of text processing affecting productivity adversely in Company A. Mention will be made of text origination, secretarial services, departmental typists and the typing centre.

In section 6.5 the feasibility study for the introduction of electronic text processing in Company A will be dealt with. Since cost-justification plays an important part in decisions of this kind it will be included as an essential part of the study. The feasibility study will be covered in five phases leading up to getting management's commitment for the discipline.

Systems design around the procedural, equipment and people factors will be covered in detail in section 6.6. Systems evaluation criteria will be weighed and a conceptual framework for systems requirements compiled. The availability of systems, and user's experience, will then be dealt with. A system selected on these grounds will then be presented, serving as the basis of recommendations to top management.

The implementation of the electronic text processing system will be enlarged on in section 6.7, emphasising the importance of sound management practice in achieving this. The implementation requirements of systems specification, installation, orientation, staff selection, procedural aspects and training will be dealt with.

The impact of the electronic text processing system will be evaluated from financial, administrative and organisational viewpoints and the results reported in section 6.8. The problems experienced will be dealt with in section 6.9.

The future scope of electronic text processing in Company A will also be outlined in section 6.10. Action plans, as a result of a strategy for electronic text processing, will indicate the future scope.

Certain elements in the text processing cycle (Table 8 in section 4.2) were already in operation in the organisation chosen. The ETP installation endeavoured to make these elements part of a total system. The purpose was not integration, but to ensure that systems normally working independently can be interactive in the communications process when required - the systems concept.

6.2 FACTORS WHICH LED TO ELECTRONIC TEXT PROCESSING

A demanding business environment with tight deadlines is characteristic of the present-day South African life assurance industry. The organisation chosen for this study has always been well aware of the many office problems affecting efficiency and productivity, and very forward-thinking in effectively applying new technology. Being one of the first companies to install a commercial computer in South Africa proves this point. At the same time it maintained its people-orientation.

In 1975 administrative office management realised that, unlike EDP, support from text processing operations was not fully geared for the expected company growth and could have an adverse effect on its objective of good policy-holder service.

Increasing volumes of paperwork and the problems associated with the handling of it, as outlined in section 2.5.1, have for many years been a matter of concern for Company A. The life assurance industry world-wide served as one of the important instigators for the introduction of micrographics for commercial use. This technique was also considered to have merit for dealing with paperwork, since many large life assurers in the U.S.A. implemented this successfully.(1) The merits of micrographics were investigated and introduced on a small scale. These systems work well to this day and include conventional microfilm and computer output microfilm applications. It soon, however, became evident that micrographics were not the complete solution to the particular organisation's main paper-handling problems.

Apart from paper-handling problems, there was the need for the more effective origination, production and distribution of paper. The developments in the field of EDP in general and electronics in particular triggered the interest in looking at this means as a possible solution for some of the problems. "Business Week"(2) on 30 June 1975 published an article "The Office of the Future". That article convinced certain individuals, concerned with research on administrative efficiency in the organisation, that the problem of text processing was viewed too narrowly. That realisation led to the identification of the main problem areas and the formulation of a conceptual framework for executing these viewpoints in the organisation.

Increased productivity had been mainly the result of the computerisation of the processing phase (throughput) of systems, whilst little had been done on the phases of preparation (input) and completion (output). The fact that traditional processes were still being followed along with highly sophisticated computerised systems offered scope for text processing.

The productivity of text processing operations was found to be low and static, whilst the cost per process of text handling was unknown with the result that cost-reduction programs could not be purposefully implemented.

The action proposed was to:

(i) Commission someone at managerial level to survey the problems on an ongoing basis with the aid of the Organisation and Methods function.(3) This was considered a very necessary step, since aspects of text processing had been dealt with on an ad hoc basis by a number of individuals from different departments in Company A. That could easily have led to duplication of equipment or decisions taken without taking complete company needs into consideration. The idea was that text processing should be dealt with as a special project, with some line management responsibility, until such time when the total commitment and effect could be determined. The responsibility would then be placed where most suitable.

(ii) Determine the methods followed and costs of originating, producing, reproducing, storing, retrieving and distributing textual information per administrative work process. The situation (including problem areas) prevailing in Company A in connection with each sub-phase had to be determined together with costs. An indication of what the situation was elsewhere, locally or abroad, was also necessary. Staff from the Organisation and Methods function with a sound systems analysis and company administration background were selected for this purpose.

(iii) Survey the market for equipment available which could handle text, once it had been created with minimum human interference, in any further processing.

(iv) Shorten the communications process and completion time of documents by minimising human effort.

6.3 COMPANY A PRIOR TO ELECTRONIC TEXT PROCESSING

The life assurance administration is only part of the total activities of Company A. Many other functional areas exist. Some of the sub-phases of text processing, viz micrographics, photocopying and duplication were already implemented successfully in the organisation. It was decided to concentrate on the remaining aspects.

Four distinct categories of text processing could be isolated in Company A:

- One-for-one relationship of senior officials to one secretary (general duties).

- Some senior and middle line managers supported by the single-unit office structure.

- Departmental typists/clerks on a limited scale.

- Centralised unit for typing, the production of form letters on magnetic tape machines and composing typewriters for typesetting.

The organisation's strategic plans included accelerated growth; greater emphasis on service and better communication; sound cost control systems; quality output; and improved documentation. In budgeting for the execution of these plans it became clear that the volume of text processing would increase substantially and that the need for high quality output would increasingly have to be met. Improved turnaround times were also essential. That pointed to the need for vastly improved paper-handling capabilities and administrative support. With that in mind the secretarial support group, departmental and central typing services were surveyed. The form depicted in annexure 6.1 was used for that purpose.

6.4 TEXT PROCESSING PROBLEM AREAS

6.4.1 Origination

Section 3.3 dealt with the procedural aspects of text origination. Four ways of text origination, viz. handwriting, shorthand, machine dictation and amendments to existing text were surveyed as part of the investigation of text processing in Company A as a whole. The situation as found is reflected in Table 19.

TABLE 19

TEXT PRODUCTION PER WORK GROUP			
Means of origination	Secretaries	Departmental typists	Typing Centre
Handwritten	63,3%	70,0%	60,2%
Shorthand	8,5%	0,4%	—
Machine dictation	3,3%	0,3%	29,9%
Amendments to existing documentation	24,9%	29,3%	9,9%
	100,0%	100,0%	100,0%
Unit of measurement: Line count			

To produce an average business letter originated by means of handwriting, shorthand and machine dictation by means of normal typing was costed with an average document as the basis. Annexure 6.2 reflects the results. As a result of cost, origination by means of handwriting is considered to be one of the least desirable means of origination for business text. An analysis of the handwritten documents showed that in excess of 90% lend themselves to machine dictation.

The reasons for the low usage of machine dictation were determined. Some of the reasons were the feeling of senior officials of too many controls on the traditional equipment; the unawareness of the higher cost of handwritten origination; the fact that some considered the nature of their work as too complicated for machine dictation; and that the equipment used was often outdated which led to communicating problems with the transcribers.

A variety of equipment with non-standard recording media was in use. It was troublesome for transcribers since more than one transcription unit had to be used. The results of machine dictation were not good. Transcribers blamed the originators and vice versa. The result was delayed turnaround, less accuracy and a return to handwritten origination.

Originators using machine dictation, and dependant on the central typing facility, followed a work pattern whereby the work to be dictated was accumulated and then dictated on to magnetic media which were distributed by an internal messenger service. That meant that apart from the delays before reaching the production stage, it was scheduled for transcription, and since it was accumulated work, it would take considerable time to complete. Clerical staff originating letters soon discovered a much faster turn-around with handwritten origination - a more even work distribution was achieved that way. The pattern of machine dictation (Table 19) reflects this. As pointed out in section 4.3 centralised dictation systems can eliminate most of these problem areas and offer many economic advantages.

Amendments meant retyping and proof-reading. It was determined that lengthy documents were retyped four times on average. Text was originated electronically at a rate of 2 million letters per annum through parameters on the main-frame computer or by means of transactions when already working in an on-line mode for other transactions. These computer letters are directly distributed to policy-holders. Computer word processing has therefore been done for a long time without special software. The facility had been used for high volumes where the quality of output was acceptable rather than meeting exacting standards.

6.4.2 Secretarial services

From the results of the survey it became clear that secretarial services were under-utilised. Table 20 reflects the situation.

TABLE 20

UTILISATION OF SECRETARIAL SERVICES		
Main categories	Percentage utilisation	Number
Administrative Support 34,1%	0 – 19,9	1
	20 – 39,9	2
Typing 30,2%	40 – 59,9	15
	60 – 79,9	5
Idle 35,7%	80 – 99,9	11
		34

The high average percentage of idle time (35,7%) could be misleading and could not be generalised on. An analysis of the distribution of the results as presented in Table 20 showed that the work load was unevenly distributed with little or no help mutually. Whilst almost half of the group was utilised effectively, the balance required serious attention. The results as in Table 21 are from an analysis (Annexure 6.1) of the administrative support activities:

TABLE 21

SECRETARIAL SERVICES : ADMINISTRATIVE SUPPORT ACTIVITIES	
Activities	%
1. Mail distribution & filing	25,3
2. Telephone	10,3
3. Reception	1,0
4. Shorthand	6,0
5. Travel arrangements and appointments	2,4
6. Personal arrangements	32,0
7. General administrative duties (handling requests, etc.)	10,6
8. Assistance to other staff members	4,1
9. Drafting letters, memos, etc.	0,9
10. Maintaining information e.g. graphs, statistics, etc.	0,6
11. Other	6,8
	100,0

The analysis revealed that secretarial staff are not sufficiently used to the advantage of management. Mail distribution, answering the phone and attending to personal matters accounted for 65,6% of the administrative support activities. Since effective administrative support can contribute to the productivity of management that was an area which called for positive action.

No control, other than that of their managers, existed over the secretaries. No production returns, quality control, career development and training, etc. were done. There was a limited scope for advancement. No use had been made of more advanced equipment. The analysis further revealed that 31% of the typing work load was more suited for word processing equipment.

Projected company growth meant that in future the number of managerial staff and secretarial support would increase.

6.4.3 Departmental typists

Table 22 reflects the utilisation of departmental typists.

TABLE 22

UTILISATION OF DEPARTMENTAL TYPISTS		
Main categories	**Percentage utilisation**	**Number**
Administrative Support 11,7%	0 – 19,9	1
	20 – 39,9	5
Typing 46,0%	40 – 59,9	8
	60 – 79,9	3
Idle 42,3%	80 – 99,9	3
		20

From the above it is clear that a very unproductive use of skilled labour took place. The need for some of the posts was questionable. In comparison with secretaries (section 6.4.2) only 30% of the work force could be considered productive. An analysis of the nature of the work revealed that a large percentage of the typing work load called for frequent retyping more suitable for automated equipment. Limited control existed over activities and work standards.

6.4.4 The typing centre

The typing centre served all typing needs which were not satisfied by secretaries and departmental typists. The centre handled the biggest work load. A staff complement of 40 typists under supervision of a supervisor provided a variety of typing services as well as the composition of forms and other documents for printing. The survey results were analysed and compared with those of secretaries and departmental typists. This revealed the following broad categories of work as percentages of the total work load dealt with on a regular basis:

TABLE 23

TYPE OF TEXT HANDLED PER WORK GROUP			
Text	Secretaries	Departmental typists	Typing Centre
• Letters	19,2%	40,5%	47,0%
• Internal memos and notes	27,3%	10,1%	1,7%
• Reports/Minutes	22,6%	4,3%	10,9%
• Schedules	15,2%	8,7%	10,2%
• Form letters	6,9%	8,9%	27,2%
• Cheques & Misc.	7,4%	25,9%	3,0%
• Telexes	1,4%	1,6%	–
	100,0%	100,0%	100,0%

The typing centre had for many years worked on a production control system instigated as a result of a scientific work measurement program. Standard times were set for all activities. It was required from each worker to meet a daily set standard. These production figures were logged and analysed on a monthly and yearly basis. This showed the actual total typing output achieved and individual performance, which in turn served as the basis for merit rating, promotion, training, etc.

The following aspects became evident from the survey which took three months to complete. Many of these aspects show a marked similarity with those for offices in general as given in section 2.5.3.:

(i) approximately 55% of the letters typed showed little variation in content. That pointed to producing standard (form) letters which could be handled more economically by means of automated typing of some form or other.

(ii) Lengthy documents which required frequent revision and retyping represented approximately 10% of the work load. The envisaged new products to be introduced by Company A would result in the creation of numerous highly revision-prone documents increasing the figure to approximately 30% of the total work load.

(iii) The productivity level was static. If one takes the level of training, the established production control system, and the equipment in use or available on the market into consideration, it is evident that the staff then employed could not be much more productive. Any increased work load therefore meant an increase in staff. More staff meant an increased span of control for the supervisor, who already handled a large number of workers. The possibility of forming a second work unit was considered. All that would add up to increased unit cost.

(iv) As pointed out in section 3.3.3 a typist can produce faster if the means of origination is by means of machine dictation rather than handwritten. More than 60% of all documents for transcription were handwritten (~~see Table 15~~), whilst only 30% were machine dictation. In analysing the handwritten documents it became clear that 92% could be originated by means of machine dictation.

(v) Short career paths created low job satisfaction. The work mix and the requirements of the posts were such that only low job gradings could be assigned. Although a division of work could be made, the possibility of job advancement was little, since only one or two direct co-ordinators on a higher job level were necessary, leaving very little scope for advancement.

(vi) The quality of text produced was poor. The clerical staff blamed the many faults on the typing centre and vice versa. The survey results showed that 72% of all the faults and revisions were as a result of clerical errors or changes. That meant that certain areas outside the typing centre needed attention.

(vii) From a line management's point of view an unsatisfactory turn-around time was experienced . The work was dealt with within 8 working hours from receipt in the centre. Delivery to the originator also took some time.

(viii) Typists were in short supply. A turnover rate of about 30% was experienced and being considered as normal because of the type of labour (females only).

(ix) Composers, basically typewriters with interchangeable typefonts, were used for the preparation of camera-ready copy for printing. The demand for typesetting was increasing rapidly. Less complicated text was handled by the typing centre, whilst the balance was given out on tender. Many documents critical in the marketing effort could not be prepared in time, resulting in frequent postponement of product releases. The envisaged quantities could be handled by adding more equipment and staff but that still would not have met the required turnaround time and would have increased cost out of all proportion. The need was felt for a completely new approach to the problem.

Any improvements in organisations mean change. The organisational implications of revised procedures and systems for electronic text processing have been outlined in the previous chapter. It was decided to concentrate on one area of text processing which would potentially offer the greatest benefits with the least human problems. It was argued that the central typing service was accustomed to the introduction of new technology, to procedural changes and production control. The anticipated results of automated equipment in that environment would yield the biggest benefits and any reduction in staff would be offset by normal turnover. Secretarial services and departmental typists were critical in so far as they affected the status levels of both managers and secretaries/typists. Top management involvement and psychological factors played a big role and it was argued that they should be dealt with as second and third phases of the investigation. Text processing was a new discipline to Company A and experimentation and research were essential before further strategy could be formulated.

In determining the feasibility of introducing electronic text processing systems (as outlined in Chapter IV) it was decided to concentrate on central typing services with regard to the origination, production, reproduction, storing, retrieval and distribution of text. The results achieved would then serve as a basis for determining action in other areas of text processing.

6.5 FEASIBILITY STUDY

In looking for solutions to some or all of the problem areas dealt with in section 6.4.4 many alternatives were considered. It became clear that an increase in machine dictation and better typing processes would be of major significance. Two factors were of importance in origination - too little machine dictation and the accumulation thereof before sending the magnetic medium to the typing centre for transcription, resulting in uneven workloads. A representative sample of dictation patterns was taken at clerical level in departments. The results are reflected in Table 24.

TABLE 24

DICTATION PATTERNS AT CLERICAL LEVEL					
Time interval (minutes)	Observations (f)	Midpoint of interval (x)	fx	% of total	Cumulative %
0 – 5	381	2,5	952,5	81,9	81,9
5 – 10	58	7,5	435,0	12,5	94,4
10 – 15	13	12,5	162,5	2,8	97,2
15 – 20	6	17,5	105,0	1,3	98,5
20 – 25	1	22,5	22,5	0,2	98,7
25 – 30	5	27,5	137,5	1,1	99,8
30 – 35	1	32,5	32,5	0,2	100,0
	465		1 847,5	100,0	
Average dictation time = 1 847,5 ÷ 465 = 3,97 minutes					

It was also determined that the shortest machine dictation was one minute and the longest 35 minutes with an average of 4 minutes. From Table 20 can be seen that 81,9% of the documents dictated took less than 5 minutes, whilst 94,4% took less than 10 minutes. Those findings indicated that centralised dictation systems would greatly facilitate turn-around time. The dictation equipment in use was not yet written off in the books of the organisation. Since centralised dictation systems are very costly it was decided to defer the project for three years, concentrating rather on text processing through- and output systems. The need was felt, however, to start with the promotion of machine dictation as the cheaper means of origination. It was also decided to prepare a formal training programme for machine dictation skills so that the acceptance rate and use would increase. Text processing through and output systems were then concentrated on.

The feasibility study was seen as the first of three phases. Systems design and implementation had to follow. This first phase took approximately six months to complete. There are several indications in the literature on how to perform a feasibility study, some with specific reference to text processing. The type of organisation, knowledge about text processing, management commitment and many other factors determine which aspects will be included in such a study. Company A followed the following sequence:

- Acquiring knowledge of electronic text processing.

- Identification of applications.

- Determining of final product requirements.

- Analysis of benefits envisaged.

- Obtaining management support.

6.5.1 Acquiring knowledge of electronic text processing

Know-how about hardware and software, the relationship with EDP and the rationale behind different systems are important prerequisites for the identification of applications for electronic text processing. Many developments in the field of electronic text processing are relatively new. If one adds to this the fact that new products and software enhancements are released frequently the learning process becomes continual. Often prospective users have to rely on suppliers for assistance. Equipment suppliers may have the technical know-how, but with little appreciation for office problems and practical solutions thereto. Today prospective users can orientate themselves in electronic text processing through equipment suppliers; other users; literature increasingly published on the subject; and business equipment exhibitions.

When in 1977 Company A carried out a feasibility study on the viability of electronic text processing the situation was completely different. Suppliers and users could assist in acquiring knowledge about non-display stand-alone text processing systems (see section 4.4.1). On more sophisticated equipment very limited information and help were available. Overseas journals, a few text books published and prereleased information from suppliers were the materials used to become more knowledgeable. At that stage the need for systematised knowledge of the procedural and systems aspects of the text processing cycle became evident. Chapters III and IV of this thesis could serve this useful purpose for prospective users in future.

6.5.2 Identification of applications

The first stage was then followed by an in-depth appraisal of existing applications to determine which problem areas required priority attention. A useful starting point was the statistics kept by the central typing service. Information on the type of text handled was available (see Table 19) and also on which departments used the service and to what extent. The types of text gave an indication as to whether it would be beneficial to use electronic text processing systems. Other texts produced organisation-wide, or planned, were also of importance in the survey. Each department was seen as a prospective user of electronic text processing systems should the facility become available.

Information was required on the applications, the volume of text, the frequency of preparation (or change) and, if applicable, the quantities to be reproduced. The applications would indicate the most suitable means of processing. The volumes of text determined input, throughput and output requirements, whilst frequency of preparation or change was critical in determining the type of storage medium and capacity thereof. Information on quantity reproduced was necessary to evaluate the effect that other means of output such as typesetting or microforms could have.

Examples of tasks such as repetitive letters, manuals, management reports, formwork and legal documents were collected. Reports or documentation subjected to repeated amendment were given special attention. The information on volumes, frequency of preparation or change and quantities reproduced were recorded on these documents.

To obtain a complete picture of organisational requirements and the feasibility of electronic text processing systems, additional information on type of output and expected benefits was also necessary. These aspects will be dealt with in the next two sections. For that reason a survey form as depicted at annexure 6.3 was used for logging the information on possible applications. As a further step the additional information was logged when it became available.

Many new applications were envisaged by departments but they could not supply all the details. That meant that, if the feasibility study favoured the implementation of electronic text processing systems in practice, the results should even be better.

6.5.3 Determining of final product requirements

Electronic text production systems were dealt with in section 4.5.1. The criteria for text output are quality required and speed, which in turn determine the output devices on an electronic text processing system. Three categories of needs were identified in Company A and recorded on the survey form (annexure 6.3):

(i) Typewriter quality

Typewriter quality has always been the criterion against which electronic printers were measured. Apart from letters generated by computer, reflecting discrepancies in premium payments or advice notes of some sort, all other correspondence is by means of typewritten letters.

Within Company A or in contact with its subsidiaries internal memos are used which are handwritten or typed. This is also the medium for preparing a master for reproducing in limited quantities by means of photocopying or offset duplicating.

(ii) Typesetting

Company A uses more than a thousand different business forms in carrying out its business. Apart from these, numerous rate books, training manuals, procedure guides and sales promotion material are prepared and reproduced. All these require typeset originals for making print masters.

(iii) Proof-reading copy

Since many documents produced are subject to revision, proof-reading copy may be used. It can be produced faster and cheaper on matrix-or line printers. An example is the preparation of a training or procedure manual where the text may be revised many times. Only when the final document is required is it necessary to produce it in typewriter quality or typeset.

6.5.4 Analysis of benefits envisaged

As a result of knowledge acquired information was available on the types of electronic text processing systems available, what they could do and the projected cost. Against that background it was decided to estimate for each identified application what cost deductions could be achieved against the existing procedures followed. The availability of a costing system for the equipment and procedures then in use proved valuable. Envisaged benefits were split into categories, viz. direct and indirect. The direct benefits envisaged were reduction in production time (both in origination and in the typing centre) and in proof-reading. These were recorded on the survey form (annexure 6.3). The indirect benefits envisaged were improved turn-around, a more balanced distribution of work among typists, better quality, improved job skills, career opportunities, job satisfaction, and the fact that these could be the basis for the further utilisation of technological advances in the field of administrative office management.

The survey revealed that:

(i) Of the total correspondence (excluding that generated by computer) approximately 55% was form letters i.e. letters consisting of standard paragraphs - an ideal word processing application. An analysis of the remainder prepared as individual letters revealed that most contained some standard text which could be stored magnetically for retrieval when required.

(ii) The actual and estimated volumes of lengthy documents with frequent revision, and statistical reports where only a few changes were made on a weekly, monthly, quarterly or annual basis, represented 30% of the total correspondence.

(iii) There was a need for proof-reading and letter quality printout.

(iv) Data and text prepared and stored on the in house computer were often printed out only to be retyped in a different form or to be typeset. Address records resided on computer file and if a number of letters of typewriter quality had to be prepared they had to be typed from the computer printout. Similarly insurance premium rates were processed by means of computer, printed out, typeset and proof-read. That meant that data or text already available in a correct form was reprocessed enlarging the possibility of errors.

(v) More than 80% of lengthy documents typed on typewriters were frequently revised and then completely typeset - a duplication of activities. Forms work and other applications also called for the expansion of the typesetting facility.

(vi) There was a lack of career opportunities. Only a selected number of typists could advance into a higher job grade.

(vii) Low job satisfaction was experienced. For that reason the decentralising of typing facilities was seriously considered.

(viii) Substantial direct financial benefits could be achieved which could be offset against the purchase of electronic text processing systems.

(ix) Line management considered improved turn-around, career opportunities and job satisfaction as important indirect benefits in introducing electronic text processing systems.

6.5.5 Obtaining management support

It became clear from the previous three chapters that the introduction of electronic text processing affects procedural and organisational aspects. It is a discipline which could have far-reaching implications on organisational and behaviour patterns. For that reason support from management was essential. The results of the direct and indirect benefits of electronic text processing (see annexure 6.4) were pointed out in a report to management and the importance of introducing it in the organisation emphasised. The purpose was to obtain management approval for further investigation in that field. A favourable decision led to systems design.

6.6 SYSTEMS DESIGN

The feasibility study indicated the text processing requirements to be met and the viability of doing it. Systems design took approximately four months and was done in five basic steps:

- Deciding on evaluation criteria.
- Developing a conceptual framework.
- Determining availability and cost.
- Obtaining product information/user's experience.
- Recommendations for approval.

6.6.1 Deciding on evaluation criteria

Company A is a member of the Diebold Research Group and participates regularly in their international activities in the field of management information systems, electronic data

processing and related disciplines for improved management. Diebold's[4] evaluation criteria for new systems proposals as reflected in Table 25 were used as general orientation.

TABLE 25

SOME EVALUATION CRITERIA FOR NEW SYSTEMS PROPOSALS	
1. CONTRIBUTION TO CORPORATE PHILOSOPHY	• How well does the proposal fit management philosophy. • Will it accelerate centralisation — perhaps contrary to set objectives.
2. IMPACT ON EMPLOYEES, MANAGERS & WORK GROUPS	• Impact on individuals • Will existing work groups be changed • Will social environment be altered negatively.
3. IMPACT ON CUSTOMERS & SERVICE	• Response to customers. • Direct interface with a computer system.
4. IMPACT ON INFORMATION PROCESSING	• Where will information be available for decision making • Effect on processing time, speed, accuracy, reliability and availability.
5. COST	• Determine all relevant cost factors (start up, development, ongoing maintenance, enhancements) • Training required for skills to deal with new technology.
6. ORGANISATION STYLE	• Does the proposed system fit the way the firm does business. • Change from personal service to machine-interaction. • Extensive input from customers and employees.
7. COMMUNICATIONS	• Telecommunication needs for voice and data. • Informal communication among individuals. • Changed patterns of interaction.

Source: DIEBOLD RESEARCH PROGRAM – EUROPE : "The economies of new systems proposals" : Research Report No E172 : January 1979 : p.20.

The importance of each of these seven factors was considered individually. Some of the questions on these factors were not relevant to electronic text processing and referred more specifically to EDP. Nevertheless they served a useful purpose.

