Introducing IT in the district office

Proposals arising from a study carried out in Southend Health District by Aslib Research and Consultancy in 1982

Published by the King's Fund on behalf of the NHS/DHSS Health Services Information Steering Group and the NHS Computer Policy Committee

Introducing IT in the district office is the second of a series of occasional papers produced by the NHS/DHSS Health Services Information Steering Group and published on its behalf by the King's Fund. The first title was *Converting data into information.*

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'Information, n. Knowledge communicated concerning some particular fact, subject, or event; that of which one is apprised or told; intelligence, news.'
Oxford English Dictionary

Information Technology is the use of computers, microelectronics and telecommunications to help us produce, store and send information in the form of pictures, words or numbers, more reliably, quickly and economically.
Definition from leaflet 'Information Technology in Health Care', prepared by NCC on behalf of IT82

The computer is the 'steam engine' of Information Technology. Just as the first steam engines were large expensive power units housed in a separate building and attended by the experts of the time, so were computers in the period 1950 to 1970. Since 1970 the availability of computers in micro form together with the advances in communications technology, have moved computing from the large data processing departments and made them available to everyone.
From J L Alty et al. *Information Technology and the Small Business.* London, 1982

Preface

Making decisions about the level of new technology to be introduced at any particular time is difficult enough even in the smallest organisations. The investment required can be substantial; patterns of work are dramatically changed; and, inevitably, staff are affected. In large organisations these issues become extremely complex and it is therefore essential that the introduction of new technology should be carefully planned.

Large volumes of information flow between the DHSS and the NHS and within the NHS. In recent years an increasing amount of information technology has become available which could assist this transmission. The DHSS and North East Thames RHA therefore commissioned Aslib Research and Consultancy to recommend a strategy for introducing appropriate technology which would permit cost-effective transmission of information within the NHS.

This paper contains the results of one part of this study, that relating to the information flow in and out of and within the district office. From the outset it was decided that attention would best be concentrated at the district level as this was the most appropriate location for the initial definition of user and system needs. No attempt has been made to prescribe in detail a total system but it is hoped that the general principles and approach described will assist district managers in recognising