(i) It has been the organisation's corporate philosophy to render the best policy-holder service at the lowest cost since most new business comes from existing policy-holders. Company A has a high regard for the worker as a human being and also accepts its social responsibility in providing work opportunities. Computerisation and other means of mechanisation prove that they contribute towards these goals. Electronic text processing facilitates corporate philosophy since it is a means of improving written communications at lower

costs, creating job opportunities and more meaningful work. (To be dealt with in section 6.8).

(ii) The impact of electronic text processing on employees, managers and work groups could be meaningful. Little change, but many benefits, were envisaged for the user - except in an advanced stage where the one-for-one relationship of manager and secretary would change. It was appreciated that the operators of the systems would be affected most. For that reason they were informed of the discipline at an early stage and constantly on progress made. Special orientation and training programs were presented.

(iii) The impact on customers and service would be indirect. Electronic text processing systems could offer the advantage of producing quantities of high quality documents in a much shorter time than with traditional typing systems. Letters to policy-holders could therefore be completed sooner with better service as the result.

(iv) Information processing requirements have increased very much. Electronic text processing would assist in the faster and more accurate processing, thereby ensuring information for decision-making to reach management in time.

(v) Costs were determined on the basis of what could be saved on existing methods if electronic text processing were introduced. These savings had to be offset against any relevant cost factors for electronic text processing.

(vi) No problems were envisaged which could have a negative effect on the organisational style.

(vii) The importance of communications, however, was stressed at all hierarchical levels. From the originator's point of view the need for voice communication in the form of centralised dictation systems existed. Any electronic

text processing system should further provide facilities to perform data communication with the central computer.

6.6.2 Developing a conceptual framework

With the above evaluation criteria as a basis, a conceptual framework was compiled for Company A's electronic text processing requirements. The conceptual framework was based on the identified requirements for electronic text processing. It was further based on the premise that the system should be modular in regard to future expansion and that it would allow telecommunication with existing data processing equipment. Since electronic text processing was a new concept to the organisation and to minimise the risk of making the wrong decision, modularity was essential. Software-orientation was a logical requirement in an organisation where a high degree of EDP sophistication existed. Telecommunication was an essential need to be able to use data for further manipulation and eventual output as part of text communication or for decentralised processing.

The survey reflected that Company A was in need of word processing equipment which could communicate with the in-house computer. The survey also reflected the need for phototypesetting equipment which in turn could communicate with the word processing system. The need was for a system which could function independently for most of the time, but interactive with other systems when required. It was accepted that the majority of the workload would be word processing requirements. Phototypesetting was viewed as a highly specialised function with specific requirements.

As a first priority the facilities for word processing had to be determined. The word processing system had to provide ease of operation, effective document formatting and handling facilities, and good systems architecture. Records processing abilities, text output options for proof-reading and quality printers and support from a company of good standing, preferably with an established satisfied user base, were additional requirements (refer to Table 12 for greater detail of these requirements). The alternative

electronic text processing systems as outlined in Chapter IV were evaluated against the organisation's requirements.

As a large user of in-house computerised systems, computer-assisted text processing was considered to be the first alternative. A system with direct in-house connection (see section 4.4.4(a)) was investigated. As a result of intensive investigation a member of top management responsible for EDP came to the conclusion that text processing has to do with unstructured string data with completely different processing requirements from that of structured data. The requirements for word processing set out in the previous paragraph could not be met and expensive software was required for the in-house computer. Large memory and storage capacity was required which would have forced a decision to upgrade the computer system much sooner than envisaged. Stand-alone word processing systems were available with the same capacity and better text-handling facilities. These were available at less than 10% of the calculated monthly in-house computer costs. The quality of computer printers was also considered to be unsatisfactory. For that reason it was decided not to consider computer-assisted text processing any further.

Table 12 contained a comparison of the suitability of text processing systems to various applications. The organisation's types of text and requirements indicated that a microprocessor type shared-logic system would be the best alternative (see section 4.4.3 for details on these types of systems). The volume and type of work determined initially necessitated a minimum of two input devices (visual display units), central processing unit with fixed disk storage and off-line storage medium, a quality character-printer and telecommunications facility with the in-house computer. Although the feasibility study revealed the need for a high speed printer for draft copy it was decided to postpone a decision on its purchase until the stage where more of its capacity would be used.

Once the conceptual framework for word processing requirements was formulated, typesetting needs were determined. The need for

text storage facilities became evident, since heavy revision of text took place in that area. The feasibility of telecommunication with the word processing equipment was essential, since data from the in-house computer processed on the word processor was needed for further manipulation on the phototypesetting equipment. Lengthy documents are often retyped many times until the final stage is reached, after which they are typeset (re-keying and re-checking all the text). That pointed to the need for transmitting text already prepared on the word processing system to the phototypesetting system.

6.6.3 Determining availability and cost.

The present position is that the major suppliers of text processing systems are represented in South Africa and a comprehensive range of systems is available on the local market. In 1977 when this project started no shared-logic screen-based system was available in South Africa. Pre-release information from the U.S.A. on a word processing system meeting the organisation's requirements, including those for telecommunication with the computer, reached Company A. The local branch office of the manufacturer indicated that this system was also scheduled for the South African market. A variety of types and makes of phototypesetting systems were available and information reached the organisation from overseas of further improvements as a result of electronics technology. No direct telecommunications link existed to interface word processing with typesetting, although many attempts to that effect had been made. That shortcoming meant that Company A would not have been able to handle text processing at optimum defined levels. No system such as the one envisaged was installed anywhere in South Africa. The requirement of a direct interface of word processing with phototypesetting was considered as a development of the distant future. The only means of achieving that was through a paper-tape medium (referred to in section 3.6.2). That was considered an impractical alternative for the large quantities of text to be handled. That meant that

the ideal system could only be partly implemented and that completion would be subject to technological developments.

6.6.4 Obtaining product information/users' experience

It has always been the practice in Company A to obtain user experience from other organisations locally when considering the purchase of office equipment. No systems similar to those envisaged for electronic text processing were installed locally. Separate word processing and phototypesetting systems were in use abroad in similar types of industry. Since the introduction of electronic text processing was considered a high risk decision and a fairly large amount of capital was involved, top management decided to send the project manager(5) on a study tour of the U.S.A., Europe and England to evaluate systems and to get feedback on user experience (February 1977). All major word processing and phototypesetting suppliers represented in South Africa were consulted and some large life assurers and financial institutions approached for information on the systems in operation.

The impetus for visual display word processing equipment came from computer suppliers. With the exception of a few companies, suppliers were not well informed about user requirements and lacked clarity in the stategies for future developments presented. The supplier that has been dominating the word processing equipment (non-display stand-alone) market for years, was very computer oriented in its approach. This applied to other suppliers as well. The would-be user had to choose between slightly upgraded traditional word processing equipment or highly sophisticated computer-derived equipment with elementary software and seemingly no fixed plans for development. When the project leader presented his own views on electronic text processing he was often confronted with the viewpoint that such sophistication will either not be a practical possibility or a scenario that will take decades to mature. One supplier in the U.S.A. (Wang Computers) displayed a sound understanding of electronic text

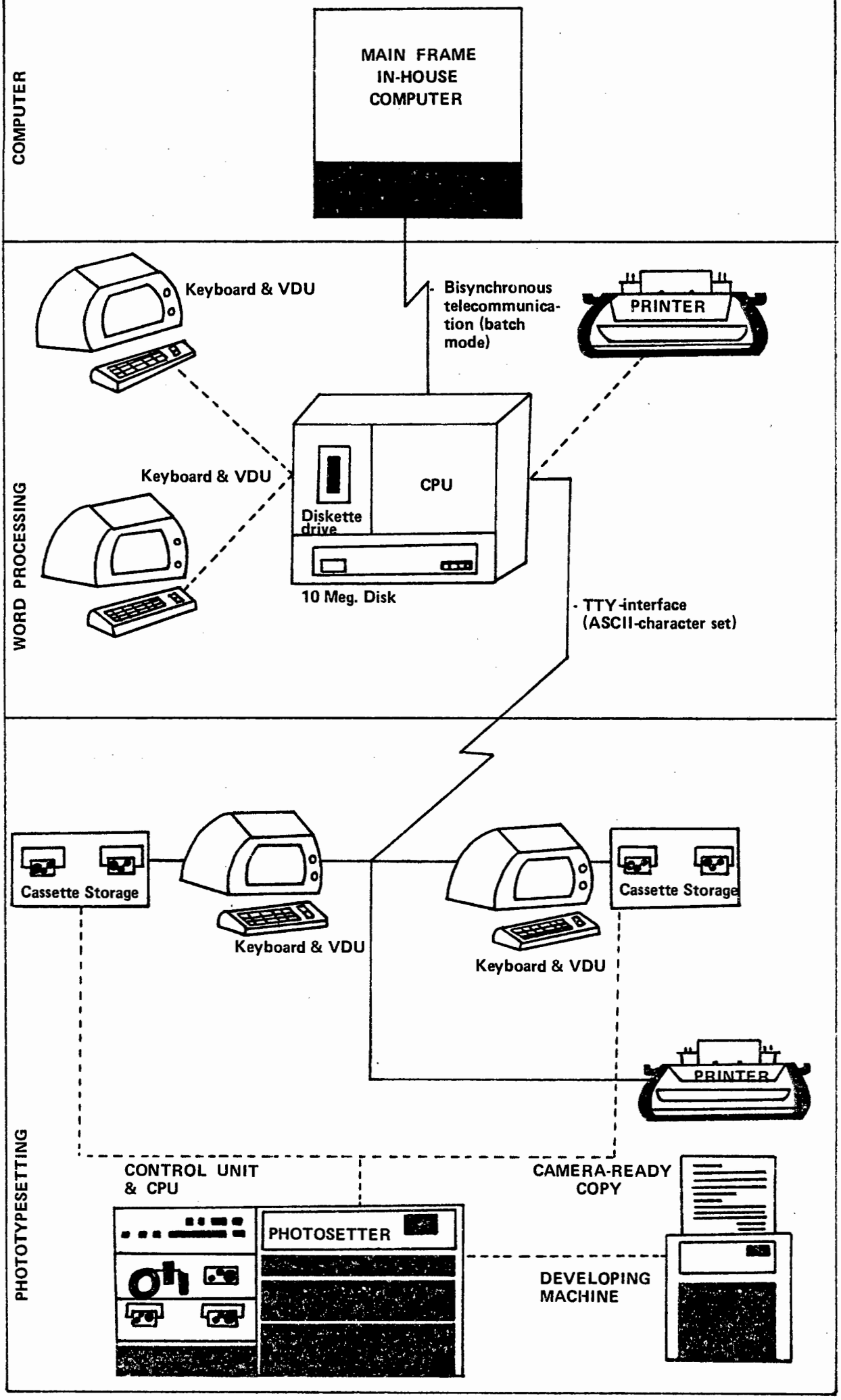
processing as presented in this thesis and gave a practical demonstration of some of the concepts at user installations. They had the concept of modular, user-oriented and software-based word processing systems with telecommunications to computers and peripheral devices.

Phototypesetting suppliers offered sophisticated software for text manipulation and visual display text entry equipment was in general use. Some companies offered large shared-logic systems intended for the newspaper industry or large publishers. A few small direct-entry systems were presented where the input and output facility forms a unit. This approach is useful for the small user, but means duplication of equipment with expanded user needs. The medium sized systems suitable for Company A's need worked on the principle of paper tape as input to the phototypesetter. Suppliers were generally not convinced that developments in word processing could benefit their systems development - probably because they did not foresee the large growth in in-house printing in medium to large organisations. No direct interface between word processors and typesetters could be offered.

It became clear that a shared-logic system would be ideal for the organisation's word processing needs. Only one supplier of phototypesetting systems, however, was prepared to design a direct interface between word processing and phototypesetting, if the organisation would assist with specifications and testing. The phototypesetting system manufactured by that company was at the same time the one meeting most of the identified requirements. Extremely valuable user information on the procedural aspects of electronic text processing was obtained, which greatly facilitated the drawing up of detailed equipment specifications and the eventual implementation of the acquired systems.

The electronic text processing system selected by the project manager is reflected in Table 26.

TABLE 26 : RECOMMENDED ELECTRONIC TEXT PROCESSING SYSTEM



6.6.5 Recommendations for approval

Top management were informed on an ongoing basis about the progress made with the project on electronic text processing. After the obtaining of product information and users' experience a report outlining the system alternatives available; the recommended configuration; and cost implications (±R200 000) was presented to them. The organisation would not be committed to either of the two suppliers selected should the direct interface not work in practice. These recommendations met with approval and preparations for systems implementation could be made.

6.7 SYSTEMS IMPLEMENTATION

The implementation of the electronic text processing system was carried out in phases. Specifications were compiled for the purchase of the required system. The installation requirements were then determined and accommodation planned accordingly. An orientation program was then planned and followed through. At an early stage staff selection criteria were determined and staff selected. Procedural aspects needed extensive planning and revision, including form design. Concurrently with these, certain aspects of training were covered and full training programmed to take place on delivery of the system. Systems implementation took six months to complete.

6.7.1 System specifications

There is often a difference between what equipment can do and what the user assumes it can do. To be able to draw up sensible specifications, requires systems know-how and sensing of company needs. The specifications should also make provision for future expansion and maintenance. These guidelines were followed by Company A in the detailed final specifications for the word processing and phototypesetting systems and communications facilities.

(a) Shared-logic word processing system

A system manufactured by Wang Computers (USA) was chosen.

These systems are sold with general text-handling software, whilst additional special purpose software packages are available for sale. These special packages include the facilities to do records processing. Records processing is the term used in electronic text processing and enables the sorting of large files; the execution of arithmetic functions; or the obtaining of document security whereby only selected operators can have access to confidential documents. A need existed in Company A for these facilities.

Since the organisation's business is conducted in both official languages, a keyboard and corresponding software had to be specified to be able to access the floating accents of the Afrikaans language. This was within the normal capabilities of the hardware and no additional changes were made.

Typewriter-quality copy was required from the printer. It was specified that the printer be supplied with a tractor-feed paper attachment, allowing continuous stationery to be used. Company A standardised on a particular type-style in 12 and 10 pitch, but can change that at will whenever the need arises.

The telecommunications facility with the in-house computer was required for batch-processing applications and is an option that can be purchased. It was necessary to specify beforehand the mode of interaction with the main-frame, the line protocol, the transmission speed and type of transmission required. It was also required that telecommunications should take place in a background mode not to interfere with the text input/output facilities. The specifications were for a telecommunications option allowing batch processing and operating concurrently with keyboarding and printing; using binary synchronous line protocol; and with full duplex transmission at a rate of 4 800 bits per second.

The ability of the system to communicate directly with phototypesetting was specified as a condition. Should the

supplier of the phototypesetting system fail to meet that requirement in negotiation with the distributors of the word processing system Company A could cancel the agreement.

The system carried a three months' guarantee. A maintenance agreement would then be entered into with a guaranteed uptime of 90% and with service facilities within 4 hours of logging a service call - very essential for high volume peak-load processing installations. The supplier had to undertake to keep an identical back-up system in the local office should serious system problems arise.

Training in systems support and operation had to take place for one week on the premises of Company A. The supplier of the word processing system would further guarantee the availability of systems support staff locally.

(b) Phototypesetting system

The equipment was sold as basic units with standard typesetting software. Users had to specify the type of keyboard layout, additional software packages (e.g. statistics, hyphenation routines, etc.) required, and the typefont and point sizes for the phototypesetter.

The complete specifications had to be drawn up for facilitating direct telecommunication from the word processing system to the phototypesetting system. There is a difference in the language used by the word processor and the phototypesetting system. For this reason all characters generated on the word processing system had to be converted into machine-readable language on the phototypesetting system.

Complete systems support and operational training were contractually provided for. The systems support training had to take place at the manufacturer's premises in Switzerland and operators' training at the premises of Company A.

From the above it is clear that specific circumstances exist in different organisations which necessitate the compilation of purchase specifications in detail. The system specifications for Company A are reflected in Annexure 6.5 (a) and (b), and can serve as a guideline for other prospective users.

6.7.2 Installation requirements

Electronic text processing systems are viewed as office equipment. For optimum functioning of electronic components a controlled environment is essential. Certain specific requirements exist additionally for phototypesetting. The installation requirements are:

(a) Accommodation

An air-conditioned and reasonable dust free environment, with anti-static flooring and well-planned lighting, is feasible. Large temperature and humidity fluctuations, excessive dust, as well as static electricity affect electronic components adversely. Ill-planned lighting may cause reflection on the video-screens with corresponding eye-strain. Office layout and furniture should facilitate the production process. A pleasing work environment is considered essential for this type of production work, and Company A incorporated these guidelines in its overall planning.

(b) Electricity supply

The systems require a stable power supply with little fluctuation. It is necessary to use either a portable current voltage transformer or connect the systems on to the stable computer power supply. The organisation decided on the last alternative and also had to provide for three phase and single phase supply.

Special attention to wiring is necessary with shared-logic systems, since work-stations and printers are all connected via co-axial cables to the central processing unit and the disk. It could create a hazard if these wires are not concealed in channels in the floor or by other means such as using computer flooring. Company A used floor channels to overcome this problem.

(c) Water supply

The phototypesetter sets text on to bromide paper, which must be developed and fixed as camera-ready copy. The developing process requires a running water supply. Since chemicals are used in the developing process, any water down-pipes must withstand the possible corrosion effects. The developing machine and water supply were installed in a separate room near to the centre.

(d) Noise control

Noise can be counter-productive. Output devices on electronic text processing systems can add substantially to noise depending on the type of accommodation.

The installation was placed in the same room where other text processing operations on electric typewriters took place. Additional noise, as a result of impact printing on the daisy printer and the phototypesetter where font changes are mechanical, did not prove to be disturbing. No special arrangements were necessary to control the noise. This may be necessary in other organisations where accommodation environments may be different.

(e) Office furniture

The optimum use of electronic text processing equipment requires specially designed office furniture. Some suppliers of electronic text processing systems sell the furniture as an integral part of their systems. Since importation of the furniture adds substantially to the cost

many suppliers decided against that and offer locally manufactured alternatives. Company A decided to use existing furniture for a period of time to enable them to determine their exact requirements and then to draw up specifications for the manufacture of purpose-made furniture. Ergonomically designed chairs with proper body support facilities were, however, supplied as a first step.

6.7.3 Orientation program

Two groups of workers, i.e. operators and users, would use text processing in Company A. Their involvement would be different - the operators in direct daily contact and users still getting their work, but generated through different means with some changes in their handling of text. It took about two weeks to prepare orientation material and for the setting up of sessions.

At that stage no selection of operators took place. Since normal typing, word processing and typesetting would be dealt with in parallel in the same centre, it was decided to orientate all staff working in the typing centre at a 3 hour seminar. No equipment was available for demonstration. By means of wall-charts and photographs the principles and expected impact of electronic text processing were outlined. Information was given on the cost-intensive nature of normal typing and the fact that productivity could only be increased by a change in equipment (increased automation). The equipment selected was dealt with, stressing the ease of operation and the text manipulation and correcting facilities. The higher productivity and cost-reducing abilities were outlined, and an indication given of the increased responsibilities and career opportunities. Higher job satisfaction was envisaged and the organisation's policy of job security emphasised. The exercise met with excellent response and participation. One of the steps would be to get a number of typists/secretaries to be trained on the new systems.

Users of the text processing systems had to be orientated to any revised work procedures. As a first step middle and first line

management were informed by means of a circular of the decision to introduce electronic text processing in the organisation. The concept was dealt with and the benefits outlined. They were informed that a systems analyst would visit them soon giving more details and discussing possible applications. A schedule was drawn up and the visits planned. Very positive co-operation and keen interest in using the systems were found. The orientation was later enlarged on with a demonstration of the actual equipment. Users were informed on the direct and indirect benefits of electronic text processing. The faster turn-around time, higher quality, less proof-reading and other benefits were welcomed. They were also briefed on the proposed administrative procedures to be followed in the text processing centre and what procedural changes on the user's side would facilitate smooth work-flow.

6.7.4 Staff selection

Company A's policy had always been to draw from its own resources, if available, whenever opportunities for advancement occurred. On systems implementation the immediate need would be for supervision, co-ordination and operating the word processing and phototypesetting systems. For back-up purposes it was decided to train two operators per input unit. A total staff complement of 1 supervisor, 2 co-ordinators and 8 operators was required. A suitable supervisor could not be found in the typing centre and the personnel department was instructed to evaluate some of the incumbents of secretarial posts. In the meantime the supervisor of the typing centre, due for retirement, offered her services for as long as deemed necessary. All other staff were selected from the existing staff from the typing centre and their vacancies filled by qualified school-leavers or college students.

The selection criteria for co-ordinators were good administrative and inter-personal abilities to be able to deal successfully with line management and the operators and to ensure planned work execution. In addition they had to show the ability to understand and operate the new equipment. The operators were

selected from the best-trained and experienced group in the typing centre. The supervisor's observations and merit rating results for a number of years served a very useful purpose. Personal interviews were also conducted to obtain the staff's own views.

All staff selected were given the assurance that, if they discovered at detail training or after it that they would rather return to their old jobs, that would be acceptable. Similarly the selected staff were informed that a certain work standard and output would be expected from them after a reasonable time, failing which they would be transferred back to their previous positions or to fill other suitable vacancies elsewhere in the organisation.

The evaluation of prospective applications for electronic text processing were assigned to a number of Organisation and Methods staff with a sound systems analysis and company administration background.

6.7.5 Procedural aspects

With traditional text processing, input and output facilities vest in the same machine and take place interdependently and simultaneously. Electronic text processing changed the pattern by separating the input and output facilities. This change demands controlled work-flow and proper scheduling of individual tasks. The large variety of tasks envisaged to be performed by electronic text processing systems and the difference in quantities of work, meant that input and output facilities must be co-ordinated and controlled for even work distribution. The procedural requirements for word processing and phototypesetting differ.

(a) Supplies

Special supply items are needed for word processing and phototypesetting systems. Continuous paper is used (with or without carbon interleafing) on all printers for unattended

output. Different types of paper are needed, e.g. with Company A's letterhead.

On any word processing system a choice of using two different types of ribbons can be made. Carbon ribbons have a limited life span and are mostly used when the document prepared will be used for reproduction. All other tasks are printed with multi-strike ribbons which last up to four times longer. The co-ordinator must take care that the correct supplies are used.

Word processing output offers a choice in typestyle and pitch. Depending on organisational needs a variety of printwheels could be obtained and minimum supply levels be maintained.

Phototypesetting takes place on bromide paper which must be developed to obtain camera-ready copy. The developing process requires chemicals (developer and fixer).

Supplies must be kept at a safe minimum level. Procedures must provide for the stock-taking, ordering, correct use and control over paper (normal and bromide), printwheels, ribbons and chemicals.

(b) Systems start-up

Word processing and phototypesetting systems are electronic systems under software control. In Company A's work environment the systems are being used on a one-shift basis for five days per week. For this reason the systems are switched off at night and over week-ends. It is necessary to follow prescribed start-up procedures to put the systems into operation and to ascertain that the correct software is used. When additional functions are required, the required software can be loaded into the system. Start-up procedures should be documented and known to all operators.

(c) Work-flow

The large number of tasks from different sources make a requisition form, containing task and user particulars, essential. The requisition form accompanies the task which gets allocated to an operator most suited for the work as a result of training and experience and whose production capacity is not filled up. The operator will carry out the work and document the input time and the number of documents as output. The finished work is returned to the user with document identification for future reference.

The type of document, e.g. original, revised, repetitive, pre-recorded or lengthy, determines the information needed from the user. In the case of pre-recorded text the user will have to indicate the numbers of paragraphs to be used. This is a change from using normal typing systems. Users need to know further that all work other than original documents has to be checked only where changes occur. All other text will be unchanged and correct.

(d) Document identification

The word processing and phototypesetting systems are equipped with magnetic storage media. Often no copies are kept of documents printed out and the text is then stored magnetically for future revision. Paper documents are filed under a reference code determined by a classification framework. With electronic text processing systems a reference system is essential to locate documents already filed. Identification takes place on the basis of a file number. When a particular document gets filed on to an off-line storage medium such as diskettes (word processing) and cassettes (phototypesetting) the reference of that off-line medium is also relevant in finding the document again. Document 0001A would be the first document to be processed and be filed on a diskette with the same or any other number.

An index is kept on magnetic media of all document numbers, with a short document description and the identification number of the off-line storage medium. A lengthy document can be filed on more than one diskette and these numbers will then be reflected in the index. It is also required that all users maintain an index of document identification numbers for their own reference. These user indexes will be updated periodically by means of up to date versions issued by the text processing centre. When any user wants a particular document to be retrieved, he must supply the reference number, or failing that the document description, to enable the centre to locate the particular document. This procedure will become increasingly important as the number of documents in permanent storage increases. It could be a very time-consuming operation to locate unidentified documents since document descriptions can often be repeated by different users.

(e) Document archiving

When a revision of text in a document is requested, the off-line medium is used to retrieve the text. The text is transferred into a working memory whilst the original text is maintained unchanged. The transferred text can then be revised extensively. For word processing the same file number is retained, but the phototypesetting system with magnetic cassette media allocates a different file number for every revision. This situation calls for strict co-ordination and control since the likelihood of errors is great. Unless the original text is replaced by the revised text on the word processing system regularly, a request for a further revision may be carried out using the wrong document. The user will only check the changes, leading to serious errors. The indexing of the phototypesetting system should be as such that only the revised text be maintained.

Strict control measures are necessary to ensure that archiving and updating of text takes place regularly on a planned basis.

(f) Systems and media security

Documented procedures are necessary for describing the handling of equipment and magnetic media. All software has to be duplicated and stored elsewhere. All master documents, such as pre-recorded text and selected critical text have to be duplicated and stored off-site. This is becoming increasingly important where certain users no longer retain paper copies and the information resides only on magnetic media. Loss or damage to magnetic media may lead to extensive rekeying and proof-reading of text at high cost. Much can be learnt from the computer industry in safeguarding text on magnetic media and regular consultation takes place. This becomes easier in more advanced text processing systems with large fixed disk storage and removable disks.

(g) Systems maintenance

Certain procedures prescribed by the manufacturers are to be carried out on a daily, weekly or monthly basis by the operating personnel of electronic text processing systems. These are documented and have to be strictly adhered to.

Fault-detecting procedures have to be recorded to enable operators to correct certain problems themselves with the least possible loss in production time. In addition a log of service problems is viewed as a necessity. This log should indicate time of service request, actual time when the problem was solved and the type of problem. This is necessary to be able to build up a history on machine down-time and service standards of suppliers. The maintenance agreements also provide for regular preventative maintenance and control should be exercised that these are carried out at given times.

A test procedure is necessary to determine whether the systems work according to expected standards after any service calls.

(h) Procedural manuals

Procedural manuals containing detailed information on the operating of electronic text processing equipment are often considered to be of importance only to the operators. It is, however, useful and in many instances essential to provide users with manuals outlining the basic procedures they have to follow in using the systems.

Most suppliers issue operations or training manuals with their systems. These are in fact procedural manuals. To these it is necessary to add the procedures on supplies, start-up procedures, work-flow, document identification, archiving, systems and document security, maintenance and statistics to be kept. A procedural manual facilitates training and reference to aspects not used on a continuous basis. To any newcomer it is a valuable aid in orientation.

User procedural manuals normally cover work-flow and specific guidelines. The manuals orientate the user in electronic text processing in general, indicating the correct procedures to be followed to ensure optimum results and turn-around time. Departments using pre-recorded text paragraphs in compiling correspondence must have a manual with the relevant paragraphs listed, numbered and indexed to facilitate retrieval. With phototypesetting in particular important guidelines have to be given to users to ensure the most economical use of the system.

(i) Management information

To be able to evaluate electronic text processing systems certain production statistics have to be kept on a continual basis. It is essential to know operator performance and efficiency, utilisation of input/output equipment, down-time, output, turn-around time, the departments using the systems and to what extent, overtime worked and new applications handled. These figures can serve as the basis for feedback to the operators and to management. Since the human effort involved in keeping and processing these

statistics could be high when volumes increase, the records processing facilities of electronic text processing systems may be used effectively for this purpose. Performance is reviewed monthly by administrative office management and quarterly by a steering committee (for EDP).

6.7.6 Training

The use of electric typewriters in the typing centre calls for staff with basic typing and language skills as acquired at school or college. On appointment the worker is usually introduced to document layout characteristic to the organisation. In-service training then takes place on dictation equipment and schedules. Work produced is proof-read on a sample basis and the findings used for feedback and retraining where applicable. The information serves as a guide to the general level of proficiency at any given time.

Operating electronic text processing equipment differs extensively from that of electric typewriters. There is even a marked difference between the operation of word processing and phototypesetting equipment. In addition to the general orientation (see section 6.7.3) it was necessary to compile an in depth training programme indicating which areas are to be covered by whom, and at what stage, for word processing and phototypesetting.

(a) Word processing

An operator is introduced to the concept of word processing and the various components of the system, viz. keyboard, visual display unit, central processor with disk storage and printer (see Table 22). This is followed by basic instructions on work flow and operating the system with the aid of sample documents.

The keyboard has a standard typewriter layout plus special function keys. An operator must learn the purpose of these keys plus the miscellaneous functions that can be carried

out. Systems functions can also be displayed to guide the operator in systems start-up, special print functions, document filing, indexing and other functions. Any training programme on word processing must include all these aspects. These functions are depicted in annexure 6.6.

Only when an operator is experienced in these functions, will training be given in more advanced aspects of records processing and telecommunications by means of word processing. Records processing uses special software packages such as for sorting and arithmetic.

(b) Phototypesetting

This is a specialised area of text processing. The operator is first introduced to the background of typography. That is followed by an introduction to the various components of the phototypesetting system, viz. keyboard, visual display unit, printer, central processing unit, phototypesetter and developing machine (see Table 26).

It is essential for an operator to know systems start-up procedures, to be able to load software and to carry out daily routine maintenance procedures. Detailed knowledge is required of text formatting and forms layout, letter types and point sizes. A wide variety of typographical commands has to be studied and used in text manipulation for typesetting. These typographical commands are reflected at annexure 6.7.

Operators must also be trained in archiving procedures; systems and media security; fault detection and recovery procedures; maintenance; and developing (such as replenishment rate of chemicals, developing times, etc.).

Training requires knowledge of the end result to be achieved, the planning to get there, a program to assist co-ordination and follow-up to ensure that the training has been successful.

6.8 THE IMPACT OF ELECTRONIC TEXT PROCESSING

The candidate spent approximately three years on the surveying, implementation, expansion and managing of the electronic text processing system (word processing and phototypesetting) in Company A.

Electronic text processing can be considered as very successful and has been expanded substantially from the configuration reflected in Table 26. Company A achieved recognition as a leader in electronic text processing not only locally but also abroad[6]. The impact of electronic text processing will be scrutinised from a financial, administrative and organisational point of view, contrasting the situation which prevailed at its inception in 1977 with the current situation.

6.8.1 Financial

In section 2.5 reference was made to the traditional office problems in the life assurance industry with specific reference to increasing cost structures. One of the aims of electronic text processing is to contain or decrease the costs of written communications. Knowledge of the financial impact of introducing electronic text processing is therefore important, especially in the light of scepticism that often exists with new technology. Even in Company A reference was often made to the marginal financial impact of electronic text processing and that the expense was justified merely for the research experience resulting from it. Many users, however, felt that the systems benefited their operations financially to a large degree. To determine the financial impact, a production control system and a sound structured system of accounting were necessary.

In section 6.7.5 the procedural aspects of electronic text processing for Company A were covered and reference was made to management information in sub-section (i). Criteria to measure against are necessary in order to evaluate sensibly. Two criteria seemed feasible for this organisation - normal typing procedures running parallel with electronic text processing, and the production results of these systems compared over a period of time.

Production control was introduced soon after the implementation of the electronic text processing system and refined from time to time. The production figures are kept on a special form (see annexure 6.8) and are summarised monthly. It is presented in the form reflected in Table 27. Compared to traditional typing and composing labour productivity increased by approximately 400%[7]. This may vary depending on the type of applications handled over a given period of time.

TABLE 27

MONTHLY RETURN : ELECTRONIC TEXT PROCESSING										
No of VDU's 10				JUNE 1980			No of printers 4		
PERIOD		PRODUCTION		INPUT (%)			OUTPUT (%)		
		No. of pages per day	Index	VDU	Admin.	Down-time	Printer	Admin.	Down-time
WORD PROCESSING	1979 Financial Year	593	100	67,8	31,1	1,1	51,8	46,0	2,2
	1980 1st Quarter	914	154	64,6	33,8	1,6	77,2	21,8	1,0
	1980 2nd Quarter	939	158	65,4	30,8	3,8	71,9	23,7	4,4
	1980								
	April	1 012	171	67,3	32,7	–	76,8	19,8	3,4
	May	794	134	63,3	36,7	–	65,1	23,8	11,5
	June	859	145	66,1	33,9	–	69,6	29,8	0,6
	1980 3rd Quarter	888	150	65,6	34,4	–	70,4	24,4	5,2
PHOTOTYPESETTING	1979 Financial Year	30	100	54,5	42,1	3,4	11,1	–	2,2
	1980 1st Quarter	47	157	81,9	18,1	–	25,5	–	1,2
	1980 2nd Quarter	39	130	57,2	42,5	0,3	42,5	–	1,8
	1980								
	April	42	140	79,2	20,8	–	41,5	–	–
	May	33	110	60,7	39,3	–	31,4	–	1,2
	June	62	207	86,1	9,1	4,8	58,8	–	1,8
	1980 3rd Quarter	46	152	75,3	23,1	1,6	43,9	–	1,0

No evidence of a formal costing system for electronic text processing (which could also be used for charging out costs to users) could be found in the literature. In comparisons it seemed that only salary and equipment costs are used in the calculations. This approach can give a completely wrong picture of the true financial impact. The same applies to scholars taking a chosen application and type of equipment when comparing the costs of electric typewriters and electronic text processing. A finding such as that by Swett[8] that engineered standards show little total effect on productivity except in very specialised cases of text processing can easily be proved wrong with different applications in different types of organisations. The focus should rather be on a costing system applicable for all types of electronic text processing systems (word processing and phototypesetting separately). A costing system was developed for electronic text processing in Company A in close co-operation with the cost accountant and accepted guidelines practised in the budgeting system. The factors used in determining the cost are those as in Table 28.

TABLE 28

BASIS OF COSTING SYSTEM FOR ELECTRONIC TEXT PROCESSING

FACTORS	DESCRIBTION
1. Remuneration	Salary + bonus + company contribution to pension and medical aid schemes.
2. Management fees	Involvement from management services.
3. Accommodation	Charge per m^2. Special environmental requirements (air conditioning, anti-static measures and special lighting) lead to higher charges.
4. EDP-charges	For telecommunications and accessing of data bases.
5. Supplies	Paper, ribbons, printwheels and chemicals.
6. Equipment	Purchase price written off over 5 - 8 years depending on whether electro-mechanical or electronic: $P = A\left(\frac{1 - Sv^n}{A\,\bar{n}|} + f\right)$ where P = Annual equipment cost. A = Purchase price. S = Scrap value (%) f = Service contract per annum (%) n = Expected time of usage $v = \frac{1}{1+i}$ i = Rate of interest per annum (%)

These costs are budgeted for annually per cost centre (typing services, word processing and phototypesetting separately) against actual outputs to determine the unit cost.

To determine whether a potential application would be cost-justified for electronic text processing the existing method is determined and flow-charted. The time involved and would-be frequency of alterations to take place are determined as accurately as possible. The result is then compared with the revised method through electronic text processing and, if there is a substantial saving in comparison with the preparation and ongoing processing, the task becomes a new application or is scheduled for later equipment expansion. The purpose is to use the system for the most profitable tasks and to exercise control over the misuse of the system for applications that can be done more effectively by other means. This is subsequently followed up to ensure that benefits as envisaged are actually realised.

To determine the return on the investment, the production control system provides useful information. The benefits that are directly quantifiable are mostly those on the operating side, since clerical costs for proof-reading etc. are always debatable, although they definitely contribute markedly to the total company cost. Taking operating costs only at this stage a document can be produced at 50% of the cost of traditional typing and composing[9]. The effect of static productivity on traditional typing and an increased salary structure means that electronic text processing can even be more profitable to Company A in future.

6.8.2 Administrative

Apart from increased labour productivity and a reduced cost structure the aims of this project (See section 1.4.1 (v)) were inter alia to determine the extent to which electronic text processing will have success in reducing the volume of paper-handling; facilitating information storage and retrieval; and increasing the availability, accuracy, quality and turnaround

time of information to facilitate decision-making and communication.

Electronic text processing brings about the more efficient handling of paper and as applications expand more paper is handled. For Company A as a whole, however, it facilitates the reduction of paper. The telecommunications facility with the main-frame computer allows selective data to be forwarded to the text processing system. The data is merged with standard text. Previously computer printouts were provided and the data had to be retyped as part of the documents for distribution. Currently 5% of the output is from this source. This will increase since it has been restricted by a lack of output capacity on the text processing system (slow daisy printers). Records are increasingly stored on the magnetic media of the word processing or phototypesetting systems and no longer retained in paper form. Positive efforts to this end were observed and, as users come to appreciate and trust these facilities, an increased effect can be expected. Currently no copies are kept for 20% of the hard-copy being distributed and users rely on the magnetic media for future reference. Over a period of time large volumes of text will only be available on magnetic media which will have to be kept indefinitely or a long as legally and/or administratively required.

Traditionally users file correspondence records in filing cabinets in alphabetical or numerical order using a subject classification. Often misfiling takes place and retrieval is either impossible or very time-consuming. Magnetic storage facilitates retrieval by utilising a system of easy identification which is duplicated on paper for security purposes. Speed and accuracy of storage and retrieval are greatly facilitated this way.

Traditional filing systems often result in out-of-file situations. Electronic text processing with magnetic media increases the availability of information. The accuracy of the information can be ensured since the system always contains the latest text worked with, whilst with paper-based systems some transactions may not have been recorded. Turn-around time is

greatly facilitated. From the production control system of Company A it was derived that 97% of all text preparation in the centre is carried out within the accepted norm set by the users. Certain large tasks of a repetitive nature requiring urgent completion can be executed at a fraction of the time it would take to type each document individually. For example: A batch of 100 one-page letters of the same content has to be sent to different policy-holders. From experience it can be accepted that this will normally take 15 - 20 times longer with normal typing than with word processing.

In certain functions the main tasks of middle line managements are the compilation of statistical reports or financial analyses. The typing and subsequent proof-reading are time-consuming. Since 75% of the contents stay the same, but often in a different format, preparation time is greatly reduced with word processing which provides easily changeable formats. It is also now necessary for senior staff to check only the text that changed, thereby saving the time of an expensive labour force. These benefits facilitate decision-making and communication.

The quality of output is better than if duplicated letters are used with the name and address particulars typed in. This way the overall corporate image of Company A is improved.

6.8.3 Organisational

As outlined in Chapter V it was envisaged that electronic text processing would affect structural and behavioural aspects. For this reason careful planning and evaluation were done.

The acquisition of electronic text processing systems meant that a completely new technology was introduced to Company A. EDP had been an established discipline but the handling of text has always been viewed as an administrative support function with low job requirements. Electronic text processing required revised skills through advanced training for which the right type of

staff had to be selected. Training programs were necessary and were generally considered of a much more advanced nature than those for any typing process used previously. Organisationally that meant increased job responsibilities with corresponding higher hierarchial levels. Previously staff had to be moved out of the centre for advancement - now staff from the rest of the organisation can be moved into the centre on advancement.

Centralised text processing was advisable for the financial benefits and from a co-ordination point of view. That paved the way for the centralisation of more and more of the activities presently still performed on a decentralised (but unproductive) basis. The situation developed where the total staff involved in text processing at Company A's head office could be maintained over a period of three years notwithstanding an increase of more than 100% in volumes. Based on formal work standards staff would have doubled with traditional text processing. No redundancy of posts took place from the employee's point of view, although the introduction of electronic text processing resulted in a substantial labour saving. As pointed out in section 6.4.4 (viii) qualified typists were in short supply so that the situation as a result of electronic text processing cannot be viewed as an infringement of the social responsibility of organisations to provide work opportunities.

Electronic text processing stressed other areas of weakness in the text processing cycle and in other decentralised areas. The high quality of the final hard-copy produced on the text processing system is one of the noticeable advantages. This became a standard against which hard-copy prepared elsewhere in the organisation was measured. It was determined that poor quality documents were often prepared elsewhere and distributed to policy-holders. It was also noted that notwithstanding the improved turn-around time offered by electronic text processing users initially complained about delays. This pointed to shortcomings in the internal distribution service. With the introduction of electronic text processing it was revealed that documents sent for typesetting have been retyped many times in order to obtain a desired "final" copy. Electronic text

processing is the ideal system to deal with frequently changing text. These aspects could then be analysed for improvement.

The typing centre functioned independently for many years with little direct contact with users. Tasks were mainly sent by means of a messenger service and in case of problematical or urgent tasks through contact with the supervisor. Electronic text processing changed work procedures and led to a sound interaction between operators and users. Electronic text processing was explained and demonstrated to users and user manuals were compiled. The more specialised nature of tasks often involved direct consultation between senior users and operators. That way the users obtained a much better understanding of the text processing function and its problems. On the other hand the text processing centre staff because of these consultations and feeling of belonging to the bigger organisation, became even more service-orientated. Text processing operators also now deal more with users and support-staff of higher hierarchical levels than before. Approximately 70% of current users were selected at random and frank opinions of the administrative impact on their own functioning or on operations under their management requested. No rating was required and merely concentrated on positive and/or negative aspects. The negative aspects were negligible and pertained to small procedural matters. This, however, stressed the need for periodical systems audits to determine the effectiveness of electronic text processing in administrative support. The positive responses were:

- Reduced paper volumes as a result of magnetic storage media.

- Improved turn-around time of correspondence and statistical reports, resulting in improved decision-making.

- Reduced proofreading effort required, resulting in more time for management or other tasks.

- Improved quality of final products, especially typeset copy for reproduction.

- Improved accuracy level of text.

- The ability to make last minute changes to important documents and still be able to present a quality end result on time.

These circumstances led to the acceptance of text processing as an important aid to improved decision-making and communication. Greater recognition came for the centre as an important administrative support function.

The specialised nature and the successful introduction of electronic text processing led to the development of a separate discipline as part of total administrative office management. The responsibilities, future growth and impact call for the revaluation of the management of this discipline. No longer can it be managed on an ad hoc basis as part of some other discipline. The logical functional placement seems to be a separate discipline as part of administrative office management.

The human implications were favourable. Job satisfaction increased and a high worker's morale is present compared to a completely different situation previously. The general and overall satisfaction of staff in the centre was tested by means of a short version of the Minnesota Satisfaction Questionnaire[10] mentioned in section 5.4.5. Operators of electronic text processing equipment previously worked in a typing centre on electric typewriters. Apart from the equipment the environment did not change with electronic text processing. The Minnesota Satisfaction Questionnaire was administered to all staff selected from the typing centre for ETP. This was repeated using the same test group (n = 13) but after becoming experienced in electronic text processing. The comparative results are reflected in Table 29.

TABLE 29

LEVEL OF JOB SATISFACTION IN TEXT PROCESSING CENTRE										
JOB DIMENSIONS	PRIOR TO ETP					ETP				
	VERY DISSATISFIED	DISSATISFIED	NEITHER SATISFIED NOR DISSATISFIED	SATISFIED	VERY SATISFIED	VERY DISSATISFIED	DISSATISFIED	NEITHER SATISFIED NOR DISSATISFIED	SATISFIED	VERY SATISFIED
1. Ability Utilization	0	2	4	7	0	0	0	0	5	8
2. Achievement	0	1	8	3	1	0	0	0	11	2
3. Activity	0	0	6	5	2	0	0	1	5	7
4. Advancement	1	5	6	1	0	0	0	1	6	6
5. Authority	0	0	9	3	1	0	0	3	7	3
6. Company Policies and Practices	0	0	5	7	1	0	0	4	7	2
7. Compensation	3	0	7	3	0	2	5	5	1	0
8. Co-workers	0	3	1	5	4	0	0	0	8	5
9. Creativity	0	1	8	2	2	0	1	3	7	2
10. Independence	0	1	2	10	0	0	1	3	7	2
11. Moral Values	0	0	1	8	4	0	0	1	8	4
12. Recognition	1	2	3	7	0	0	2	1	3	7
13. Responsibility	0	4	4	5	0	0	1	1	9	2
14. Social Service	0	0	7	6	0	0	1	3	8	1
15. Social Status	2	4	5	1	1	0	0	2	8	3
16. Supervision, Human Relations	0	1	2	8	2	0	0	0	8	5
17. Supervision, Technical	0	0	3	9	1	0	0	0	8	5
18. Variety	1	2	5	4	1	0	0	0	7	6
19. Working Conditions	0	0	2	10	1	0	0	1	11	1
TOTAL RESPONSE	8	26	88	104	21	2	11	29	137	68
	3,42%	10,53%	35,63%	42,10%	8,50%	0,81%	4,45%	11,74%	55,47%	27,53%
	13,8%		35,6%	50,6%		5,3%		11,7%	83,0%	

6.9 PROBLEMS EXPERIENCED

Certain factors are critical for the successful introduction of electronic text processing in any organisation. Very few significant problems regarding these factors were encountered in organisation A in the implementation and/or operational phases of electronic text processing. This can be attributed to the fact that electronic text processing was dealt with as a project and as such was well-planned and co-ordinated. Top management support for electronic text processing, together with high user and operator acceptance, contributed much to the success achieved. Reliable equipment, detailed attention to work procedures, production control and the job satisfaction experienced are other factors which facilitated the successful introduction of electronic text processing in Company A. Obviously many difficulties are experienced with projects of the magnitude of the one Company A carried out. This is especially true if the fact that pioneering work was done is taken into account. These difficulties were:

6.9.1 Feasibility study

The steps taken by Company A in the feasibility study were outlined in section 6.5. Electronic text processing only started to emerge as an important contributing factor towards the automated office when the project started in 1976. Many articles on electronic text processing started to appear in overseas magazines, most of them based on generalisations. Equipment manufacturers often made claims about growth and cost justification which even now (four years later) are still not a reality.

The lack of knowledge of electronic text processing and the poor quality of information available were difficulties experienced. Knowledge is an essential prerequisite for the identification of applications, determining of final product requirements and analysis of benefits envisaged. In order to obtain management support for a completely new way of text processing and to justify a large capital outlay, persuasive arguments were necessary. Often these arguments could not be substantiated beyond doubt. Considerable foresight by top management was necessary for a high risk decision such as the one to implement electronic text processing.

6.9.2 Equipment

The system implemented proved to be very reliable over a period of three years. Difficulties were, however, experienced with the operating environment and certain mechanical components.

As a safety precaution the typing centre was moved to an air-conditioned, open-plan office environment with carpet-tile flooring. Soon after implementation of the phototypesetting equipment, Company A experienced loss of text on the magnetic media. This led to frequent service calls, communication with the supplier in Switzerland and at times conflict situations between Company A and the local supplier. Test programs revealed no inherent problems in the equipment. It was then discovered that fluctuating electricity voltage supply and static conditions owing to the man-made fibres of the carpet tiles were the contributing factors. These difficulties ended with the installation of anti-static carpeting and connection to a stable power supply. Although the word processing equipment was not affected by these difficulties the facilities were extended to it as a precaution.

Company A experienced difficulties with the word processing/phototypesetting interface (see 6.6.3). The interface involved a bigger engineering effort than envisaged by the Swiss supplier. When the interface was delivered to Company A it was subjected to extensive testing. The principle is that any character generated on the word processing equipment will be translated into machine readable characters by the phototypesetting equipment. The test results revealed that no provision had been made for the Afrikaans characters ^¨`´. Since the major portion of text processing in Company A takes place in Afrikaans this was an unacceptable situation. There was no straightforward solution to the problem as a result of the inherent limitations of the TTY translation table used. An acceptable situation was reached six months after delivery of the basic system.

6.10 THE SCOPE OF ELECTRONIC TEXT PROCESSING IN COMPANY A

The financial, administrative and organisational impact of electronic text processing led to the rapid expansion of the system. The benefits from using the system were soon realised by line management and it is now being used extensively even by senior management. It was also soon felt that the input facilities for phototypesetting should be expanded to cope with the increased work load. A decision was made rather to expand the word processing system and use the telecommunications interface for transferring the text. Word processing itself had to be expanded rapidly to provide for the increased need. In the three years since the introduction of electronic text processing eight more keyboards with visual display units and three printers were added to the configuration depicted in Table 26. Since the text processing system is modular, any increased need for processing can be dealt with by expanding the central processing unit, storage capacity and text input and output facilities. A major decision is necessary only when the capacity of the shared-logic system is filled up to such an extent that no additional peripherals can be supported. Company A reached this stage within three years and a major expansion of processing capacity had to take place. Table 30 reflects how the electronic text processing system has grown since its introduction, and the costs involved.

TABLE 30

ETP SYSTEMS EXPANSION & COSTS
JUNE 1977 – JUNE 1980

DATE	WORD PROCESSING		PHOTO TYPESETTING	
	EQUIPMENT & SOFTWARE	COSTS	EQUIPMENT & SOFTWARE	COSTS
JUNE 1977	CPU + 10 meg. disk 2 VDU's 1 printer (40cps) Telecommunications W.P. software	R 45 200	CPU + Casette controller 2 VDU's 1 printer (40cps) Telecommunications Typesetter Typesetting software Developing machine	R150 965
NOV. 1977	1 VDU	5 850		
JULY 1978	1 VDU + 1 printer	13 500		
MARCH 1979	Hardware extension to 1 VDU	1 040		
JUNE 1979	Guillotine + decollater 4 VDU's 1 printer Special software	39 275		
OCT. 1979	Feeder for printer	3 120	Telecommunications extention	3 750
JUNE 1980	Increased CPU capacity 80 meg. disk 2 VDU's 1 printer Upgrading capacity of existing VDU's	70 200		
		R178 185		R154 715

The initial period after the introduction of electronic text processing not only served as a test period during which the impact could be gauged, but also revealed its further scope. The organisation plans to use the system as a base-line system for achieving complete administrative support. Areas other than the typing centre will also be subjected to feasibility studies. A total strategy was determined for electronic text processing and lines of action were planned for the next five years. Some of these actions are subsequently dealt with:

6.10.1 Centralised dictation

In section 6.5 the feasibility of introducing centralised dictation systems was stressed. The project was deferred for three years while the attention was on throughput and output systems. Since these were successfully implemented, renewed interest can be focused on centralised dictation. This facility fits in well with word processing.

Many of the applications of the word processing system are based on master documents and/or pre-recorded paragraphs stored on a magnetic medium and retrieved when a request for revised text is received. The operator then works from handwritten instructions on paper. Alternatively the originators can give these instructions by means of centralised dictation. In this way no paper will flow to the text processing centre, the operator will produce the required document and distribute it to the originator. Any subsequent revisions can be dealt with in this way. This could also pave the way for doing away with some correspondence on a decentralised basis.

Centralised dictation offers scope for improved communication, less handling of paper and increased productivity. These systems are costly. Only one supplier offers centralised dictation systems of an advanced nature in South Africa. The implementation of such a system involves procedural changes and support from management services. If a chosen system is not performing to set standards there is no alternative other than to put up with it or to change to traditional dictation equipment. Company A considers this as a disadvantage and will

delay a decision for up to three years pending the possible introduction of systems by other suppliers. It is also a known fact that developments in the field of voice digitising are progressing well in the U.S.A. South Africa's choice of an electronic telephone exchange system will allow the telephone to become an extended communications device such as for dictation of text onto disk. The need for centralised dictation systems with extensive additional wiring requirements will then fall away.

6.10.2 Departmental typists

The decentralisation of typing services was stopped as a result of the success of word processing and its excellent cost performance. No request for additional departmental typists was granted. It was further determined that many applications presently dealt with by departmental typists qualify for word processing on a centralised basis. It is therefore envisaged that in the next five years most tasks handled by departmental typists will be transferred to the text processing centre with a corresponding saving in staff. These workers could be accommodated in vacancies resulting from normal staff turnover. The unproductive use of skilled labour as pointed out in section 6.4.3 will then be terminated. A larger percentage of text processed will then be subjected to quality control and be measured against set work standards. Improved quality of work and labour is envisaged.

6.10.3 Secretarial services

This area was considered critical in the light of the possible organisational implications on managers and secretaries. It has been experienced that managers (with secretarial services) increasingly use the text processing system for typing previously done by their own secretaries. Applications include lengthly documents, statistical reports and personalised letters with standard contents. If centralised dictation facilities are offered in addition (see section 6.10.1) most of the typing requirements of management can be met by the text processing centre. Administrative support and limited typing can then be

provided by a group supporting a number of managers. The one-for-one relationship will then change and the secretary will be transferred to the text processing centre or to administrative support groups. These groups can be formed on a functional basis and provide improved career opportunities.

Another approach may be followed if functional groups demand their own typing facilities for technical or security reasons. It is then possible to form secretarial support groups with word processing facilities and administrative support. These word processing facilities may be linked to the shared-logic system in the text processing centre or visual-display stand-alone equipment may be used (see section 4.4.2). These support groups can be equipped with central dictation systems.

The envisaged growth of Company A and the expected expansion of the management structure will increase the need for secretarial support. It is becoming increasingly difficult to get qualified secretarial staff, with the result that better utilisation of available resources will have to take place. It is envisaged that evolutionary changes will take place in the next three years.

Staff and cost savings are envisaged by this approach which can only be implemented with top management support.

6.10.4 Telex services

This service traditionally forms part of the mail room. It is staffed by operators with limited typing skills and often experiences problems in finding relief workers when required. All telexes originated are typed or handwritten and sent to the telex department. The text is then re-keyed - a slow process with typing mistakes often being made. The mistakes can be cancelled but these cancellations are also transmitted since text is transmitted as typed. All telexes sent to Company A are also received by the department. A log is kept manually of all telexes sent or received.

If this facility should be incorporated in the text processing centre the services of trained typists would be available - also for relief purposes. Once available, the telexes can be dictated to the centre via the centralised dictation system (or other electronic means to come), thereby saving the writing or typing of the text to be sent. The messages can be prepared on a visual display unit, any corrections be made prior to transmission, telexes for different locations accumulated in memory, paper tapes be prepared, and only then transmitted. A log can be kept automatically on the text processing system and sorted in any required order.

Electronic text processing offers the opportunity for eliminating the need to type telexes twice and ensures the correct transmission of information. The introduction of this concept is planned to take place within one year and could further improve with technological developments in electronic message systems (see section 4.5.3).

6.10.5 Records processing

Text manipulation facilities on the word processing system allow sorting of text or retrieval of a specific record. These facilities allow the system to be used for records processing. Some applications become too cumbersome to be handled manually, but the volumes may not justify computerisation and the programming effort involved. The shared-logic system used by Company A offers fairly large disk storage capacity, which facilitates records processing applications. The system is programmable by assigning codes to different series of text handling functions (decision processing) and by using BASIC. Most senior operators use decision processing facilitating the execution of various text processing applications. Comprehensive documentation of a non-technical level is supplied with BASIC software. Manuals dealing with typical text processing applications (called OFFICE BASIC) are also provided. The supplier's support group assist by providing general orientation and when specific problems are experienced. Currently restricted use is being made of the BASIC programming facility and the responsibility vests with one staff member of

the Organisation and Methods function and with the supervisor of the text processing centre. The scope for records processing is limited to processing and storage capacity, and innovation from text processing management. Only a few examples will be offered to further the understanding of the principle.

(a) Forms control

A classification of all forms used can be made and processed on the word processing system. Full details of these forms can be recorded on magnetic medium and updated whenever necessary. At any given stage information on a certain form, or a group of forms with the same function, may be retrieved. Various sorts can be made, giving complete control over forms and offering the facility of sensible statistics. The complete record can be printed out periodically as an up-to-date reference manual. Annexure 6.9 reflects an example of the forms control record on the text processing system of Company A.

(b) Management reports

Departments often compile reports reflecting the changing position of financial or marketing matters on a periodical basis. These reports may differ only slightly from the previous ones, or may call for additions and deductions to be made. Many applications require percentages to be calculated. Since the shared-logic system offers mathematical functions these requirements can be met and processed automatically. The output from the system can serve as the management report to be distributed.

(c) Name and address files

Company A keeps various records of contact persons or selected groups of people. These particulars are kept on index cards which are manually updated whenever titles or addresses change. It is a cumbersome and time-consuming task to select a specific group from the total file, to

process individual letters, and to file the cards back in sequence. These name and address files can be recorded on magnetic media and be maintained on the text processing system. Whenever a particular group has to be contacted, a sorting can take place and letters can be produced through the automatic letter writing facility. Since disk capacity fills up fast and these applications are not dealt with on a daily basis off-line storage on magnetic diskettes is being used.

6.10.6 Documentary control

Many different filing systems exist in Company A. Classifications are normally made of document groups and individual files opened per category. These are normally identified by means of a reference number. It is common practice to file copies of all correspondence in these files and if one letter pertains to more than one matter, multiple copies are made and filed in different files. In this way a complete history is built up. Electronic text processing offers the opportunity to maintain vital information in magnetic form (stored off-line) and to produce a copy of a letter or document on request. Documentary control can be implemented in this way. For this reason it is advantageous to create all or most documents electronically. Electronic text processing offers the possibility of facilitating the bringing about of the paperless office. Company A is in a position to maintain a record of reference numbers and dates only, instead of the actual files - a major step towards documentary control. The feasibility of a remote visual display unit, linked into the central text processing system, for user purposes is currently being evaluated.

6.10.7 Use of other peripherals

Compatibility of office equipment was always a problem. In fact some manufacturers intentionally produce equipment using only their supplies with no compatibility. The electronic text

processing system implemented in this organisation interfaces with the main-frame computer. This type of interface is becoming an industry standard in EDP and can increasingly be used to link other peripherals previously considered as stand-alone and independent equipment. Examples of the scope of electronic text processing in this regard are:

(a) Computer output microfilm

The records processed on the word processing system may have to be printed out on paper and duplicated for distribution to decentralised offices. The possibility now exists to transfer these updated records in their final form to the main-frame computer from where they can be produced on microfiche by means of a computer output microfilm-unit. In this way a COM-unit can indirectly become a peripheral to the word processing system.

(b) Image printing

Image printers were dealt with in section 4.5.1(e) and can be considered as a fast means of producing quality output. An interface already exists to link such a printer to the word processing system. In Company A, however, the image printer can become a peripheral to the main-frame computer via the word processing system. In future it would be possible to transmit data requiring quality printout of a standard that cannot be met by computer line-printers, to the image printer via the word processing system. Image printing systems will become available in South Africa at the beginning of 1981. The feasibility of introducing image printing in Company A will then be determined.

(c) Plastic card embossing

World-wide embossed plastic cards have become a major instrument in identification and purchasing. For many years Company A has been using embossed plastic cards with

policy identification for presentation with cash premium payments. For each new policy issued on a cash premium basis, or when the premium on existing ones changes, an embossed plastic card is prepared. Each character is typed manually and simultaneously embossed on the card.

The input facilities for embossing machines have changed rapidly in the last few years. Visual display units with memory capacity are used increasingly as "front-end" devices to embossing machines. Company A's word processing system can be used as a "front-end" device for an embossing machine. It even offers scope for receiving the data via the word processing system from the main-frame computer and for producing the cards automatically. The benefits are obvious. Such a system will be operational in Company A at the beginning of 1981.

6.10.8 Phototypesetting

The interface between the word processing and the phototypesetting system offers scope for increased input and creates the opportunity for selling spare output capacity on the phototypesetter, thereby decreasing own unit costs.
The interface consists of a translation table for converting word processing characters into machine readable instructions on the phototypesetter. The typograhical commands can also be entered on the word processing system instead of on the typesetting input media. This means that any other organisations (e.g. those using the organisation's computer service bureau) with compatible word processing systems can avail themselves of typesetting facilities without going to that expense and training themselves.

6.11 CONCLUSION

This chapter dealt with the surveying of the feasibility of electronic text processing, its implementation in and impact on the head office operations of one large South African life assurance company.

The factors which led to considering electronic text processing and the situation prevailing in the organisation prior to its introduction were outlined. A program of action was proposed.

Specific text processing problem areas were dealt with. These problems related mainly to text origination, and production by means of secretarial services, departmental typists and the typing centre. The results of a survey were presented. These results pointed to a definite need for introducing electronic text processing.

A feasibility study was conducted and the results reported. A five-step approach was followed which proved very successful and can serve as a useful framework for organisations considering a similar exercise. The feasibility study served to identify applications for electronic text processing, the final product requirements and the expected benefits. The feasibility study revealed a need for electronic text processing.

A system was designed according to organisational requirements. The system was developed by using evaluation criteria, drafting a conceptual framework, determining the availability, and acquiring product knowledge and consumer experience. The ideal system was investigated and recommended for implementation.

Detailed attention was given to all aspects of systems implementation. Systems specifications, installation requirements, orientation, staff selection, procedural aspects and training were dealt with.

The impact of electronic text processing from a financial, administrative and organisational point of view, was estimated by comparing the situation at its inception and the situation three years later. The main findings are increased productivity and lower costs.

In the light of the success achieved with electronic text processing the scope for the discipline was evaluated in this organisation. It became clear from these aspects that the initial installation was indeed a base-line system for further administrative support. A wide variety of services which can become part of the system were outlined.

This organisation's need for an electronic text processing system was determined, suitable systems were investigated and very successfully implemented. The results reported positively support the parameters for success outlined in research objective (v) - see section 1.4.1. The extent to which electronic text processing will be beneficial to other large South African life assurance companies has been determined by means of a field study. The results are reported in the next chapter.

CHAPTER VI : FOOTNOTES

1. L.O.M.A. regularly reports on these developments. Information was obtained from a number of member companies in the U.S.A.

2. EDITORIAL : "The office of the future" : Business Week: Number 2387 : 30 June 1975 : pp. 48 - 84.

3. The Ph.D. candidate is the Organisation and Methods Manager for Company A and was instrumental in assessing and implementing electronic text processing. The results reported in this chapter are based on firsthand experience. All information contained in the various tables was collected by him personally. He designed and implemented the annexures as part of the ETP operations.

4. DIEBOLD RESEARCH PROGRAM-EUROPE : "The economics of new systems proposals" : Research Report No. E172 : January 1979 : p. 20.

5. The Ph.D. candidate was the project manager referred to.

6. EDITORIAL : "Is this the ultimate in word processing?" : Business Systems and Equipment : Volume 8, No 10 : October 1977 : p.1.

   and

   EDITORIAL : "Word processing" : The Word : Volume 9, No. 4 : April 1980 : pp. 6 - 9.

7. Based on the number of typed pages produced per day on electric typewriters and electronic text processing equipment respectively.

8. SWETT, D.D. : "Productivity and word processing" : The Office : August 1975 : pp. 57 - 59.

9. Based on the production figures reflected in the monthly return (Table 27) and by applying the costing system outlined in Table 28.

10. As presented by :

    Mc Cabe, H.M. & POPHAM, E.L. : Word processing - a systems approach to the office : Stamford, Connetticut : Office Publications : 1976 : pp. 70 - 74.

DAILY RETURN : TEXT PROCESSING AND ADMINISTRATIVE SUPPORT

	User Identification	
	Time Spent	
	Letters	TYPING
	Internal memos	
	Reports/ Minutes	
	Schedules	
	Form letters	
	Cheques & Misc.	
	Telexes	
	Handwritten	ORIGINATION
	Shorthand	
	Machine Dictation	
	Amendments	
	Mail & Filing	ADMINISTRATIVE
	Telephone	
	Reception	
	Shorthand	
	Travel & Appointments	
	Personal arrangements	
	General Administrative	
	Assisting others	
	Drafting letters	
	Maintaining Information	
	Other	
	REMARKS	

ANNEXURE 6.1

TEXT PROCESSING COSTS WITH DIFFERENT MEANS OF ORIGINATION*

ORIGINATION / PROCESSING	HANDWRITTEN BY CLERICAL STAFF	R	MACHINE DICTATION BY CLERICAL STAFF	R	HANDWRITTEN BY MIDDLE MANAGEMENT	R	SHORTHAND BY MIDDLE MANAGEMENT	R	MACHINE DICTATION BY MIDDLE MANAGEMENT	R
1. PREPARATION	15 min. @ R6,80 p.h.	1,70	8 min. @ R6,80 p.h. **	0,91	15 min. @ R14,67 p.h.	3,67	10 min. @ R14,67 p.h. + 5 min. @ R6,77 p.h. (Secretary)	2,45 0,56	8 min. @ R14,67 p.h.	1,96
2. TYPING	12 min. @ R5,39 p.h.	1,07	9 min. @ R5,39 p.h.	0,81	11 min. @ R6,77 p.h.	1,24	11 min. @ R6,77 p.h.	1,24	8 min. @ R6,77 p.h.	0,90
3. PROOFREADING	Typist		Typist		Secretary		Secretary		Secretary	
	3 min. @ R5,39 p.h.	0,27	3 min. @ R5,39 p.h.	0,27	3 min. @ R6,77 p.h.	0,34	3 min. @ R6,77 p.h.	0,34	3 min. @ R6,77 p.h.	0,34
	Clerk		Clerk		Manager		Manager		Manager	
	5 min. @ R6,80 p.h.	0,57	5 min. @ R6,80 p.h.	0,57	3 min. @ R14,67 p.h.	0,73	3 min. @ R14,67 p.h.	0,73	3 min. @ R14,67 p.h.	0,73
	Supervisor		Supervisor							
	3 min. @ R9,36 p.h.	0,47	3 min. @ R9,36 p.h.	0,47						
4. CORRECTIONS	10% (2 + 3)	0,24	10% (2 + 3)	0,21	5% (2 + 3)	0,12	5% (2 + 3)	0,12	5% (2 + 3)	0,10
		R4,32		R3,24		R6,10		R5,44		R4,03
		***		***		***		***		***

Cost advantage of machine dictation to:

- Handwriting = $\frac{4,32 - 3,24}{4,32}$

= 25%

Cost advantage of machine dictation to:

- Handwriting = $\frac{6,10 - 4,03}{6,10}$

= 34%

- Shorthand = $\frac{5,44 - 4,03}{5,44}$

= 26%

*May differ considerably from organisation to organisation.

**Tests revealed a ± 25% decrease in typing time for machine dictation (also see section 3.3.3).

***Equipment costs excluded. Unit cost negligible.

SURVEY OF TEXT PROCESSING REQUIREMENTS AND ENVISAGED BENEFITS

APPLICATION	VOLUME OF TEXT	FREQUENCY	TOTAL ANNUAL PRODUCTION	QUANTITIES REPRODUCED	OUTPUT			PROCESSING		PROOFREADING		INDIRECT BENEFITS
					TYPE	PROOF	SET	PRESENT COST	DEDUCTION WITH E.T.P.	PRESENT COST	DEDUCTION WITH E.T.P.	

ANNEXURE 6.4

FEASIBILITY STUDY
DIRECT & INDIRECT BENEFITS OF ETP ENVISAGED

1. DIRECT	PER ANNUM
1.1 Decrease in typing costs.	R29 250
1.2 Decrease in paper and printing costs (typesetting)	R17 370
1.3 Decreased postage.	R 980
1.4 Saving in labour cost	R 6 950
1.5 Rental of additional typesetting equipment	R 1 600
1.6 Rental of 3 Magnetic tape typewriters	R 7 850
1.7 Additional equipment budgeted for	R11 000
TOTAL DIRECT BENEFIT PER ANNUM	R75 000

2. INDIRECT

2.1 Reduction in proofreading

2.2 Improved turnaround time of work

2.3 Quality of final output

2.4 Accuracy level of internal documentation and external correspondence.

2.5 New career opportunities for typists

2.6 Aid to improved decision-making and communication.

ANNEXURE 6.5(a)

SYSTEMS SPECIFICATIONS : WORD PROCESSING

1. GENERAL

1.1 Tender price is firm from date of order.

1.2 Free systems and operating training on site.

1.3 Payment will only be made once the direct interface with the phototypesetting system is finalised.

1.4 Comprehensive systems and operating documentation will be supplied.

1.5 The system is quaranteed for 90 days after installation whereafter a maintenance agreement will be entered into.

2. EQUIPMENT

2.1 **Central processing unit**

One CPU comprising:

2.1.1 16K, 16 bit microprocessor RAM

2.1.2 Interfacing to 14 or more peripherals

2.2 **Software**

2.2.1 Standard W.P. software allowing text editing and text manipulation

2.2.2 SORT & MATHS functions

2.2.3 Afrikaans language to be processed (provision for ^" ´`)

2.3 **Storage media**

One 10 meg. sealed disk
One single diskette drive

2.4 **Visual display units**

Two VDU's with standard Netherlands keyboard layout (QWERTY) and additional function keys:

– 24 lines of 80 characters per line on display in positive or negative.

2.5 **Printer**

One daisy wheel line printer:

– 40 c.p.s.

– Tractor feeder attachment

– 38,1 cm paper width

– Line length of 132 characters in 10 pitch and 158 characters in 12 pitch.

– interfaced to C.P.U.

2.6 **Telecommunications**

One interface between IBM 370 main frame computer and this system

– supporting hardware and software (2780 protocol)

– text to be structured in block form

– binary synchronous line protocol

– full and half duplex transmission

– transmission speed of 4800 bps.

ADDITIONAL SPECIFICATIONS
AS PER DATA SHEET

ANNEXURE 6.5(b)

SYSTEMS SPECIFICATIONS : PHOTOTYPESETTING

1. GENERAL

1.1 Tender price is firm from date of order based on a currency exchange rate of X S.Fr = R1.

1.2 Systems and operator training is free of charge on site.

1.3 Payment will be made on the following basis:

1.3.1 One third when the order is placed.

1.3.2 One third on complete installation as per specifications.

1.3.3 One third one month after installation and satisfactory operation.

1.4 Comprehensive systems and operations. Documentation will be supplied.

1.5 The system is quaranteed for 180 days after installation, whereafter a maintenance agreement will be entered into.

2. EQUIPMENT

2.1 **Control Unit**

One control unit comprising:

2.1.1 32K, 16 bit microprocessor RAM.

2.1.2 Control panel.

2.1.3 Papertape reader

- Reading speed of 300 characters per second.
- Allowing for normal, coated or metallic 5, 6, 7 or 8 channel (ISO standard) paper tape to be read.

2.1.4 Magnetic cartridge controller

- Three drives
- Microprocessor with buffer and controlling capacity of up to eight drives.
- Reading/writing speed of 2 800 characters per second.
- Recording at 1 600 bpi.
- Tape speed of 30 ips, reading or writing, and 90 ips fast forward/rewind.
- Storage of 98 formats of 250 codes each.

2.1.5 Magnetic cartridges

- 3M DC300A, 90 meter two track storage tape.
- Storage capacity of 760 000 characters.
- Lifespan of 5 000 runs guaranteed.
- Reels driven by iseolastic band giving equal tangential pull.
- Recording inhibitor incorporated to eliminate accidental tape erasure.

2.1.6 Interfaces to

- Microprocessor
- Phototypesetter

2.1.7 Fitted in standard rack with power cable, switch and line filter.

2.2 **Software**

2.2.1 Modular phototypesetting program (BASIC), including exception dictionary and automatic justification.

2.2.2 English and Afrikaans hyphenation routines.

2.2.3 Programs: Utilities, labels, multicodes, statistics and listing.

2.3 **Photosetter**

One Photosetter

- Xenon flash lamp.
- Speed of 120 000 characters per hour.
- Interchangeable glass disc with eight fonts, each with 126 characters.
- Type faces, Univers 55, Univers 56, Univers 65, Univers 66, Times New Roman 2, Times New Italic 2, Times New Bold 2, Standard Pi-font.
- Interchangeable lens pack allowing for point sizes 6, 8, 10, 12, 14, 20, 24 and 36.
- Mixing of all type styles and point sizes available in the machine under tape command.
- 65 Cicero justification.
- Reverse leading of paper or film up to 300 mm.
- Paper of film width: 75mm, 100 mm, 150 mm, 200 mm, 250 mm and 300 mm.

Continued

– Two 300 mm cassettes.

– Allowing for horizontal and vertical rules.

2.4 **Visual Display Terminal with dual Casette Input/Output**

Two 32K, 8 bit Visual display units with standard typewriter key-board layout (QWERTY) and additional function keys:

– Total of 97 keys.

– Standard 38 cm. diagonal screen with P4 phosphorus surface.

– 192 character set (upper case, lower case and special signs).

– 24 Lines of 80 characters per line on display in positive and negative.

– Transmission speed: 1200, 4800 or 9600 Bauds, international standard RS 232C.

– Cassette controller to be of dual type as per specifications 1.4.

– Both units to be interfaced to line printer, with isolation switch to enable each unit to output to the printer, but not simultaneously.

2.5 **Printer**

One daisy wheel line printer:

– Tractor feeder attachment included.

– 45 c.p.s.

– 38,1 cm. paper width.

– Line length of 132 characters in 10 pitch and 158 characters in 12 pitch.

– Interfaced to both visual display units.

2.6 **Telecommunications**

One interface between the word processing system and this system:

– supporting hardware and software (TTY)

– text to be structured in block form

– transmission speed of 2800 bps.

TRAINING PROGRAM : WORD PROCESSING SYSTEM

SYSTEM START-UP	SPECIAL PRINT FUNCTIONS	OTHER FUNCTIONS	DOCUMENT FILING	DOCUMENT INDEX
Edit Old Document	Cancel Print Request	Attach Glossary	Copy to Archive Diskette	System Disk
Create New Document	Select Next Printed Document	Edit Old Glossary	File to Archive Diskette	Archive Diskette
Print Document	Merge Print	Create New Glossary	Retrieve from Archive Diskette	Printers
Special Print Functions	Dual Column Print	Reset Date and Time	Delete from System Disk	
Document Index	Print Index	Duplicate Diskette	Delete from Archive Diskette	
Document Filing	Cancel Index Printout		Prepare New Archive Diskette	
Telecommunications				
Other Functions				

TEXT MANIPULATION FUNCTIONS:

KEY	PURPOSE
1. AUTOSCORE MODE	To underscore (underline) new text and inserted characters as they are entered by the operator.
2. BACKSPACE	To move the cursor backwards through text. Usually to strike over incorrect text.
3. CANCEL	To terminate any function or operation before the EXECUTE Key has been touched.
4. CENTER	To center text automatically on a line.
5. COPY	To highlight consecutive text in one part of a document, and copy it to another location in the same document. Both parts of the document will contain the same text.
6. CURSOR CONTROL KEYS	To position the cursor on the screen, or to move the cursor to the beginning or end of the screen.
7. DECIMAL TAB	To automatically align columns of numbers on their decimal points, or to right justify any column of text of figures without decimal points.
8. DELETE	To highlight consecutive text in a document, and to remove it from that document.
9. DOCUMENT MARKING	To mark a specific location in a document and later return to this same location.
10. EXECUTE	To inform the system that the present course of action is acceptable to the operator.
11. FOOTER	To create the footers at the bottom of pages which will identify documents, usually from page 2 on.
12. FORMAT	To set or change the right-hand margin, tab settings, and/or vertical print spacing between lines.
13. GLOSSARY	To automatically have the system recall and enter into a document some previously-created text or instructions.
14. GO TO PAGE	To position the cursor to another location in the current document.
15. HEADER	To create the headings at the top of pages which will identify documents, usually from page 2 on.
16. HYPHENATION (Globally)	To automatically find each instance in a document where a hyphenation decision is necessary, and to allow the operator to insert a hyphen.
17. INDENT	To indent paragraphs or any section of text automatically.
18. INSERT	To insert any amount of text into an existing document.
19. MERGE	To create letters or documents with provision for the future addition of "variable" information from a second document. To combine two documents into one.
20. MOVE	To highlight consecutive text in one part of a document and then move it to another part of that document.
21. NEXT SCREEN/ PREVIOUS SCREEN	To view any screenload of text in a document.
22. NOTE	To allow non-printing comments (notes) to appear on the screen but not on the printed document.
23. PAGE	To define the end of a page.
24. REPAGINATION	To automatically search through a document, deleting old page breaks, and to allow an operator to insert new page breaks in appropriate places.
25. REPLACE	To highlight consecutive text in a document and then replace it with other text.
26. REPLACE (Globally)	To highlight all instances of defined consecutive text in a document and then replace them with other text.
27. RETURN	To end a line of type and bring the cursor to the start of the next line.
28. SEARCH	To search through a document and stop at any defined character sequence.
29. STOP	To stop the printer. Usually for changing the print wheel or sometimes, the forms.
30. SUBSCRIPT/ SUPERSCRIPT	To allow the printer to move up and/or down one-half (½) line from the main typing line to create subscripts and/or superscripts.
31. SUPER COPY	To highlight consecutive text in one document and copy it to any location in another document. Both documents then contain this same text.
32. SUPER MOVE	To highlight consecutive text in one document and move it to another document.
33. TAB	To indent the beginning of a paragraph or other text not on the left margin.
34. WORK PAGE	To hold special notes or information, separate from the document, for the operator's use.

ANNEXURE 6.7

TYPOGRAPHICAL COMMANDS FOR TEXT MANIPULATION

Line Measure	*M picas picas points points
Point size	*P08 or *P12
Font selection	*F1 to F8
Leading plus	*LP points halfpoints
Leading minus	*LM points halfpoints
Indent left	*IL picas picas points points
Indent right	*IR picas picas points points
Indent both	*IB picas picas points points
Indent hang	*IH picas picas points points
Indent now left	*INL
Indent now right	*INR
Cancelling indents	*IX
Storing Subroutine	*S(no) e.g. *S01
End of subroutine	*E
Using Subroutine	*U(no) e.g. *U01
Delay lines in subroutine	*DL(no of lines) e.g. 7 lines = *DL007
Delay vertical in Subroutine	*DV points points points halfpoints
Vertical forward	*VF points points points halfpoints
Vertical reverse	*VR points points points halfpoints
Leading zero	*LZ
Zero leading (just for one line)	*Z
Vertical set	*VS
Vertical back	*VB
Vertical maximum	*VM
No escape	*NE
Character insertion	*C character e.g. *C. (for line)
No flash	*NF
No flash cancelled	*NX
Hyphenation cancelled	*HX
Hyphenation allowed	*HA
Discretionary hyphen	ϑ (blue key)
Disallow ideal line break	*XE character
Cancel letterspacing	*AX
Allow letterspacing	*AL
Modification of letterspacing	*XL units units
Width change of minimum variable space	*XSM units units
Width change of optimum v.s.	*XSO units units
Width change of maximum v.s.	*XSX units units
Kerning	*K units units
Modifying width of a sign	*XW character units units
Width add	*WA points one-sixth point
Width subtract	*WS points one-sixth point
Ragged left	*RL picas
Ragged centre	*RC picas
Ragged right	*RR picas
Ragged special	*RS character
Ragged cancel	*RX
Tabulation begin	*TB
Tab now	*TN
Tab start	*TS
Tab cancel	*TX
Tab allow	*TA
Tab end	*TE
Exceptions dectionary add	*XAM word variable space
Exceptions dictionary delete	*XD word variable space
Delete all words from exceptions dictionary	*XI
Quad left	⊢
Justify	⊢⊣
Quad centre	⊢—⊣
Quad right	*Q
Merge (break point)	▽
Determine lines without spaceband for justify	*XBJ
Determine lines without spacebands for quad left	*XBL
Determine lines without spacebands for quad right	*XBR
Determine lines without spacebands for quad centre	*XBC
Define multicode in unshift level	*DMUbxxxxxx*E
Define multicode in shift level	*DMSbxxxxxx*E

Continued

Define multicode in pi-shift level	*DMPbxxxxxx*E
Define multicode for all shift level	*DMAbxxxxxx*E
Cancel all multicodes	*DMX*E
Automatic repetition of a character	*XYb
End of automatic repetition of a character	*XZ
Call the contents of the statistics buffer	*AS
Call the contents of the statistics buffer and clear	*AC
Halt typesetter	*BT
Halt computer	*BC
End of take	*Y
Label of an unjustified tape from the keyboard	JUnnnnnn,nn.0△
Label of a correction tape from the keyboard	JKnnnnnn,nn.1△
Label of an iterative correction tape from the keyboard	JInnnnnn,nn.1△
Label for reader 2 to obtain a tape listing	BS
A new output proof containing line number	*OP
A new output proof of corrected parts containing line numbers	*OC
A new output proof without line numbers	*ON
A new output proof of selected parts without line numbers	*OSnnn,nnn△
End of a correction tape	*O (zero)
Spaceband	△
Cancel word or commands	⊄

PRODUCTION CONTROL : WORD PROCESSING & PHOTOTYPESETTING

A. WORD PROCESSING

JOB NO.	USER	USER CODE	PRODUCTION			EDITING			NEW WORK			TIME TAKEN
			0 — 2 days	3 days	> 3 days	0 — 2 days	3 days	> 3 days	0 — 2 days	3 days	> 3 days	
			Number of pages									

B. PHOTOTYPESETTING

JOB NO.	USER	USER CODE	TYPE OF WORK (NEW OR EXISTING)	EQUIPMENT UTILISATION		TURNAROUND TIME			PAPER USAGE (METERS)	REMARKS
				VDU (time)	Photosetter (characters)	0 — 5 days	5 — 10 days	10 — 15 days		

RECORDS PROCESSING ON W.P. : A FORMS CONTROL SYSTEM

SUBJECT	TYPE	PROCEDURE	FUNCTION	NUMBER	SIZE	SPECS.	QUAN.	C/NC	Colour	CODE
VACANCY	CLERICAL	APPOINTMENT	APPLICATION	AE 1234	A3	1 Sheet	1 x 250	C	White	0049
VACANCY	SALES STAFF	APPOINTMENT	APPLICATION	AE 1235	A3	1 Sheet	1 x 250	C	White	0050

CHAPTER VII : THE FIELD STUDY

CHAPTER VII

THE FIELD STUDY

7.1 INTRODUCTION

Detailed analysis of electronic text processing as a management discipline was undertaken in chapters I-V. Chapter VI dealt with the feasibility, implementation and impact of electronic text processing in one large South African life assurance company. The company pioneered electronic text processing in the life assurance industry and implemented very successful cost effective applications. The experience gained from this installation served as the basis for a field study in the large South African life assurance industry. The objective of the field study was to obtain information to substantiate the validity of hypotheses formulated on the current status and impact of electronic text processing on the head office operations of the large life assurance companies.

As far as could be determined no previous research had been undertaken and published in this area.

Fact collection was based on questionnaires. The responses to the questionnaires from the organisations approached, permitted certain inferences to be drawn.

The criteria for large South African life assurance companies were dealt with in section 1.4. The sample consisted of the nine largest companies (all with assets in excess of R200 million) as listed in the "Financial Mail" top companies supplement of 1979[1]. It included Company A which was dealt with in the previous chapter. All nine companies selected responded to the questionnaire.

7.2 HYPOTHESES

The nature of life assurance demands much supporting paperwork. Correspondence is to a large extent with individual policyholders. Irrespective of the development of electronic message systems (see section 4.5.3) hard-copy will be required to a large extent as a means of communication. The growth of the life assurance industry

necessitates the faster handling of text. For this reason the insurance industry world wide has long been a primary user of word processing technology - automated typing by means of magnetic tape or magnetic card typewriters introduced by International Business Machines in 1960[2]. The recent introduction of microprocessor-based text processing systems with capabilities similar to those of electronic data processing, offers the opportunity to the life assurance industry to increase productivity and effectiveness in dealing with text processing. Chapters II to V dealt with these aspects.

Knowledge derived from liaison with life assurance companies locally and abroad, and the results achieved with the introduction of electronic text processing in Company A allowed the formulation of the following hypotheses on the current status and impact of the discipline on the large South African life assurance companies:

7.2.1 Most companies have introduced electronic text processing systems.

7.2.2 The least cost-effective structures for electronic text processing are predominant.

7.2.3 Problems associated with text processing are similar to those universal for administrative offices.

7.2.4 Typing applications more suitable for electronic text processing will have a high incidence.

7.2.5 The responsibility for electronic text processing is not clearly defined.

7.2.6 Text processing is still mainly supported by ordinary and memory typewriters.

7.2.7 Advanced software functions are in limited use.

7.2.8 Prospective buyers of electronic text processing equipment are selective in their approach.

7.2.9 Investigating and implementing initial electronic text processing equipment have a long project duration.

7.2.10 The changeover of typists/secretaries to electronic text processing operators poses no significant problems.

7.2.11 There is a lack of formal production and cost control systems for electronic text processing.

7.2.12 Security measures for electronic text processing are inadequate.

7.2.13 Factors affecting the introduction of electronic text processing are considered more critical than those applicable to the continued operation.

7.2.14 The organisational impact of electronic text processing will be:

- Greater centralisation of text processing activities.
- Increased job content and job satisfaction for text processing staff.
- The facilitating of decision-making and communication.
- A decrease in the growth rate of text processing staff.

7.2.15 Electronic text processing will reduce the unit cost of written correspondence.

7.2.16 Electronic text processing will increase labour productivity and benefit organisations indirectly through improved text handling.

7.2.17 Electronic text processing offers the scope to provide a basis for interactive administrative support.

7.3 THE SURVEY

The questionnaire was made up of a title page and two parts. The information requested on the title page was to test the validity of the first hypothesis (see section 7.2.1). Part 1 related to hypotheses 7.2.2 to 7.2.4 dealt with the structure and size of organisational units for text processing; problems peculiar to the discipline; and applications and the incidence thereof. All participants were asked to complete the relevant questions. Part 2 related to hypotheses 7.2.5 to

7.2.17 and dealt with specific questions on companies with an installed electronic text processing base. Questions dealt with structural relationships; equipment and/or software; procedural aspects (selection, training, production and cost control, system security, factors determining success and problems experienced); impact and the scope of electronic text processing.

A trial run was done on the questionnaire to determine its shortcomings. The supervisor of the text processing operations and members of the Organisation and Methods function, with a sound procedural background, of Company A were requested to complete questionnaires. They were specifically informed to look for any possible dual interpretations. These comments and constructive criticism from an expert in questionnaire design led to redesign with improved readability and the elimination of ambiguity. The final result was typeset to improve general appearance and to provide for easier completion. The questionnaire sent out is reflected in annexure 7.1.

The questionnaire was sent out on 10 July 1980, with a covering letter (see annexure 7.2) and a self-addressed stamped envelope to facilitate returning. A return date of 1 August 1980 was requested by which time three questionnaires had not been received. To allow for postal delays, follow-up was postponed to 8 August 1980 when the particular organisations were contacted telephonically. In all three companies special circumstances were responsible for their not responding in time and they promised a speedy reply. All questionnaires had been received by 31 August 1980.

Each response was individually acknowledged and companies thanked for their participation. As promised in the questionnaire a summary of the overall results of the survey was sent to all participants. It was reasoned that such action and quick fulfilment of a promise made would create a favourable attitude in these organisations towards research in general.

A number of factors contributed to the high response rate:

- Specific members at general management or assistant-general management level of most of the organisations approached had been contacted previously and their provisional support obtained. The covering letter had been addressed to them personally with the request to appoint a suitable person to complete the questionnaire.

- The opportunity (specifically expressed by some participants) to use the questionnaire as a guide for evaluating electronic text processing in their respective organisations and to draw up strategies for development.

- The promised feedback of the comparable situation in other life assurance organisations.

- The assurance that anonymity would be ensured.

- The professional image of the questionnaire itself.

- A genuine interest in the field of research.

One limitation was the lack of expertise on electronic text processing by some respondents. Information supplied may be based on assumptions, or personal viewpoints, rather than company policies. These issues affect mainly the viewpoints on the scope of electronic text processing and not the main aspects to be validated. The questionnaires were completed by the individuals most qualified to do so. They were either from data processing management or administrative office management (including Organisation and Methods functions). Most completed questionnaires were checked at senior management level before they were returned.

7.4 THE RESULTS

It was clearly stated in the research questionnaire that electronic text processing equipment also included memory typewriters (with or without magnetic media) and word processors (stand-alone and shared-logic types). It also included software packages for use in association with electronic data processing equipment.

7.4.1 The user base of electronic text processing systems

An analysis of the title pages of the questionnaires returned indicated the user base of electronic text processing systems. All respondents investigated the feasibility of electronic text processing and none rejected the viability of its introduction. Eight companies (89% of the sample) installed electronic text processing equipment whilst the remaining one planned to do so. Notes on the questionnaires by the respondents and reference to

question 5 of Part II on equipment and/or software revealed that of the eight companies using electronic text processing equipment:

- seven used microprocessor-based text processing equipment

- the remaining one used memory typewriters, but would change to microprocessor-based text processing equipment before the end of 1980.

These results validate the hypothesis that most companies in the large South African life assurance industry have introduced electronic text processing systems.

7.4.2 The structure and size of organisational units for text processing

Question 1

Office structures for text processing were outlined in section 5.2. Four structures were identified, viz. one-for-one relationship, single-unit (one secretary to a number of managers), work-group (per function i.e. line/staff department) and centralised (correspondence typists in one or more than one unit with no administrative support). It was decided not to use these terms in the questionnaire but rather to be descriptive to minimise misinterpretation. The results were:

Structure	Questionnaire Description	Response	Number of Typists/Secretaries	Total	As % of Total
Centralised Unit	Central typing service	3	40, 12, 18	70	11,4
	Decentralised typing service pools	5	12, 15, 29, 11, 7	74	12,0
Work-group	Typists in line departments	9	140, 43, 17, 16, 6, 6, 21, 1, 8	258	42,0
Single-unit	Secretarial support: one secretary to a number of managers	8	28, 32, 21, 12, 4, 9, 5, 2	113	18,4
One-for-one	Secretarial support: one-for-one relationship	7	8, 13, 39, 5, 3, 1, 31	100	16,2
				615	100,0

The results above reveal that less than a quarter (23,4%) of the staff involved in typing/secretarial duties are organised on a centralised basis - considered to be the most cost-effective arrangement.

Typists in line departments (work-group structures) comprise 42,0% of the staff. A feasibility study in one organisation (Company A) revealed this as a very unproductive area with the larger percentage of typing more suitable for automated equipment (reported in section 6.4.3).

Electronic text processing is seldom justified for workers operating on a one-for-one or single-unit basis as a result of the small typing work load (refer to section 5.2.1). This means that currently 34,6% of the staff involved in these activities cannot be supported by electronic text processing on a cost-effective basis.

These findings substantiate the hypothesis that the least cost-effective structures for electronic text processing are predominant. (See section 7.2.2).

7.4.3 Problem areas

Question 2

Section 2.5 dealt with traditional office problems in the life assurance industry and for administrative offices in general. A number of problem areas universally associated with text processing were listed and respondents were required to indicate on a 5 point scale (0-4) how problematic they considered these factors in their own organisations. The participation of 9 respondents meant a maximum score of 36 in any individual item. The results were:

Rating	Problem Areas	Score	As % of Maximum Score
1	Repetitive typing	23	63,9
2	Increasing volumes	21	58,3
3	Fluctuating work loads	20	55,6
4	Increasing unit costs	16	44,4
5	Uneven work distribution	15	41,7
6	Lack of productivity measurement	12	33,3
	Lack of career opportunity	12	33,3
7	Static productivity	11	30,6
8	Low job satisfaction	10	27,8
9	Poor quality of final copy	9	25,0
	Lack of job standards	9	25,0
10	Away from the desk situation	6	16,7

The factors which obtained high scores are all considered to be problematic in traditional text processing. Repetitive typing was rated the most problematic area. In section 2.6 increased office automation, with electronic text processing as a logical starting point, was offered as a viable solution for solving these problems.

These research results corroborate the hypothesis that problems associated with text processing are similar to those universal for administrative offices.

7.4.4 Applications

Question 3

Respondents were requested to indicate the incidence of different typing applications in their organisations on a five-point scale (very low, low, fair, high and very high). Based on 9 respondents and a 0-4 scale, a maximum score of 36 was possible in any individual item. The results were:

Rating	Typing Applications	Score	As % of Maximum Score
1	Repetitive typing (letters with standard wording)	30	83,3
2	Form letters with variable text	29	80,6
3	Normal typing (original documents)	24	66,7
	Lengthy documents (for example reports requiring extensive retyping when changes are made)	24	66,7
4	Manuals (for example training and procedural)	23	63,9
5	Statistical typing (only certain figures change periodically)	19	52,8
	Legal documents (no alterations allowed)	19	52,8
6	Draft copy for revision	15	41,7
7	Retyping from computer printouts (for example address records and rate book information)	10	27,8
8	Transcription from machine dictation	7	19,4

All the applications listed are more suitable for electronic text processing and with the exception of retyping from computer printouts and transcription from machine dictation obtained high scores. Repetitive typing has the highest incidence. Most of the companies surveyed produce some repetitive letters by means of computers. The quality of output is often not acceptable for letters where a desired impact is expected - the assumed effect of personalised letters against mass mailings. Electronic text processing is the ideal means for dealing with repetitive typing and the other applications listed. Section 8.2.5(d) covers these applications in the life assurance industry in detail.

The results confirm the hypothesis (section 7.2.4) that typing applications more suitable for electronic text processing will have a high incidence.

7.4.5 Structural relationships

Question 4

In order to determine the structural relationship of electronic text processing the responsibility for investigating and implementing systems; the level of co-ordination; and the functional grouping of activities were dealt with. The question was split up into four sub-sections and applied to the eight current users of electronic text processing systems.

Question 4.1: Responsibility for investigating and implementing electronic text processing

The results were:

Responsibility for Investigating & Implementing ETP	Response
Organisation and Methods function	5
Specialist ETP personnel	3
Office Administration	2
Line department	1
EDP function	0
Equipment supplier	0
Service bureau	0

Organisation and Methods, and specialist ETP personnel were mainly responsible for investigating and implementing electronic text processing systems. The two responses for Office Administration were as a result of the Organisation and Methods functions being part of the discipline in those companies and both categories were indicated. The Organisation and Methods function of one company was initially responsible for investigating and implementing electronic text processing, but a line department (Pensions) took over the responsibility for further expansion after the installation of one system.

The initiative for investigating electronic text processing came from management services - the group traditionally associated with improved typing procedures. Although computer technology

"End users are learning more about computing (DP and WP) and computing people must learn more about their businesses so that interfunctional relationships can really contribute towards the accomplishment of organisational goals."

This stresses the importance of co-ordination of EDP and ETP at the same top management level. Five organisations responded positively to, whilst three reported negatively on this issue.

Question 4.4: Reporting structure

The survey revealed the following reporting structure:

ETP Reports To	Response
Management Services	4
Office Management	2
Line department	2
EDP	0

Traditionally typing centres reported to administrative office management. Electronic text processing was introduced as a logical extension to that concept - automating typing activities with no change in the reporting structure.

The utilisation of computer technology in no instance led to ETP reporting to EDP.

In two companies group life activities (pensions) were considered the primary application for electronic text processing. The line departments investigated and implemented electronic text processing (with the aid of Management Services). Electronic text processing centres report to the line functions. A review of the reporting structures should take place if electronic text processing is expanded to other users (who may be from different line departments). This type of reporting structure is seldom in the overall interests of an organisation since considerable duplication may take place and equipment may not be utilised to its optimum capacity.

Management Services manages electronic text processing activities in the four largest companies - one on a centralised and the remainder on a decentralised basis. Results from the field study on equipment/software and the scope of the discipline indicate that these companies are also the largest users of electronic text processing systems and plan considerable expansion. Electronic text processing is considered a development project and it is foreseen that the management responsibility will eventually be transferred to the where it will be most functional - possibly administrative office management. Currently many uncertainties about the future automated office and the structural implications exist.

Summary

These findings support the hypothesis that the responsibility for electronic text processing is not clearly defined. It can, however, be concluded that no critical factors for concern are currently present.

7.4.6 Equipment and/or software

Question 5

This question aimed at perspective on the current installed base of electronic text processing equipment; the software features used; the suppliers surveyed; and the time taken to be operational. It was sub-divided into seven sub-questions. The first three referred to computer-assisted and dedicated electronic text processing installations. The fourth one dealt with the software features used, whilst the last three covered the organisations surveyed before a decision was made and the time lapse between investigating the feasibility and becoming operational.

Questions 5.1 to 5.3: Computer-assisted text processing

Only one of the eight companies uses computer-assisted text processing. Special text processing software is used on a

mini-computer installation. The organisation indicated that the approach was unsuccessful as a result of poor supplier support and inability to interface the system with the in-house main-frame. Unless a marked improvement is experienced the company will acquire dedicated electronic text processing equipment. (Question 5.1).

No organisation uses a service bureau and their software packages for electronic text processing. (Question 5.2).

Four companies use memory typewriters with magnetic card storage (84 of which most were supplied by IBM). All have been introduced since 1975 - a large number were installed in 1977 and later when display electronic text processing equipment was already available on the South African market. One company uses 57 of these units. It was indicated by most respondents that they were phasing out magnetic card type of equipment on an evolutionary basis in favour of more cost effective display type text processing equipment. Two companies implemented stand-alone word processors during 1979. In one organisation this is in addition to other electronic text processing systems, whilst in the other it is the only equipment in that category. Six companies use shared-logic text processing systems (7 systems). Two of these systems were introduced in 1977, one in 1978 and the remainder in 1980 just prior to the field study. Display text processing systems supported 34 visual display units and 20 daisy wheel printers as in August 1980. The two manufacturers of stand-alone equipment are Lanier and Olivetti. Wang equipment dominates the shared-logic category with 27 visual display units and 15 printers. In total 118 electronic text processing input units were used. The nine companies surveyed employed 615 typists/secretaries for text processing (see section 7.4.1). The figure was 588 for the eight companies which had installed electronic text processing equipment. This meant that 470 typists/secretaries used traditional typewriters (manual or electric) for text processing.

The results confirm the hypothesis that text processing is still mainly supported by ordinary and memory typewriters (see 7.2.6). No indication of volumes is available to determine the

percentage of correspondence being handled by this category and display text processing equipment respectively. The latter offers considerable advantages for increased productivity as a result of which the total output will not be in proportion to the smaller number of input units. Since most display text processing equipment has been introduced recently it can be reasoned that the impact on output was still small at the time of the survey. This situation may change drastically in the short term.

Question 5.4: Software features

Seven companies were equipped with electronic text processing systems utilising text-handling software. All systems were supported by basic text processing software with text manipulation abilities. Software is available for more advanced functions and some systems are programmable. This question sought perspective on the utilisation of these features in the organisations. The results were:

Software Features	Response	% of Users (n = 7)	% of Sample (n = 8)
Simultaneous print-out (at the same time as input takes place)	7	100,0	87,5
Global search and replace	6	85,7	75,0
Proportional spacing	6	85,7	75,0
Justification	6	85,7	75,0
Glossary (Call up of prerecorded text)	7	100,0	87,5
EDP capabilities (Sorting & arithmetic functions)	5	71,4	62,5
		n = 5	
• Records processing	(3)	(60,0)	37,5
• Forms management	(2)	(40,0)	25,0
• Electronic diary	(0)	(0)	0,0
• Decision processing (automatic execution of operators' instructions)	(4)	(80,0)	50,0
• User programmable	(2)	(40,0)	25,0
Input to phototypesetting equipment	2	28,6	25,0
Telecommunications with other ETP equipment in same location	4	57,1	50,0
Telecommunications with in-house computer	4	57,1	50,0

The facilities for simultaneous print-out (the ability to enter text on a visual display unit while previously entered text is printed out) and retrieving glossaries (prerecorded text) are used by all seven companies. Six of the seven use the software features of global search and replace, proportional spacing and justification. The reason why there is not a 100% response to these features can be attributed to the fact that they are not provided for on the equipment in use by the respondents. These advanced functions (a term used in the introductory stage of electronic text processing) can currently be considered as part of basic software since most suppliers offer these facilities as standard.

It could be assumed that advanced functions such as EDP capabilities, interfacing to phototypesetters and telecommunications would be used by the minority of companies. The assumption was based on the very recent introduction of electronic text processing in general and of the software features specifically.

Five of the respondents (62,5%) use EDP capabilities (that is sorting records and arithmetic functions) on their electronic text processing equipment. Of the five respondents in this category, four use decision processing which is the automatic execution of operators' instructions with a view to facilitating the handling of text. Records processing facilities are used by three respondents, whilst two use a forms management application. Two of the respondents (that is 25% of the sample) have acquired program languages to enable them to do their own programming. These facilities have only recently been acquired and no applications have been programmed. The program language is BASIC although one organisation can also use COBOL and SACBOL.

The ability of electronic text processing equipment to communicate with other equipment is used on a number of occasions. Two organisations use their word processing equipment as input to phototypesetting equipment. The one organisation has a proven track record for the past 3 years, whilst the other has only recently installed their telecommunications facility. It was not possible to evaluate the success of the latter. Telecommunications with other electronic text processing equipment are used by four

respondents - this is a feature of some systems and not necessarily an indication of sophistication of use. Three respondents communicate with main-frame computers. The application is mainly to receive data files for further processing, whilst only one organisation transfers text to the computer for storage. No one has yet transferred high volume printing to the computer printer or for computer output microfilm purposes.

It was formulated as a hypothesis (7.2.7) that advanced software functions are in limited use. The survey results prove the opposite situation and the hypothesis is therefore rejected. The hypothesis is only valid for one software feature, i.e. interfacing to phototypesetting equipment.

Questions 5.5 and 5.6: Suppliers surveyed

It seems a logical approach for existing computer users to survey the viability of text processing software packages for their equipment. The following suppliers were approached by organisations prior to making a final decision (results as per question 5.5):

Organisation Approached	Response	% of Users
IBM	7	87,5
ICL	3	37,5
WANG (General Business Systems)	2	25,0
SIEMENS	1	12,5
SPL	1	12,5

Only one company decided to use this means as an experiment. As reported in section 7.4.6 the experiment was not very successful and a decision on dedicated equipment is pending.

Most organisations implemented their electronic text processing systems during the latter period of this research (6-12 months). As a result of an increasing number of suppliers on the South African market they could avail themselves of a wide choice. The eight respondents surveyed the following makes of equipment:

Equipment	Response	% of Users	Equipment	Response	% of Users
IBM	8	100,0	Philips	2	25,0
Wang	7	87,5	Adler	1	12,5
Lanier	5	62,5	Olympia	1	12,5
Olivetti	5	62,5	ICL	1	12,5
Burroughs	4	50,0	Radio Shack	1	12,5
Ontel	3	37,5			

Prospective users could avail themselves of a wide choice of equipment suppliers before they made a final decision. The survey revealed that IBM, Wang, Lanier, Olivetti and Burroughs equipment were mostly surveyed before the final decision was taken. (IBM has the largest installed base of magnetic card machines which is losing ground against more sophisticated equipment. Wang dominates the shared-logic installations). The results substantiate the hypothesis (7.2.8) that prospective buyers of electronic text processing equipment are selective in their approach.

Question 5.7: Project duration

The electronic text processing project at Company A had a duration of 12-18 months to investigate the feasibility and becoming operational with the first application. Information on the project durations in other large life assurance companies would confirm whether that could be considered a norm. If Company A is isolated the project durations in the remaining six companies which implemented visual display electronic text processing equipment are:

0-6 months = 1 6-12 months = 1 12-18 months = 4

Both companies which took less than 12 to 18 months reported that their project durations had been considerably shortened as a result of user information obtained and certain calculated risks taken as a result of that. It seems that a project duration of 12 to 18 months can be accepted as a norm for investigating and implementing electronic text processing equipment effectively in the large life assurance companies, unless sources of available information can be used. The size of companies seems to have no effect on project duration. The results validate the hypothesis that investigating and implementing initial electronic text processing equipment have a long project duration.

7.4.7 Procedural aspects

Question 6

The question was subdivided into four categories and dealt with staff requirements, production and cost control, systems security and critical factors for the success of electronic text processing. Each category was subdivided into questions pertaining to the relevant topic.

Question 6.1: Selection and training

Two extreme situations may prevail in introducing electronic text processing systems in organisations for the first time. Suppliers tend to oversimplify the training aspects, whilst typists/secretaries to be trained are often doubtful whether they will be able to handle the changeover successfully. Electronic text processing will change behavioural patterns and requires revised skills. As pointed out in section 5.4.2 it will be a changeover from a general approach to specialisation. The process can be evolutionary with substantial benefits to the trainee. Company A experienced no significant problems to phase their existing typists/secretaries into electronic text processing. The survey sought information on the selection and training requirements.

The minimum job requirements for electronic text processing personnel were determined. Most organisations prefer matriculants to junior certificate (5-3), whilst with the

exception of one, they require previous work experience of one to two years (5 respondents) and three to five years (2 respondents). Language skills are considered essential and seven respondents demand bilingual skills, whilst one requires only English. All organisations require formal training in typing skills with standards ranging from 40-60 words per minute. The latter is a theoretical maximum which will seldom be reached in practice. One respondent also mentioned the additional requirement that staff had to be able to work in groups. These job requirements were standard for typists/secretaries involved in other than routine copy typing.

Only one organisation administers specialised tests to potential ETP operating staff. They administer a test for conceptual ability and a job related test.

Suppliers are, in 50% of the cases, responsible for initial training in hardware and/or software of new entrants to electronic text processing. In 25% of the cases the supervisors of electronic text processing are performing this duty, whilst the remaining 25% use both suppliers and supervisors.

Not in a single organisation are suppliers solely responsible for ongoing training of electronic text processing staff. In 62,5% of the organisations the surpervisor is responsible, whilst in the remainder both supplier and supervisor do this.

The majority of organisations (75%) compile and maintain written procedures for operating electronic text processing equipment and/or the correct use of software. Only 50% of the organisations compile and maintain written procedures for users of electronic text processing.

The design of most electronic text processing systems aims at ease of operation. The software is mostly operator-orientated to allow staff to adapt easily to the equipment. Documentation further facilitates the operation. For these reasons the requirements for electronic text processing operating staff are on par with those for traditional typists/secretaries. The hypothesis that the changeover of typists/secretaries to electronic text processing operators poses no significant problems can be accepted.

Question 6.2: Production and cost control

The impetus for the introduction of electronic text processing comes mainly from the envisaged benefits of increased production and lower unit cost of correspondence. Production control based on work measurement standards is a prerequisite for formal cost control - including cost benefit analysis of potential applications. The primary unit of production measurement for text can be documents received for processing, pages, lines, characters or keystrokes. The latter differs from characters, which refer to hard-copy output, in that all function keys depressed with no corresponding character output are added in. Unit costs based on sound formal costing structures can be determined in terms of the primary units selected. Without formal production and cost control the quantifiable impact of electronic text processing cannot be accurately determined. The position in the organisations in the sample was clarified.

Only 50% of the organisations established a work measurement standard for electronic text processing. Pages are used as the primary unit of production by three of these four. The primary unit will be reviewed by one of these respondents. One organisation selected to use keystrokes performed as the primary unit, on the grounds that this would be the only aspect that would not be affected by greater sophistication in electronic text processing.

The costing of individual tasks is done by 37,5% of the respondents (3) whilst two plan to do so in the foreseeable future. If Company A, which developed and implemented a costing system based on formal cost accounting principles, is isolated from the results it means that only 25% of the sample practises cost control. The two organisations indicated that they used remuneration and equipment costs as the basis for costing. As pointed out in section 6.8.1 (Table 28) other factors also apply and wrong conclusions may be drawn if these are not taken into account. Only one company is charging out costs to users, whilst another plan to implement this.

It is the practice in the majority of organisations (62,5%) to carry out a cost benefit analysis of potential electronic text processing applications before implementation. Most of these analyses are based on a comparison of the proposed with the existing method. Indirect benefits, although not quantifiable, are also taken into account.

These results verify the hypothesis (7.2.11) that there is a lack of formal production and cost control systems for electronic text processing.

Question 6.3: Systems security

Security measures for electronic text processing are back-up magnetic storage, restricted entry to the physical environment and means of maintaining confidentiality. The following security measures for electronic text processing apply in the various organisations:

Security Measures	Response	% of Users
Back-up magnetic media	6	75,0
Restricted entry to physical environment of electronic text processing equipment	3	37,5
Use of passwords to limit access to text files	3	37,5
Special operators for confidential work	3	37,5

Of the six respondents using back-up magnetic storage two protect this in a fire-proof cabinet/room, one in a separate store and one off-site. This means that two organisations have no security in respect of back-up magnetic media - the most critical security aspect. The findings support the hypothesis (7.2.12) that security measures for electronic text processing are inadequate. Section 8.2.5(g) will enlarge on this critical aspect.

Question 6.4: Critical factors for success

The main emphasis in the surveying and implementation of electronic text processing tend to be on equipment and aspects affecting it. Section 5.4, however, emphasises the importance of the behavioural aspects of management and workers in introducing electronic text processing.

Eighteen factors were listed and respondents asked to indicate the degree of importance of these factors as decisive for the success of electronic text processing in their respective organisations. They were required to indicate the level of importance on a five point scale (0-4). A maximum score of 32 for any one item was possible. The following responses were obtained:

Rating	Critical Factors for Success	Score	As % of Max. Score
1.	Reliable equipment (Minimum down-time)	31	96,9
2.	Management commitment	29	90,6
3.	User acceptance	27	84,4
4.	Proposer supervision/management	26	81,3
5.	Thorough feasibility study	25	78,1
	Operator acceptance	25	78,1
6.	Support from suppliers (hardware and software)	24	75,0
7.	Operator oriented software	23	71,9
8.	Recognition of electronic text processing as an important function by management	20	62,5
9.	Procedural training for operational staff and users	19	59,4
10.	User orientation programs	18	56,3
	Support by a management services function	18	56,3
11.	Increased job satisfaction	17	53,1
12.	Operator orientation programs	14	43,8
13.	Low staff turnover	13	40,6
	Expanded career opportunities	13	40,6
	A production control system	13	40,6
14.	A costing system	10	31,3

Respondents were asked to specify factors not listed which they considered as decisive for the success of electronic text processing. Three factors were listed - one by one respondent and two by another:

- Telecommunications with the main-frame computer.
- Co-operation between users.
- User understanding and knowledge of system and its capabilities.

Scrutiny of the completed questionnaires of these two companies shows that one was unsuccessful in interfacing the electronic text processing system with the main-frame computer. The other reported a negative attitude from the users.

Respondents were also requested to indicate any significant problems regarding any of the critical factors encountered in the implementation or operational phases of electronic text processing. Of the sample four organisations (50%) encountered problems with at least one of the critical factors listed. The problems experienced were:

Significant Problems Encountered	Response	% of Users
Supplier support	2	25,0
Operator acceptance	2	25,0
User acceptance	2	25,0
Selection and training	1	12,5
Management commitment	1	12,5
Production control	1	12,5
Management Services Support	1	12,5

Problems with supplier support were mainly experienced in the implementation phase. The situation points to a lack of technical knowledge about systems and the software supporting them on the supplier side. Both respondents who reported problems with operator and user acceptance pointed out that the impact of the systems over a short period of time changed the

attitudes. The first candidate selected by one organisation to be trained in the new system was not successful. Later choices performed well. One respondent reported a lack of management commitment until the success of a trial electronic text processing system changed the attitude. The problem experienced by one organisation in implementing production control for electronic text processing should be gauged against the background that they did not have such a system for traditional text processing and could initially not rely on other life assurance companies for information. The problem experienced with management services support was:

> "Unwillingness of EDP department to assist in the development of applications involving telecommunications to the main-frame computer."

It can be concluded that few significant problems were experienced and those present could be related to the relative newness of the discipline.

Reliable equipment was rated the most critical factor for the success of electronic text processing. Only one respondent did not allocate the maximum score to that item. Electronic text processing equipment purchased is required to perform according to specifications and continue to do so over a period of time (depreciation period) at an acceptable level in terms of results and up-time. Apart from two organisations which reported problems with supplier support no significant equipment problems were indicated. From a management point of view equipment reliability is an uncontrollable factor apart from strict adherence to prescribed handling procedures. All other critical factors are controllable. For this reason it can be reasoned that reliable equipment is the starting point, whilst other factors contribute to the successful utilisation of the equipment. Hardware and software support from suppliers was rated sixth (75% response) - an essential factor for supplying and getting equipment operational.

An arbitrary division of the critical factors may be ratings 1 to 7 as of primary importance and ratings 7 to 14 as of secondary importance. If equipment factors are isolated from

the primary factors, the remaining ones point to conditions favourable for the introduction of electronic text processing. The secondary factors all relate to the continued operation of electronic text processing systems. From the results the following can be concluded:

- They validate the hypothesis (7.2.13) that factors affecting the introduction of electronic text processing are considered more critical than those applicable to the continued operation.

- Factors creating a motivational climate for good operator performance are considered of less importance contrary to conclusions arrived at in this research (see section 5.4).

- Production and cost control systems in this research considered to be essential for measuring the success of electronic text processing were rated lowest.

7.4.8 Impact

Question 7

The question was subdivided into three categories to gauge the organisational, financial and administrative impact of electronic text processing.

Question 7.1: Organisational impact

The sub-questions aimed at positive or negative responses to a number of organisational aspects without requiring respondents to elaborate on any choice, with the exception of staff reduction/turnover where they were asked to indicate the effect. The results obtained from the eight organisations were:

	Organisational Impact	Positive	Negative		Organisational Impact	Positive	Negative
Structural	Increased centralisation of typing activities	5	3	Managerial	The acceptance of ETP as an important aid in improved decision-making and communication.	4	4
	Decentralisation of typing activities into small work groups	2	6				
Behavioural	Greater job satisfaction than with traditional text processing	7	1	Operational	Reduction in number of typists/operators:		
	Increased job content and responsibility of operators	6	2		• Immediately following implementation	3	5
	Improved organisational impact of ETP	6	2		• Within one year of becoming operational	5	3
	New career opportunities with higher hierarchical levels	3	5				

It was found in Company A that centralisation of typing activities was the most advantageous for electronic text processing. Electronic text processing increased the centralisation of typing activities in 62,5% of the user organisations, whilst only two respondents reported decentralisation into small work groups - centralisation according to functional activities.

Substantiating evidence for increased job content and responsibility of electronic text processing operating staff was found in 75% of the organisations surveyed. The survey, however, revealed that in the majority of organisations (62,5%) new career opportunities with higher hierarchical levels had not been created. Two reasons may be that some organisations only recently introduced text processing equipment whilst others operate less sophisticated equipment. Two respondents remarked that they could not as yet determine the responsibility levels, but expected it to be higher than at present.

It is reassuring to note that only one respondent does not report greater job satisfaction for operating personnel with ETP than with traditional text processing. This organisation operates with first generation word processing equipment where no marked change can be expected. A 75% positive response that the organisational image of electronic text processing had improved, was obtained, which points to a climate motivational for worker performance.

Four respondents (50%) reported improved decision-making and communication as a result of electronic text processing. Three other expected this to happen, but could not substantiate it.

Electronic text processing is often viewed as a threat to job security. Reduction in staff was reported in the majority of cases only after one year of becoming operational, whilst some organisations had experienced no reduction in staff because of the very recent introduction of the discipline. Three organisations had a reduction in the number of typists/operators immediately following implementation of electronic text processing, whilst five organisations had a reduction within one year of becoming operational. No proof of redundancy could be

found. The effect of electronic text processing over periods of time ranging from 3 years to only a few months was a reduction of eighteen typists/secretaries in total. In section 7.4.2 the total number of typists/secretaries employed is given as 615. The effect of electronic text processing on staff reduction to date can therefore be gauged at approximately 3%. Most organisations reported that no change in turnover of staff had been experienced, whilst two had experienced a decrease.

A follow-up on the answers given indicate that electronic text processing rather absorbs greater work-loads with the result that it is not necessary to increase staff or to fill vacancies. Provisional cost/benefit analysis during feasibility studies pointed to an overall saving of 20% in text processing staff over a period of three years. In Company A staff numbers were contained at the 1977 level, in spite of a considerable growth in work quantities. The actual figures are considerably higher than the 20% projected by the user organisations in general. One respondent reported:

> "Electronic text processing is our way of providing a cost-effective support service acknowledged by users by means of a smaller manageable work group who experience a high degree of job satisfaction."

These findings validate the hypothesis (7.2.14) that the organisational impact of electronic text processing will be:

- Greater centralisation of text processing activities.
- Increased job content and job satisfaction for text processing staff.
- The facilitating of decision-making and communication.
- A decrease in the growth rate of text processing staff.

Question 7.2: Financial impact

Four respondents (50%) indicated that electronic text processing had succeeded in decreasing the cost of correspondence in their

organisations. A decrease in cost of 25-50% had been experienced. One respondent found no decrease in cost, whilst the remainder indicated that it was too soon after implementation for them to determine the effect. These findings support the hypothesis (7.2.15) that electronic text processing will reduce the unit cost of written correspondence.

Question 7.3: Administrative impact

The respondents were unanimous in reporting that electronic text processing had increased typing output in comparison with traditional methods. The estimated or known effect is 50-400%. The following indirect benefits were also reported:

Rating	Indirect Benefits	Positive	Negative
1	Improved quality of final typed products	8	0
2	Improved turnaround time of work	7	1
	Reduced proof-reading for authors	7	1
3	Improved accuracy level of internal documentation and external correspondence	6	2
4	Reduced paper volumes as a result of magnetic storage media	4	4

The results substantiate the hypothesis (7.2.16) that electronic text processing will increase labour productivity and benefit organisations indirectly through improved text handling.

7.4.9 The scope of electronic text processing

Question 8

Technological achievements in electronics are facilitating electronic text processing, leading to an increase in the sophistication of applications that can be handled. It is often difficult for users to determine the scope of electronic text processing in their organisations. The responses at best reflect viewpoints which may change.

Scope of Electronic Text Processing	Positive	Negative
The scope of administrative office management will change dramatically	8	0
Expansion of equipment and/or software is envisaged	7	1
The use of other peripherals is foreseen	7	1
A strategy for ETP has been drawn up	6	2

The respondents were unanimous in their viewpoint that the scope of administrative office management will change dramatically in the next decade as a result of electronic text processing in their organisations in particular. One respondent was of the opinion that the word dramatically might be too strong, but did not deny that the effect would be substantial. Some of the comments received were:

> "We are a paper-intensive industry at present. Our commitment to ETP will speed up and simplify the generation, revision and distribution of business documents, etc."
>
> "ETP will result in our administrative office management becoming more scientific and cost-conscious with the emphasis on productivity, performance standards and clerical work measurement - but ETP will involve development work, systems organisation and control on an ongoing basis so that both the nature and scope of management will change considerably."
>
> "We shall be able to handle the ever-increasing quantities of information necessary for an organisation to keep abreast of developments and to make business decisions. Productivity will increase. Greatly reduced paper handling."
>
> "We anticipate ETP facilities distributed by terminals to virtually all workstations."
>
> "Always subject to capital cost of equipment, it is clear that the administrative part of the organisation will ultimately hold the vast majority of its written communications on word processing equipment, all of it in communication with one another and with the main-frame. This will have massive though as yet unpredictable influences on the nature of the work done by and the skills required from administrative staff."
>
> "The movement, sorting and filing of paper will be drastically reduced, changing the office environment. Production statistics will enable closer control. The office management role will begin to resemble that of the factory production manager and will be more concerned with quality and output."

Expansion and upgrading of electronic text processing equipment were foreseen by most respondents in line with the organisational, financial and administrative advantages reported in paragraph 7.4.8. Conversion of memory typewriters with magnetic media to visual display electronic text processing

systems is reported as a first, but evolutionary step. The changeover will take place sooner in those companies who operate the memory typewriters on a rental basis. Existing users of shared-logic systems foresee a rapid expansion in the number of peripherals. The three organisations which implemented their systems just prior to the field study were cautious but optimistic that a rapid expansion would take place. Display stand-alone systems may be implemented in selected areas, but respondents favoured an approach to rather decentralise peripherals for the shared-logic systems and to maintain centralised control over magnetic media and systems maintenance. The two largest companies in the sample foresee the duplication of their existing systems in one year to allow for the increased need of peripherals. The results show that electronic text processing will be a major growth area and it can be predicted that the largest volumes of written communications will be dealt with in this way within the next three years.

It is interesting to note the associated office areas that are already incorporated or are planned to be incorporated in electronic text processing:

Peripherals	Response Company A Included	Response Company A Excluded
Phototypesetting	5	4
Computer output microfilm	4	4
Telex	3	3
Image printing	3	3
Plastic card embossing	1	0

One respondent interfaced phototypesetting successfully with a shared-logic text processing system in 1977 and reported major benefits (see section 6.10.8), whilst another is in the process of implementing such a system.

Direct interfacing of computer output microfilm units with electronic text processing systems is currently restricted to phototypesetters. This means is used in the newspaper and

publishing industries where exact copies of publications are stored on film. The availability of direct interfaces of "word processors" with COM-units could not be determined. Respondents may use telecommunictions to transfer text for filming to main-frame computers with on- or off-line COM-units. Alternatively magnetic tape units may be linked to word processors to prepare the input for COM.

Telex, image printing and plastic card embossing have been dealt with in section 6.10.7. The equipment to affect the interfaces is available locally.

The results revealed that electronic text processing, like EDP, is considered of sufficient importance to draw up strategies for development. Six of the eight companies (75%) responded positively. The high response is surprising. It was pointed out in section 7.3 that the questionnaire used in the field study acted as the basis for evaluating electronic text processing and for drawing up strategies for development in a number of organisations.

It became clear from the results that organisations aim to use electronic text processing and peripheral equipment on an increasing scale in providing administrative support services. The hypothesis (7.2.17) that electronic text processing offers the scope to provide a basis for interactive support is valid.

7.5 OVERALL SUMMARY AND CONCLUSIONS

The objective of the field study was to obtain information on the current status and impact of electronic text processing in a selected sample of life assurance companies to be able to evaluate formulated hypotheses.

The 100% response to the questionnaire and the completeness of the answers allowed valid inferences to be drawn. The structuring of the questionnaire into two parts, each with logical sections and subsections, relating to the hypotheses set, greatly facilitated analysis. Detailed findings already covered will not be revised.

7.5.1 Part I : Feasibility for ETP (All companies)

All respondents had to complete this part of the questionnaire. The aim of this part of the survey was to determine whether the structures for text processing, problem areas experienced and typing applications were favourable for the introduction of electronic text processing in companies with no such systems installed or for its expansion. The information required on the feasibility of electronic text processing in the large South African life assurance companies in general could be obtained and analysed. Sections 7.4.2 - 7.4.4 detailed the findings. With the exception of one company all have implemented automated text processing equipment. Most have implemented visual display text processing equipment - some just prior to the survey.

Information on organisational and procedural aspects was required as well as an indication of the incidence of certain applications. An analysis of the information submitted by the company without text processing installations indicates circumstances which are favourable for the implementation of it. Since existing users have mostly implemented their systems recently and project considerable growth it will be sensible rather to determine whether the circumstances are favourable for the expansion of electronic text processing.

(a) Structural

An analysis of the breakdown per system of all electronic text processing equipment installed in the various organisations surveyed, indicates that 118 of the total number of typists/secretaries (615) operate word processing keyboards. This means that at present only 19,2% of this group is supported by electronic text processing equipment. As pointed out in section 7.4.2 traditional organisational structures (private secretaries or secretarial support for a number of managers) make up 34,6% of the staff for whom electronic text processing is considered not to be cost-justified unless structural or technological changes take place. The circumstances are therefore favourable for expanding electronic text processing to the remaining areas (46.2%).

(b) Text processing problems

The areas rated as most problematic were repetitive typing, increasing volumes, fluctuating work loads, increasing unit costs and uneven work distribution. These problem areas are universally accepted as most problematic for administrative offices in general (see section 2.6). Contradictory to the general acceptance of the "people factors" as primary problem areas in text processing one third or less of the large South African life assurance companies rated these factors as problematical. Respondents may have placed more emphasis on the procedural aspects or there may actually be few problems with text processing staff.

(c) Text processing applications

A classification into five major categories of documents most suitable for electronic text processing was offered in section 4.6. The ratings of the incidence of typing applications correllate highly with the classification. The feasibility for electronic text processing was proved.

Less than 20% of transcription takes place from machine dictation. This cost-effective means of origination can facilitate electronic text processing.

7.5.2 Part II: Current status and impact of electronic text processing in user organisations

(a) Structural relationships

Organisations and Methods functions and specialist ETP personnel are the driving forces for investigating and implementing electronic text processing, whilst EDP, suppliers and service bureaux are not active at all. This points to a formal and planned basis for the introduction of electronic text processing.

Only two organisations (both large-scale users of computers) have steering committees for electronic text processing. The discipline is mostly co-ordinated at top management level by the same individual responsible for EDP. It is, however, not managed by the EDP function, but either by management services (such as O & M and office administration or as a separate department). The responsibility for electronic text processing is not yet clearly defined and respondents prefer to await final decisions pending developments in the future.

(b) Equipment/Software

Computer-assisted text processing was rejected by most companies after the feasibility had been studied. High running costs and operational considerations led all users except one to decide on dedicated electronic text processing equipment. No organisation uses a software bureau and their software packages for electronic text processing.

Memory typewriters with magnetic media were the forerunners of sophisticated ETP equipment and many systems are still in use. These are being phased out on an evolutionary basis. Most visual display electronic text processing systems have been installed recently and are of the shared-logic type. Two organisations reported three years' experience whilst the others ranged from 6-24 months.

Against the expectations, advanced software functions allowing EDP capabilities are used by the majority of companies. Interfacing to computers and peripheral equipment such as phototypesetters has, however, only been successfully implemented by the minority of users.

Prospective buyers are selective in their approach and consult with most major suppliers of electronic text processing equipment before making a final decision. Project duration on average is 12-18 months and points at thorough feasibility studies.

(c) Procedural aspects

Users found few difficulties in staffing ETP equipment. Existing typists/secretaries, mostly bilingual matriculants with some years of typing experience, were trained with success and training standards maintained. The changeover from traditional to electronic text processing posed no major problems.

The industry is in need of a universal formal basis for production control, cost benefit analysis and costing. Surprisingly these factors were rated as the least important for the success of electronic text processing.

Systems security measures are inadequate. Text stored on magnetic media is often not properly safeguarded.

Users report few significant problems with the introduction and operation of ETP equipment - those experienced mainly related to poor supplier support, operator and user acceptance.

Critical factors for the success of electronic text processing have been established. Reliable equipment is rated as the most critical factor. The important role of management is emphasised. Both management commitment and proper supervision/management are rated among the five most important aspects (rated 2nd and 4th respectively). User and operator acceptance of the discipline also rated highly. A thorough feasibility study is also rated as of particular importance. The latter emphasises the importance of a planned approach to electronic text processing. In section 2.4 the scope of administrative office management was outlined and one user's approach to the integrated electronic office offered. The functional areas of management, people, processing, communication and environment were analysed (subsections 2.4.1 - 2.4.5). These factors are important in any feasibility study and have a bearing on most of the factors rated as critical for the success of electronic text processing.

The results point at a situation where respondents consider factors affecting the introduction of electronic text processing more important than those applicable to the continued operation. The latter includes factors essential for creating a motivational climate for good operator performance.

(d) Impact

Organisationally electronic text processing furthered centralisation of typing activities. Jobs became more meaningful as a result of increased job content and responsibility. High levels of job satisfaction were reported. Respondents pointed out that electronic text processing improved decision-making and communication. A decrease in the growth rate of text processing staff was experienced with emphasis on greater specialisation.

The unit cost of written communications was reduced considerably (25 to 50%), whilst productivity increased by 50 to 400%. Various indirect benefits facilitating text handling were experienced, resulting in more accurate information in less time and a higher quality standard.

(e) The scope of electronic text processing

Respondents were unanimous that paper handling would be dramatically facilitated by means of electronic text processing at higher productivity levels and with lower cost implications. Considerable expansion of visual display electronic text processing equipment is expected as well as interfacing to a variety of peripheral equipment. Strategies for electronic text processing have been drawn up and the discipline will be managed on a thoroughly planned basis.

CHAPTER VII : FOOTNOTES

(1) FINANCIAL MAIL : Top companies supplement : 20 April 1979 : p.156.

(2) LOMA : "Word processing in life assurance companies" : Operations and Systems Report No. 52 : August 1979 : pp.1-5.

(3) VAN WYK, W. & MARAIS, S.J. : "The automated office - where DP and WP work together" : Systems : November 1980 : p.26.

ANNEXURE 7.1

RESEARCH QUESTIONNAIRE

ELECTRONIC TEXT PROCESSING IN THE LARGE DOMESTIC SOUTH AFRICAN LIFE ASSURANCE COMPANIES

OBJECTIVES

1. *To determine if the circumstances are favourable for the introduction of electronic text processing in large domestic S.A. life assurance companies with no such facilities installed.*

   Information is required on:

   1.1 The structure and size of organisational units for text processing;

   1.2 Problems peculiar to text processing; and

   1.3 Applications and the incidence thereof.

2. *To determine the experience with and current status of electronic text processing in the large domestic S.A. life assurance companies which installed equipment and/or acquired special software.*

   Information is required on:

   2.1 Structural relationships

   2.2 Equipment and/or software

   2.3 Procedural aspects

      2.3.1 Selection and training

      2.3.2 Production and cost control

      2.3.3 Systems security

      2.3.4 Factors determining success

      2.3.5 Problems experienced

   2.4 Impact: organisationally, financially and administratively.

   2.5 Scope of ETP.

RESEARCH QUESTIONNAIRE

ELECTRONIC TEXT PROCESSING IN THE LARGE DOMESTIC SOUTH AFRICAN LIFE ASSURANCE COMPANIES

All information supplied will be treated as confidential. The anonymity of all participating organisations is ensured. A summary of the overall results of the survey will be sent to your organisation as soon as the facts are collated.

In this questionnaire "electronic text processing" (ETP) is considered to be:

> *"The conversion of word content into a readable form of communication with improved accuracy at increased speed and less cost through the combined use of proper procedures, automated business equipment and trained personnel."*

Electronic text processing equipment includes memory typewriters (with or without magnetic card storage) and word processors (stand-alone and shared-logic types). It also includes special software for use in association with electronic data processing equipment.

This survey focuses on head-office operations only.

ooOoo

Please supply the following general information and then complete either Part 1 or Part 11 or both.

Organisation Surveyed
.....

What is the current status of electronic text processing (ETP) in your organisation?

☐ We installed ETP equipment and/or software.

☐ We plan to install ETP equipment and/or software.

☐ We have not investigated ETP.

☐ We have investigated ETP but rejected it. Please give reasons:

.....

.....

.....

.....

.....

PART 1 (pp. 2 – 3) : To be completed by all participants

PART 11 (p.p. 4 – 14) : To be completed by current users of ETP equipment and/or software only.

PART 1

TO BE COMPLETED BY ALL PARTICIPANTS

Please indicate your choice by an X in the appropriate squares.

1. ORGANISATION (STRUCTURE & SIZE)

Which of the following structures for typing exist in your organisation? Please indicate the size of each applicable structure by inserting the number of typists/secretaries involved in the appropriate space. More than one category may be indicated.

Indicate choice (X)	STRUCTURE OF TYPING	NUMBER OF FACILITIES	NUMBER OF TYPISTS/SECRETARIES
	Central Typing Service		
	Decentralised Typing Service Pools		
	Typists in Line Departments (e.g. Marketing, Actuarial, Policy Services)		
	Secretarial Support : One Secretary to a number of officials		
	Secretarial Support : One-for-one-relationships to officials		

2. PROBLEM AREAS

Please indicate (X) how problematic the following aspects peculiar to text processing are/were in your organisation.

PROBLEM AREAS	Less Problematic		Problematic	Very Problematic	
	0	1	2	3	4
Static productivity					
Increasing unit costs					
Repetitive typing					
Fluctuating work loads					
Uneven work distribution					
Increasing volumes					
Poor quality of final documents					
Lack of productivity measurement					
Lack of job standards					
Away from the desk situations					
Low job satisfaction					
Lack of career opportunities					

3. APPLICATIONS

Please indicate the incidence of the following typing applications in your organisation:

TYPING APPLICATIONS	INCIDENCE				
	0 Very Low	1 Low	2 Fair	3 High	4 Very High
Lengthy documents (e.g. reports requiring extensive retyping when changes are made)					
Repetitive typing (letters with standard wording)					
Form letters with variable text					
Manuals (e.g. training and procedural)					
Statistical typing (only certain figures change periodically)					
Legal documents (No alterations allowed)					
Transcription from machine dictation					
Normal typing (original documents)					
Retyping from computer print-outs (e.g. address records and rate book information)					
Draft copy for revision					

THIS IS THE END OF PART 1. IF YOUR ORGANISATION IS NOT CURRENTLY USING ETP EQUIPMENT AND/OR SOFTWARE PLEASE STOP HERE AND RETURN THE COMPLETED QUESTIONNAIRE IN THE ENVELOPE PROVIDED. THANK YOU FOR YOUR CO-OPERATION.

PART 11

TO BE COMPLETED BY CURRENT USERS OF ETP EQUIPMENT AND/OR SOFTWARE ONLY.

Please indicate your choice by an X in the appropriate squares.

4. STRUCTURAL RELATIONSHIPS

4.1 Who is responsible for investigating and implementing electronic text processing in your organisation? More than one may be indicated.

- ☐ Specialist ETP personnel
- ☐ Equipment suppliers
- ☐ Organisation and Methods
- ☐ Electronic Data Processing
- ☐ Office Administration
- ☐ A Service bureau
- ☐ Other: Please specify: .....

.....

.....

4.2 Is there a Steering Committee for electronic text processing in your organisation?

Yes	*No*

4.3 Is ETP co-ordinated at the same top management level as electronic data processing (EDP) in your organisation?

Yes	*No*

4.4 Which of the following best describe the structural relationship of ETP in your organisation? More than one may be indicated.

- ☐ ETP is a separate department
- ☐ ETP is managed by the EDP function
- ☐ ETP reports to a line department
- ☐ ETP is part of Management Services
- ☐ Other: Please specify: .....

.....

.....

5. EQUIPMENT AND/OR SOFTWARE

5.1 Does your organisation use special text processing software on in-house computer equipment (e.g. ATMS from IBM)?

Yes	*No*

If "yes", please specify: .....

.....

.....

5.2 Does your organisation use a service bureau and software packages for text processing?

Yes	*No*

If "yes", please specify: .....

.....

.....

5.3 Please give a breakdown per system of all ETP equipment installed in your organisation.

	Make of equip-ment	Type	Number of VDU's	Number of printers	Disk storage	Telecommu-nications		Location/ Function	Date opera-tional
Example	WANG	SHARED-LOGIC	4	2	10 meg.	~~Yes~~	No	CENTRAL	JUNE 1977
1						Yes	No		
2						Yes	No		
3						Yes	No		
4						Yes	No		
5						Yes	No		
6						Yes	No		
7						Yes	No		
8						Yes	No		

Please use reverse side of this page if more space is required.

5.4 Apart from basic text processing software, which of the following software features are used by your organisation?

More than one may be indicated.

☐ Simultaneous print-out (The ability to enter text on a VDU while previously entered text is printed out.)

☐ Global search and replace. (Searching for and replacing text in an entire document).

☐ Proportional spacing.

☐ Justification.

☐ Glossary functions (call up of prerecorded text).

☐ EDP capabilities (e.g. sorting records and arithmetic functions).
If "yes", which of the following:

- ☐ Records processing
- ☐ Forms management.
- ☐ Electronic diary (calender management).
- ☐ Decision processing (automatic execution of operators' instructions.)
- ☐ User programmable. If "yes", give program language .....
  .....

☐ Input to photocomposing equipment.

☐ Telecommunications capability with other ETP equipment in the same location.

☐ Telecommunications capability with companies' in-house computer or with service bureau.
If "yes", please indicate purpose.

- ☐ To access files for name/address information, revised premium rates, etc.
- ☐ To transfer text from an ETP system to the computer for storage and subsequent retrieval.
- ☐ To transfer high volume printing to the computer printer.
- ☐ To transfer text to the computer for COM purposes.

☐ Other: Please Specify: .....
.....
.....

5.5 Please indicate the suppliers of software packages surveyed before a final decision was reached.

☐ IBM ☐ ICL ☐ Siemens ☐ Other: Please specify:

.....

.....

.....

5.6 Please indicate the different makes of equipment surveyed before a final decision was reached.

☐ IBM ☐ Wang ☐ Lanier ☐ Philips ☐ Olivetti

☐ Adler ☐ Olympia ☐ Redactron ☐ Other: Please specify:

.....

.....

.....

5.7 Approximately how much time elapsed between investigating the feasibility of ETP for your organisation and becoming operational with the first application?

☐ 0 – 6 months ☐ 6 – 12 months ☐ 12 – 18 months ☐ Other: Please specify:

.....

6. PROCEDURAL

6.1 Selection and training

6.1.1 The minimum job requirements for ETP operating personnel in your organisation:

(a) Educational standard: Please specify: .....

.....

.....

(b) Work experience. Please specify: .....

.....

.....

(c) Language skills. Please specify: .....

.....

.....

(d) Typing skills. Please specify: .....

.....

.....

(e) Other. Please specify: .....

.....

.....

6.1.2 Do you administer any specialised tests to potential ETP operating personnel in your organisation?

Yes	*No*

If "yes", please specify: .....

.....

.....

6.1.3 Who is responsible for initial training of new entrants to ETP in hardware and/or software use in your organisation?

Please specify: .....

.....

.....

6.1.4 Who is responsible for ongoing training of ETP operating personnel in hardware and/or software use in your organisation?

Please specify: .....

.....

.....

6.1.5 Does your organisation compile and maintain written procedures for operating ETP equipment and/or the correct use of software?

Yes	*No*

If "yes", please specify: .....

.....

.....

6.1.6 Does your organisation compile and maintain written procedures for users of ETP?

Yes	*No*

If "yes", please specify: .....

.....

.....

6.2 Production and cost control

6.2.1 Have you established a work measurement standard for ETP in your organisation?

Yes	*No*

If "yes", what is the primary unit of production on which the standard is based? :

☐ Pages

☐ Lines

☐ Characters

☐ Documents received for processing

☐ Other: Please specify: .....

.....

.....

6.2.2 Do you cost individual ETP tasks? | *Yes* | *No* |

If "yes" do you charge out costs to users?

☐ Yes

☐ No

☐ We plan to implement it

☐ Other procedures: Please specify: .....

.....

.....

6.2.3 Is it policy to carry out a cost-benefit analysis of potential ETP applications before implementation? | *Yes* | *No* |

If "yes", what criteria do you use? Please specify: .....

.....

.....

.....

.....

6.3 **Systems security**

6.3.1 Indicate the security measures for ETP in your organisation:

☐ Restricted entry to physical environment of ETP equipment.

☐ Back-up magnetic storage.

If applicable, indicate:

☐ Off-site.

☐ Fire proof cabinet/room.

☐ Other: Please specify. .....

.....

.....

☐ Use of passwords to limit access to text files.

☐ Special operators for confidential work.

☐ Other: Please specify. .....

.....

.....

6.4.2 Have you encountered any significant problems regarding any of the above factors in the implementation or operational phases of ETP?

Yes	*No*

If "yes", please write down below the corresponding numbers of the factors in 6.4.1 and specify the problems encountered with each:

6.4 Critical factors for success

6.4.1 Please indicate (one X per line) the degree of importance of the following as decisive for the success of ETP in your organisation.

		Less important		Important	Very important	
		0	1	2	3	4
1	Management commitment					
2	Thorough feasibility study					
3	Reliable equipment					
4	Operator oriented software					
5	Operator orientation programs					
6	Operator acceptance					
7	User orientation programs					
8	User acceptance					
9	Procedural training for operational staff and users					
10	Proper supervision/management					
11	Support from suppliers (hardware & software)					
12	Support by a management services function, e.g. Organisation & Methods					
13	Low staff turnover					
14	A production control system					
15	A costing system					
16	Recognition of ETP as an important function by management					
17	Expanded career opportunities for ETP personnel					
18	Increased job satisfaction for ETP personnel					
Other: Please specify:						

7. IMPACT:

7.1 Organisationally

7.1.1 Did ETP lead to, or increase, centralisation of typing activities? | *Yes* | *No*

7.1.2 Did ETP lead to decentralisation of typing activities to small work groups? | *Yes* | *No*

7.1.3 Has ETP increased job content and responsibility of ETP operating personnel? | *Yes* | *No*

7.1.4 Were new career opportunities with higher hierarchical levels created? | *Yes* | *No*

7.1.5 Do your operating personnel experience greater job satisfaction than with traditional text processing? | *Yes* | *No*

7.1.6 Did ETP lead to a reduction in the number of typists?

(a) Immediately following implementation | *Yes* | *No*

(b) Within one year of becoming operational | *Yes* | *No*

If "yes", indicate number [ ] and percentage [ ] of typists and time frame applicable [months]

7.1.7 What was the effect of ETP on turnover of typists/secretaries?

(a) Immediately following implementation:

[ ] Decreased [ ] Increased [ ] No change

(b) One year after implementation:

[ ] Decreased [ ] Increased [ ] No change [ ] Not applicable

7.1.8 Do you consider the organisational image of ETP to be better than that of the traditional secretarial environment? | *Yes* | *No*

7.1.9 Is ETP accepted as an important aid to improved decision-making and communication? | *Yes* | *No*

7.2 **Financially**

7.2.1 Did ETP succeed in decreasing the cost of correspondence in your organisation? | *Yes* | *No* |

Please give an indication of the effect.

.....

7.3 **Administratively**

7.3.1 Did ETP increase typing output compared to traditional methods? | *Yes* | *No* |

Please give an indication of the effect.

.....

7.3.2 Did ETP contribute to a reduction in paper volumes as a result of records being stored on magnetic media? | *Yes* | *No* |

7.3.3 Is improved turnaround time of work experienced? | *Yes* | *No* |

7.3.4 Do your authors using ETP benefit substantially from the reduction in proof-reading time required with document revisions? | *Yes* | *No* |

7.3.5 Has the quality of typed final products improved? | *Yes* | *No* |

7.3.6 Has the accuracy level of internal documentation and external correspondence improved? | *Yes* | *No* |

8. SCOPE OF ETP

8.1 Has your organisation drawn up a strategy for ETP? | *Yes* | *No* |

8.2 Do you envisage expanding the equipment and/or software considerably? | *Yes* | *No* |

If "yes", please comment: .....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

8.3 Do you foresee the use of other peripherals?

Yes	*No*

If "yes", indicate which:

☐ Telex.

☐ COM.

☐ Image printing.

☐ Plastic card embossing.

☐ Photocomposing.

☐ Other: Please specify. .....

.....

.....

.....

8.4 It is predicted that the scope of administrative office management will change dramatically in the next decade as a result of electronic text processing. Do you consider this view applicable to your organisation in particular?

Yes	*No*

Please qualify: .....

.....

.....

.....

.....

.....

.....

THIS IS THE END OF THE QUESTIONNAIRE. PLEASE RETURN THE COMPLETED QUESTIONNAIRE IN THE ENVELOPE PROVIDED. THANK YOU FOR PARTICIPATING IN THIS SURVEY.

ooOoo

ANNEXURE 7.2

P.O. Box 34
SANLAMHOF
7532

10 July 1980

Dear Mr

PhD RESEARCH

I am undertaking a survey among the large domestic South African life assurance companies in order to determine:

(a) If the circumstances are favourable for the introduction of electronic text processing in companies with no such facilities installed.

(b) The experience with and current status of electronic text processing in those companies which installed equipment and/or acquired special software.

The findings will be incorporated in my doctoral thesis to be submitted to the University of Cape Town later this year.

I am dependent on the co-operation of your company. Would you please assist in this survey by assigning someone suitable to complete the attached questionnaire. This should not take much time. You can accept that all information supplied will be treated as confidential and your company will remain anonymous in the reporting of the results of the thesis itself.

A summary of the overall results of the survey will be sent to your company as soon as the facts are collated. I believe this will prove valuable in evaluating electronic text processing in your organisation.

Could you please return the completed questionnaire by 1 August 1980. A self-addressed stamped envelope is enclosed for your convenience.

Thanking you in anticipation for your co-operation.

Yours faithfully

S.J. MARAIS, M.A. (SA)

CHAPTER VIII : IMPLICATIONS OF THE RESEARCH FOR THE SOUTH AFRICAN LIFE ASSURANCE INDUSTRY

CHAPTER VIII

IMPLICATIONS OF THE RESEARCH FOR THE SOUTH AFRICAN LIFE ASSURANCE INDUSTRY

8.1 INTRODUCTION

The implications of this research for the South African life assurance industry must be gauged against the objectives it aimed at (see section 1.4.1). The research revealed the changing role of administrative office management towards information processing management; the major text processing problem areas; and the role of electronic text processing in procedural, technological and behavioural terms as an important solution. The research weighed the feasibility of text processing for the large South African life assurance companies and provided the impetus for the development of a conceptual framework for interactive administrative support.

The field study as part of the research focused on the nine largest of 39 life assurance companies, accounting for 83% of the total premium income (see section 1.3). It has been pointed out in section 7.1 that the organisations of the sample all have assets in excess of R200 million. The "Financial Mail" top companies supplement of 1979[1] indicates that the next three companies have assets in excess of R100 million and the remainder on the list between approximately R70 and R32 million in assets. The rest of the companies of the South African life assurance industry at that stage had assets worth less than that. This means that life assurance activities attracting 17% of the total premium income are divided between 30 companies.

Since the division between the large and other categories was arbitrary (see section 1.3) it seems logical to gauge the feasibility of electronic text processing for the life assurance industry in general. The tenth largest life assurance company has since the completion of the field study decided on a visual display shared-logic text processing system. The current status of electronic text processing in the rest of the industry is unknown.

LOMA[2] surveyed the life assurance industry in the U.S.A. (1979) and determined that the industry was one of the leading users of word processing technology. They concluded:

> "The primary reason for such widespread use is that the insurance industry is very paper intensive - the nature of the product is such that much supporting paperwork is mandatory. A large amount of correspondence and documentation is required, not only to sell the product, but to service it after it is sold. Further, the long-term nature of the relationship between the insurance company and the policyowner, and the number of options available to the policyowner throughout the life of the contract, serve to increase the amount of paperwork required."

It was outlined in chapter VI that the most suitable electronic text processing system must satisfy organisational needs. These needs can only be determined on the grounds of a thoroughly planned feasibility study. A medium sized life assurer may not be able to cost justify electronic text processing equipment, whilst a much smaller company may be able to do so. It entirely depends on the organisational structure, management, work procedures and factors such as cost conciousness. The nature of the activities should be very similar for the industry in general and volumes may therefore be the determining factor. It is assumed that the research results are applicable to the South African life assurance companies in general when and if it can be justified. The development of text processing software for small computer systems may allow certain life assurers to avail themselves of the same facilities (on existing data processing equipment) as their large competitors.

8.2 IMPLICATIONS

8.2.1 Development of information processing management

According to Foley[3].

> "Insurance organizations must be capable of communicating accurate information on a timely basis to decision makers at all levels if they are to survive. To do this, the office environment of the future will have to accommodate dramatic improvements in the acquisition, analysis, storage, retrieval and distribution of information."

The stages of growth in the office, viz. initiation, expansion, formalisation and maturity, as outlined in section 2.3 serve as the basis for pointing out the development of a new discipline - information processing. In terms of the descriptions of these stages it can be considered that most organisations in the life assurance industry are in the initiation stage. Few companies

of the large life assurance industry have entered the expansion stage of growth aiming at reduced paper flow with electronic means. At this stage orientation for reducing office costs is towards devices. Electronic text processing is offered as the starting point for developing interactive administrative support. This requires greater cohesion of systems and a shift in orientation towards processes rather than devices (Formalisation). Cohesion would be the result of successful integration of management, people, processing, communication and environment. These functions are directed towards optimum information processing.

The rapid growth of electronic text processing as an integral part of information processing creates a new dimension for administrative office management - the transition towards an information processing manager. This is a central theme of this research. The formalisation of this knowledge is beneficial in general and for the paper-intensive life assurance industry in particular.

8.2.2 Identification of traditional text processing as an inefficient cost-intensive discipline

It has been pointed out in section 2.5 that generalisations are made about information on text processing as a problematic management area with little substantial evidence. It is generally accepted that offices are inefficient - mostly based on impressions, which may be wrong or may not identify the attributing factors. No research findings on text processing for the South African life assurance industry could be located. The results of the field study (reported in section 7.4.3) identify the problem areas for the large South African life assurance companies and it is then generalised that the situation will apply to the industry in general.

The research findings substantiate the general assumption that offices are inefficient cost-intensive entities. One of the implications of this research for the South African life assurance industry is the identification in order of priority of those areas which are most problematical. The findings on these

areas in Company A further enlarge on specific areas of inefficiency. The research findings and the results of the field study offer information to the South African life assurance industry on the problem areas associated with text processing. Prospective users can avail themselves of a reference framework for investigating and solving these problems. The effect of one solution - electronic text processing - is clearly demonstrated.

8.2.3 Electronic text processing and its application defined procedurally, technologically and behaviourally

The approach in this research to break up text processing into the phases of origination, production, reproduction, storage, retrieval and distribution and to analyse the procedural aspects of each phase can serve as an important reference framework. This approach focuses on the flow of paperwork as part of information processing. The emphasis is placed on the most efficient means of text processing. Chapter III details these aspects.

The research broadens the current perspective of electronic text processing in the South African life assurance industry from something more than just the automation of typing processes to an effective means of providing interactive administrative support. As a result of the research, the South African life assurance industry can now avail itself of a reference framework in striving towards the most cost-effective office.

This research led to the development of a text processing cycle relevant to administrative offices in general. This schematic presentation (Table 8) serves the interests of the South African life assurance industry in respect of text handling. This reference, divided into input, throughput and output phases, is valuable in understanding text processing at work in organisations, as well as all relevant aspects involved. The systematic presentation of equipment available for the most efficient execution of the various phases is a major contribution in providing a reference framework to the South African life assurance industry for selecting the most appropriate system for particular organisational needs. (Chapter IV).

The in-depth analysis of the structural and behavioural implications of electronic text processing on organisations (Chapter V) serves the interests of the South African life assurance industry. The implication of the research findings is that the South African life assurance industry can rely on a cost-effective discipline satisfying structural and behavioural needs. Electronic text processing, unlike many other office automation disciplines, offers the South African life assurance industry the opportunity to restructure offices more cost-effectively and additionally create a more meaningful working life. The implication of the research finding is that humans involved in text handling can now be humans and resources.

8.2.4 Guidelines for the investigation and successful implementation of electronic text processing

The investigation and successful implementation of electronic text processing in one large South African life assurance company (Company A) were reported in detail in Chapter VI. The step-by-step presentation of the progress made with the study, and reference to problem areas or factors of main concern, can serve as a model for other prospective users in the South African life assurance industry. These research findings offer a guideline for the formal investigation and implementation of electronic text processing in any life assurance company.

8.2.5 Derived from the results of the field study

The results of the field study were reported in section 7.4. These relate to the user base of electronic text processing systems, the structures for text processing, problem areas, applications, structural relationships, equipment and/or software, procedural aspects, impact (organisational, financial and administrative) and the scope of electronic text processing. The implications of these research findings for the life assurance industry in general are gauged:

(a) User base

Most large life assurance companies have installed electronic text processing systems and it is known that at least one organisation in the remaining group has decided to do so soon. The research results reveal that most users have installed their systems recently. It can be assumed that as knowledge and suitable applications grow, expanded use will be made of the installed systems. The more paper intensive a company becomes the greater the need for electronic text processing will be. The large users of electronic text processing systems will act as a stimuli for other members of the industry to investigate and implement electronic text processing.

(b) Organisation structure and size

The research results point to structures for text processing in the life assurance industry which are the least cost-effective. Typing on a centralised basis is done by 23,4% of the staff; 42,0% of the text processing staff are part of work-group structures (line departments) and the remainder (34,6%) support one-for-one or single-unit structures.

As pointed out in section 5.2.4 centralisation of typing production (central or decentralised work groups) is the ideal arrangement for implementing cost-effective electronic text processing systems. Depending on the size of work-group structures and the type of application, electronic text processing may facilitate this category. This may be of particular relevance to the two organisations employing 140 and 43 typists/secretaries on this basis (see 7.4.2). To implement electronic text processing successfully for the one-for-one or single-unit activities requires organisational restructuring or technological developments which will effect a drastic reduction in equipment costs.

It can be assumed that a direct relationship between the size of a life assurance company and the volume of text handling exists. Computers may be used more extensively in the larger life assurance companies for the handling of text so that the number of text processing staff may not be in relation to the size of the organisation. Scrutinisation of the research findings reveals that some of the smaller companies in the large category in fact use more text processing staff than their larger competitors. The smallest number of text processing staff used by a large life assurer is 30. It can be assumed that the category of the life assurance industry not surveyed (medium and small companies) will have fewer typists/operators involved in any combination of the structures outlined in section 7.4.2. From the research results it can also be determined that the smaller companies of the large category tend to rely more on one-for-one and single-unit structures.

The implication of the research is that an awareness has been provoked of typists/operators being used in an unproductive way. This may lead to alternative action:

- Organisation structures may change to benefit from electronic text processing. This could mean the separation of production typing and administrative support which will effect both managers and the secretaries.

- Evolutionary change-overs to more centralised systems.

(c) Problem areas

Section 8.2.2 made reference to the implications of the research in identifying traditional text processing as an inefficient, cost-intensive discipline. The field study brought clarity on those factors considered most problematic.

It appears that the areas relating to the worker are considered of secondary importance (rating 6-10). The

reasons for these viewpoints are unknown, but it seems sensible to reason that respondents were more aware of the obvious problem areas affecting productivity, service and costs than the "people" aspect. For this reason knowledge of the motivational factors for worker performance and the behavioural implications of electronic text processing as outlined in section 5.4 will be beneficial.

(d) Typing applications

The results revealed a high incidence of typing applications more suitable for electronic text processing. The implication of this finding is that South African life assurers can now consider changing over their typing applications to more cost-effective means of processing. The ratings can be used as a basis for investigating the feasibility of those applications rated highest and then to proceed on an evolutionary basis with the balance. The detail of each category given will facilitate this process.

Letters with standard wording are especially used in marketing. Policyholders may be informed about a new product, or advised about an option on their policies. They may also be informed on non-payment or irregularities in payments of premiums. Electronic text processing achieves its highest productivity with this type of application.

Correspondence on policy administration aspects can be classified in a number of categories such as renewals, values, and claims. Very similar text may be used for letters in the various categories with certain variable information e.g. figures. Certain paragraphs may need changing. The creation of standard paragraphs, from which a letter can be structured, on magnetic media to be retrieved by electronic text processing equipment facilitates the production process considerably.

The incidence of normal typing, i.e. documents produced on a typewriter and distributed without frequent revision, is high. These are better known as "one-off" documents. Electronic text processing can seldom be cost-justified for this type of application unless the work is centralised. This means that a cost-intensive process is not supported by electronic text processing. An experiment presently carried out at Company A points to a completely different situation than generally accepted for this type of application. It is assumed that there is a low incidence of retyping of this type of correspondence. Depending on author changes and typing errors it seems that even "one-off" letters are frequently retyped and may be a viable text-editing application. Increased productivity as a result of the software abilities of electronic text processing systems may result in a cost effective application.

The incidence of lengthy documents such as reports requiring extensive retyping when changes are made, was rated on a par with that of normal typing. Many examples exist in the life assurance industry. Strategic planning documents, job descriptions, tender specifications, group life policies, rules and regulations for pension funds, organisation and methods reports and distribution lists are examples. The text editing and text manipulation facilities of electronic text processing are most suitable for these applications.

Training and procedural manuals are subject to frequent revision. Field and head office staff must work with the most recent information. Any major changes to contents may result in a complete retyping of a manual, whilst text-editing will save considerable effort and time.

Statistical typing and legal documents where no alterations are allowed also show a high incidence. Examples of statistical typing are production figures, investment performance and marketing trends. Legal documents comprise contracts and endorsements to

policies. Legal documents are subject to frequent changes, whilst endorsements are mostly standard wording with some variables. Electronic text processing can handle both applications successfully.

It is possible for authors of documents to determine reasonably accurately whether the document will be revised. Considerable time and proofreading effort can be saved by utilising electronic text processing to produce draft copy. If one considers the stages of finalisation of certain lengthy documents the benefits of electronic text processing become clear. The originator may prepare a handwritten document or make use of machine dictation. The document is created on an electronic text processing system and output supplied in the form of draft copy. A sequence may then take place: The author makes changes; document is retyped; senior staff member scrutinises document and proposes changes; document is retyped; language services or the legal department may check the contents and/or stipulations and suggest changes; document is retyped. The process outlined is normal practice rather than the exception and emphasises the need for draft copy.

Computer files are important sources of information for policyholder data. If a life assurance company plans to correspond with a certain category of policyholders and typewritten correspondence is required, the required names and addresses will be extracted from the computer files and a computer printout supplied to the typing pool. The same procedure is followed for information such as premium rate changes. The final documents are then prepared on typewriters or composers. Telecommunication between computers and electronic text processing systems allows files of information to be transferred without the need to provide hard-copy. The information received by the electronic text processing system is then used to create the desired end result. No retyping takes place.

Transcription from machine dictation showed the lowest incidence. Company A experienced the same situation.

(Reported in section 6.4.1). The South African life assurance companies may benefit substantially by using this means of transcription in association with electronic text processing systems. Company A experienced a 25% reduction in production time (see annexure 6.2). As reported in sections 3.3.3 and 4.3 machine transcription is a proven cost-effective means of origination.

(e) Structural relationships

The results obtained refer to responsibilities for investigating and implementing electronic text processing, co-ordination levels and the reporting structure.

Management services took the initiative for investigating and implementing electronic text processing in the large South African life assurance companies. EDP, service bureaux and suppliers were not responsible in any of the organisations approached. Electronic text processing is or was the responsibility of a certain individual. Project duration (see section 7.4.6 - question 5.7) could be 6 to 18 months and involvement is mostly on a full-time basis. Smaller companies normally do not have the resources and management services may be performed on an ad hoc basis. The implication of this may be that South African life assurers in the category other than large will have to release a line or staff official from normal duties and assign him or her to the electronic text processing project. Alternatively suppliers, service bureaux or management consultants will have to be used.

Non-involvement of EDP and the lack of steering committees for electronic text processing point to a situation in the South African life assurance industry where electronic text processing is developing as an entity rather than an integral part of administrative support, of which EDP is an important component. The reason could be the underestimation by EDP of the importance and impact of electronic text processing in an environment where the information mix is estimated at 90% text and 10% data (see section 1.1(ii)). This research emphasises the need for

formal co-ordination of electronic text processing activities.

The research findings point to a new type of reporting structure. Non-EDP management will in future deal with aspects closely related to EDP. Electronic text processing and peripheral functions will require decisions to be made on aspects of a more technical nature than before. Administrative office management will have to equip themselves to be able to deal successfully with the responsibilities developing from electronic text processing.

(f) Equipment and/or software

The results revealed that dedicated visual-display text processing equipment (shared-logic and stand-alone types) offers the best cost advantages. This can serve as a guideline for prospective South African life assurers.

EDP capabilities are used by 62,5% of the respondents to the field study. According to Van Wyk and Marais[4]:

> "One-time small applications of particular use to management do not normally cost-justify the DP effort required. WP offers a sensible cost-effective alternative. Similarly if an initial WP project becomes too big to handle efficiently, DP will take over. WP serves as a buffer in this way."

The implications of this finding are twofold. Large South African life assurers with main-frame computers can effectively use electronic text processing in the way quoted. Smaller companies may use basic word processing software on their mini-computer systems used for data processing. With the programming abilities and the improving cost/capacity ratios of some shared-logic text processing systems it may be feasible for companies at the lower end to primarily use electronic text processing equipment with data processing software.

Of particular importance to the South African life assurance industry may be the finding that telecommunications of electronic text processing equipment with computers and peripheral equipment were successful. Interfacing has big potential for the production of premium rate books and repetitive letters. The interfacing with phototypesetters means that camera-ready copy of documents may be prepared for reproduction without re-keying text. This offers the opportunity to users without phototypesetting equipment to use a bureau service at much lower cost than if the text input had to be re-keyed.

(g) Procedural aspects

The research results and acceptance of the hypothesis that the changeover of typists/secretaries to electronic text processing operators poses no significant problems (see section 7.4.7 - question 6.1) are of major importance to the industry in general. The implication is that South African life assurers can approach the new discipline with existing resources and staff involved no longer have to fear failure.

The finding of a lack of formal production and cost control systems for electronic text processing affects the South African life assurance industry directly. Cost benefit analyses on which decisions are based must take all relevant factors into account. To minimise the risk of finding out at a later stage that initial assumptions on electronic text processing were wrong, it is essential to establish a formal production and cost control discipline for traditional typing/secretarial activities and then change that according to revised parameters for electronic text processing.

Systems security refers to those factors necessary to ensure that text stored on magnetic media is safeguarded against unauthorised handling, operator negligence and acts of God. The storage and retrieval of documents created by traditional typing were the responsibility of

the originators or support functions. The introduction of memory typewriters placed part of this responsibility on the production side. Operators had to maintain selected text on magnetic tapes or cards for subsequent retrieval. The cost per page storage on these media was high and discouraged their use as alternative for paper. This is in contrast to EDP where technological developments have led to highly cost-effective magnetic storage media. That resulted in EDP systems largely unsupported by paper records except where administrative and legal requirements determined it. The reliance on computers and magnetic media for information and the absence of paper records necessitated strict systems security measures. Electronic text processing systems use magnetic media similar to computers which offer cost effective storage as an alternative for paper. Apart from text processing software which must be stored magnetically, various types of text are stored indefinitely for revision or reference when needed. Electronic text processing replaces typing (and the typewriters) with the result that any situation resulting in the loss of magnetic media may become critical since documents may be lost completely or the means may not be there to reproduce it in typewritten form in a reasonable time frame.

The research results allow the critical factors for the success of electronic text processing to be rated in order of importance. The South African life assurance industry now has a reference framework of the critical factors for success with the introduction of electronic text processing. One further implication is the lesser importance placed on those factors creating a motivational climate for good operator performance. This is contrary to research findings universally and conclusions arrived at in this research. The South African life assurance companies should satisfy themselves that they give sufficient attention to these factors since they may counteract the initial success of electronic text processing.

(h) Impact : Organisationally, financially and administratively

The research findings have been reported in detail in section 7.4.8. It became clear that electronic text processing increases labour productivity, reduces unit cost and benefits organisations through improved text handling. The implications of these results to the South African life assurance industry could be far-reaching:

- Increased job responsibility and content for typists/secretaries leading to job satisfaction.

- Improved information processing and decision-making.

- Containing staff levels of typists/secretaries with more opportunities for the same number of people.

- Decreased unit costs of correspondence.

- Increased labour productivity.

- Improved administrative support through facilitated text handling.

The overall implication of electronic text processing for the South African life assurance industry is that it provides the opportunity for interactive administrative support necessary for a very competitive industry.

CHAPTER VIII : FOOTNOTES

(1) FINANCIAL MAIL : Top companies supplement : 20 April 1979 : p.156.

(2) LOMA : "Word processing in life assurance companies" : Operations and Systems Report No. 52 : August 1979 : p.3.

(3) FOLEY, J.F. : "Managing and controlling the electronic office" : LOMA Resource : May/June 1980 : p.19.

(4) VAN WYK, W. & MARAIS, S.J. : "Where DP and WP work together" : Systems : November 1980 : p.26.

CHAPTER IX : CONCLUSION

CHAPTER IX

CONCLUSION

9.1 OVERVIEW

Active involvement and close liaison with administrative office management in the large South African life assurance companies emphasised mutual problem areas in text processing. International research substantiated many of these as a universal phenomenon for administrative offices. These problems mostly relate to static productivity, increased cost structures and lack of job satisfaction. The favourable organisational, financial and administrative impact of a pilot installation in one large life assurance organisation pointed at considerable benefits for the industry in general. The fact that no previous comprehensive research done against a business administration background in this field in general or in the life assurance industry specifically could be located, motivated the research.

Chapter I outlines the areas leading to the research in more detail and also scrutinises the relationship between electronic text processing and information processing. Information management is viewed as a central infrastructure task and administrative information processing regarded as the interaction between EDP and ETP. The importance of the South African life assurance industry for the economy is indicated. The rationale for selecting only the large category of life assurers to be included in a field study is given. The objectives, methodology and limitations of the research are dealt with.

Chapter II accounts for the administrative office management function in the South African life assurance industry indicating the organisational concept and its changing role. The scope of administrative office management is outlined in terms of the effect on management, people, processing, communication and environment. A number of traditional office problems are dealt with with reference to international research and publications. Some solutions to these problems exist. ETP is offered as one of the viable solutions and forms the basis for Chapters III - V covering the main elements of electronic text processing, viz. procedures, equipment and people.

It was reasoned that there was a need for systematised knowledge of text

processing. In Chapter III the discipline was defined and analysed from a procedural point of view. ETP was subdivided into six phases for detail analysis. The phases of origination, production, reproduction, storage, retrieval and distribution were covered extensively. In conclusion attention was drawn to the fact that the current perspective of the discipline is too narrow and that the emphasis should be on integrated administrative support.

Chapter IV covers systems (automated equipment) used in the text processing cycle of input, throughput and output. The diagrammatic presentation of the text processing cycle proved valuable for the further analysis of each element. Electronic input, throughput and output systems were analysed and related to specific office needs. System selection guidelines were compiled and a comparison offered of the suitability of text processing systems to various applications.

Chapter V covers the structural and behavioural implications of electronic text processing. Reference is made to traditional office structures and their implications. The role of motivational factors for worker performance is outlined and an indication given on how electronic text processing complements this issue.

Chapter VI is a feasibility study on the implementation and impact of ETP in one large South African life assurance company. This pilot study initially focuses on the situation prior to ETP and the problems experienced. The logical steps of the feasibility study are outlined up to the stage of management approval. Systems design and implementation parameters are offered. The impact of ETP is gauged financially, administratively and organisationally. An indication is also given of problems experienced and the expected scope for the discipline.

Chapter VII deals with a field study of the companies in the selected sample to determine the current status and impact of electronic text processing. A questionnaire based on the hypotheses formulated was designed. This questionnaire was split up into two parts. Part 1 was used to determine the feasibility of the introduction of electronic text processing in large South African life assurance companies with no such facilities installed or expansion by existing users. Part 2 dealt with the current status and impact of ETP in the large South African life assurance companies which had installed equipment and/or acquired

special software. A 100% response allowed valid conclusions to be drawn. The detailed findings are reported, analysed and the hypotheses tested for validity. Conclusions are drawn as a prerequisite to evaluate meeting the objectives of the study.

Chapter VIII gives an account of the implications of the research on the South African life assurance industry. The objectives of the research and the results from the field study served as the basis for evaluation.

9.2 EDUCATIONAL IMPLICATIONS

Research can be directed to the educational process in general and to specialised areas:

9.2.1 There seems to be a growing interest in the research subject in general. The Faculty of Commerce of the University of Cape Town considers ETP to be an important aspect of information management. One post-graduate student successfully completed a technical report in 1978 on certain aspects of the discipline[1]. Other universities and professional institutions (such as the Computer Society of S.A.) also show an increasing interest in the subject[2]. The systematisation of knowledge and its relation to practical problems point to universal advantages for ETP. For this reason it should be seriously considered to create a specific teaching module of ETP as a subdivision of information management.

9.2.2 The results of the field study point to improved decision-making as a result of electronic text processing (see section 7.4.8). The discipline aims at improved text handling and can act as the basis from which interactive administrative support can develop. Electronic text processing is only one of the available office automation functions. Diebold[3] views office automation to 1985 as a steady extention of existing and known technologies:

> "Our basic assumption is that the purpose of automating office functions is to improve executive and managerial performance in decision-making. If employee productivity is gained in the process, particularly at the clerical and secretarial level, that is an additional benefit. However, the purpose of this exercise is to establish a situation in which managers can make significant decisions. Information

> access is critical; timeliness is vital. Reducing head count is nice when it happens, but this is not the purpose for which automation is installed".

It could be a natural extension to the research on electronic text processing to determine the parameters of success for office automation in improving executive and managerial performance in decision-making.

9.2.3 The changing role of administrative office management was outlined in section 2.3. Song[4] predicts the rise of the administrative technocrat assuming responsibility for information as a corporate resource - a manager tying together the data, word and image processing functions. This person in any organisation is seen as a well-informed generalist as well as a good people-oriented corporate administrator:

> "The Information Resource Manager (IRM) is a concept whose time has come."

Research focusing on the development of a new professional manager, the IRM, should make a marked contribution to knowledge.

9.2.4 Research directed at establishing a formal production and cost control system for electronic text processing would make a marked contribution to knowledge.

9.2.5 The changing role of typists/secretaries in industry necessitates the reassessment of the curriculum requirements for high school and college secretarial training. It will in future not be adequate to possess basic typing skills only. This could become a research project.

9.2.6 ETP offers tremendous scope for handicapped people. People who have lost the use of limbs instrumental in the writing process must at present make a great effort in typing. Sophisticated software and magnetic storage will allow these people to produce text with less effort and may create employment opportunities presently considered impractical. The challenge offered by electronics in general and ETP in particular for the creation of braille script for the blind is another area of possible research.

9.3 THE FUTURE

Electronic data processing made major contributions in selected areas of organisations, especially accounting and finance. The emphasis was on the record-keeping aspect of business. The last decade was characterised by steep rises in labour costs and a drop in the costs of electronic office equipment as a result of the advances in the semi-conductor industry. Information for decision-making became a valuable resource with the result that emphasis was placed on office automation rather than on EDP.

Diebold[5] recently surveyed office automation tools and systems. Two viewpoints expressed are of significance:

> "The past few years have seen a series of tools, each useful and even financially viable, evolve in a gradual way into systems. The uni-function machine, for example, a small office level computer, has slowly given way to a system that provides not merely data processing capabilities but, in addition, word processing and communication functions."

> "Modern office automation systems represent a convergence of three technologies: computers, communications and traditional stand-alone office machines. The essential merging force is now standard use of the same semi-conductor chips in all systems as well as the managerial recognition that there is a data-driven strength in being able to access information broadly. Once a piece of raw data is captured, it is important that it be accessible for many systems in many locations regardless of whether the function is office or computationally based."

Throughout this research electronic text processing was offered as a cost-effective management tool - not as a solution to all office problems. The interaction of ETP equipment with other office machines has been emphasised to create interactive administrative support. A conceptual model for interactive administrative office support is offered on the next page.

There is still a lack of "an office system" approach by organisations. Stand-alone equipment is often not adaptable to allow communications. This lack of an office system hampers development in organisations to avail themselves of the latest cost-effective technology available. It is predicted that only systems which fit into the model presented will be used in future. The equipment should meet with attributes of flexibility and modularity. EDP and ETP are established disciplines and communications will bring about convergence of these disciplines. It is envisaged that computer PABX systems will be instrumental in facilitating communication and convergence. Foley[6] summarised the future development:

> "It has become a question of when, not whether, insurance companies will make the transition to an electronic office environment."

9.4 MEETING OBJECTIVES

Section 1.4.1 (i - viii) outlined the objectives of this research.

9.4.1 The research aimed in the first place to provide knowledge of the administrative potential of electronic text processing today and promote a broader understanding of the role of this as an important aspect of the total information processing requirements of modern life assurance industries as a component of effective office management. Chapter II accounted for administrative office management in transition, traditional office problems and the ETP solution thereto. The formalisation of the knowledge satisfies the aim set.

9.4.2 The second objective was to outline the various procedural phases in text processing as a basis for improved understanding of work flow and its improvement. Chapter III dealt with these aspects in detail. The approach to divide text processing into logical phases of origination, production, reproduction, storage, retrieval and distribution is new and brought perspective on paper handling procedures, its shortcomings and areas for improvement. The set objective is met.

9.4.3 ETP is a relatively new development. A lack of knowledge of systems exist. The research objective was to further the understanding and to guide prospective users in the selection of the most suitable equipment for their needs. A formalised approach is followed in Chapter IV where electronic text processing systems are divided into input, throughput and output equipment and the availability in each category outlined. Selection guidelines for systems selection are offered. The results meet the objective.

9.4.4 Electronic text processing affects the organisation, management, operations and users. It was set as an objective of the research to indicate the positive and negative structural and behavioural implications of the discipline to evaluate its feasibility. Chapter V satisfies this objective.

9.4.5 The success of electronic text processing, judged by a number of hypothetical parameters, in one user organisation has been defined. The pilot study presented in Chapter VI resulted in these parameters being substantiated.

9.4.6 A field study has been undertaken to gauge the current status and impact of ETP in large South African life assurance companies. It has been determined that the circumstances are favourable for the introduction of electronic text processing in companies with no such facilities installed. Since all organisations except one have implemented systems (most of them recently) it has also been determined that the circumstances are favourable for expansion in this field. Sections 7.4.2 to 7.4.4 account for this. The current status and impact of electronic text processing in the large South African life assurance companies which have installed equipment and/or special software has been determined and reported in sections 7.4.5 - 7.4.19. Valuable information on structural relationships as well as on the impact and scope of ETP equipment/software and procedural aspects has been accumulated and analysed. The inferences being drawn from the survey results validate the hypotheses, with the exception of 7.2.7 which is partly rejected.

9.4.7 As a result of the field study focussing on the large sector of the life assurance industry it was set as an objective to determine the implications of the research on the industry in general. This objective was met through the account given in Chapter VIII.

9.4.8 Finally the research aimed to identify how the future office is likely to develop from the impetus of new technology and to present a conceptual framework for the South African life assurance industry. Section 9.3 meets this objective.

This thesis fully satisfies the objectives towards which it was directed.

CHAPTER IX : FOOTNOTES

(1) BIGGS, G.L. : Word processing : Unpublished M.B.A. technical report : Graduate School of Business, University of Cape Town : November 1978.

(2) Professor N. Duffy, associated with the Graduate School of Business of the University of South Africa, has published a number of articles on related aspects of ETP - emphasising information management and the human factor.

The Ph.D candidate on request addressed MBA-students at the University of Stellenbosch on the discipline as part of information management. He was also invited to deliver papers to professional institutions:

Business Equipment Association : October 1979 : "ETP in the life assurance industry".

Institute of information management for S.A. : March 1980 : "The role of word processing in office automation".

Computer Society of South Africa (Cape Town Chapter) : November 1980 : "A user's approach to word processing".

(3) DIEBOLD RESEARCH PROGRAM - EUROPE : Office Automation; Tools and Systems : Research Report No. 185T34 : February 1980 : p.68.

(4) SONG, N. : "Office technologies in the 80's; Changes are coming - so, be ready" : Boardroom : March 1980 : pp.8-11.

(5) DIEBOLD RESEARCH PROGRAM - EUROPE : Op. cit.

(6) FOLEY, J.F. : "Managing and controlling the electronic office" : LOMA Resource : May/June 1980 : p.19.

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APPENDIX

TERMINOLOGY DEFINED

ARCHIVE: procedure used on some word processing systems to transfer text from the on-line diskette to an off-line storage diskette.

ARCHIVE DISKETTE: storage medium used with a system to store text off-line. A diskette is divided into 77 tracks or rings, each divided into 16 sectors. Each sector can hold 256 bytes of information. A diskette can accommodate 300 000 characters.

AUXILIARY EQUIPMENT: 1. peripheral equipment. 2. off-line equipment. 3. equipment supplementing other equipment.

BIDIRECTIONAL: ability to move in two directions, usually refers to the motion of the print element on a printer.

BUFFER: storage device used to compensate for a difference in rate of flow of data or time of occurrence of events, when transmitting data from one device to another.

BYSYNCHRONOUS: capable of simultaneous functions, i.e. input and output.

CAMERA READY COPY: final copy on special paper ready to be photographed for subsequent reproduction on a printing press.

CAPTURING KEYSTROKES: process of recording text as it is typed and storing it on some medium thereby allowing extensive change to be made without retyping an entire document.

CENTRAL PROCESSING UNIT (CPU): 1. heart of the computer. It consists of circuitry to control input and output units and auxiliary attachments. In addition, it interprets and executes the computer program. The CPU contains memory devices which hold computer programs and data. 2. contains the arithmetic unit and special register groups. It does not include input-output, peripheral, or internal storage.

CENTRALIZED DICTATION SYSTEM: dictation system with all dictation wired directly into a central location or word processing center where it is recorded and transcribed. In non-centralized dictation systems, dictators use desk units that record on belts, cassettes, disks and tapes which have to be transferred from the dictator's desk to the word processing center or area.

CHARACTER: actual or coded representation of a digit, letter, or special symbol.

CHARACTER PRINTER: printer in which only a single character is composed and determined within the device prior to printing.

COM: computer output to microfilm.

COMPOSE: to set type for phototypesetting.

COMMAND: 1. a control signal. 2. instruction or the operation part of an instruction in machine language. 3. mathematical or logical operation.

COMMUNICATING TEXT EDITING TYPEWRITER: text editing typewriter which can transmit information over a special telephone hook-up to other text editing typewriters, computers, or terminals.

COMPATIBLE: refers to machines capable of accepting and processing information prepared for or by another machine without conversion or code modification.

COMPATIBILITY: ability of one brand of business machine to send or receive from another brand.

CONTINUOUS FORMS: sets of forms joined together in a series of folds to eliminate single handed insertion.

CURSOR: indicator displayed on a cathode ray tube showing where action will occur.

DAISY WHEEL: print element of a daisy wheel character printer, a flat disk with characters around the circumference, may be either 10 or 12 pitch in a variety of type styles.

DATA PROCESING: 1. removal of data from source media and handling such data to accomplish such operations as classifying, sorting, calculating, summarizing, and recording. 2. production of records and reports. 3. use of the computer for operations which include the functions of storing, retrieving, sorting, merging and calculating data, according to programmed instructions.

DICTATION EQUIPMENT: generally, any device capable of recording a document in verbal form and playing it back for transcription. May be in the form of a single desk top unit, a portable unit, or a centralized system, adjacent to a word processing center, capable of handling many recording and transcribing operations simultaneously.

DISK: magnetic storage medium about the size of a 33 1/3 RPM record, capable of storing large amounts of text, as well as system information. A disk is usually a fixed part of the word processor but in some cases may be physically removed from the system. The advantages of using a disk for word processing applications are its large storage capacity and its ability to allow the faster (random access) method of document retrieval. Also known as hard disk or disk platter.

DISKETTE: magnetic storage medium the size of a 45-RPM record. Used in word processing applications because it has an ample storage capacity and permits random access document retrieval. Primarily used for text storage but sometimes stores system information as well. Also known as a flexible or floppy disk.

DOWNTIME: period of non-productive time due to equipment failure whether mechanical, electrical or operator caused.

DRAFT: text copy in unfinished form for use in editing, revising and layout positioning.

EDITING: process of incorporating the changes made to a document by an author or editor, involving inserting, deleting, rearranging or reformatting text.

FACSIMILE: transmission and reception of a picture or copy by wire.

FEASIBILITY STUDY: in-depth analysis of all the paperwork of an organization done prior to making a decision to implement the word processing/administrative support concept. The word processing feasibility study includes an evaluation of the kinds and volume of paperwork an organization produces, how this paperwork is produced, the allocation and use of the personnel and resources devoted to paperwork production, and related administrative matters.

FORM LETTER: basic pre-recorded letter containing the same information or space for variables sent out to different companies or individuals.

HARD COPY: printed copy of machine output in readable form.

INTERFACE: shared boundary where electronic devices with different signal levels and requirements are matched to obtain operation of both devices as originally intended.

MICROGRAPHICS: art, science and technology by which information can be quickly reduced to the medium of microfilm, stored conveniently, and be easily retrieved for reference and use.

MODEM: contraction of modular-demodulator. A device which modulates and demodulates signals transmitted over communication facilities.

PHOTOCOMPOSITION: method of putting textual material into type form photographically in preparation for printing. Often called "cold type" as opposed to the older "hot lead" type.

REPETITIVE TYPING: typing that is done over and over again using the same wording or adding variables. With the new automatic text editors and computerized systems, repetitive typing can be done fast and errorless by storing the message in memory and recalling it when needed.

SHARED LOGIC: word processing system with several input and output devices linked to one host computer which controls recording of input, editing functions, and generation of output. Shared logic is the opposite of stand-alone system which accomplishes all text processing in one unit.

SOFTWARE: support system offered by vendors which may include programs, training manuals and routine assistance for hardware.

STAND-ALONE: self-contained text processing system able to accomplish all phases of text processing, including entry, recording, text editing and final playout. Stand-alone is the opposite of a shared logic system.

TELECOMMUNICATIONS: transmission and reception of text over telephone lines. The medium by which a word processor in one location can send to or receive text from a word processor or computer far away.

TIME SHARING: 1. method of operation in which a computer facility is shared by several users for different purposes at the same time. 2. capability of a computing system to accommodate more than one user during the same interval of time without apparent restriction caused by the existence of other users. In time-sharing, a given device is used in rapid succession by a number of other devices, or various units of a system are used by different users or programs. The sharing is controlled automatically and may or may not include a priority scheme. By using multi-processing, time-sharing may reduce total processing time from that required to do batch processing.

TURNAROUND TIME: time elapsed from the point when a dictator dictates a document to the point when the finished document is returned to him.

VIDEO DISPLAY TERMINAL (VDT): word processing input equipment which utilizes a screen something like a television screen. As the operator types, the words appear on the screen rather than on a sheet of paper. To make a correction the operator with the use of a cursor, locates the error, and retypes. The revision appears immediately on the screen. Because an operator van visually see the typed project, more extensive text manipulation and updatable jobs can be accomplished at a greater speed.

Source:

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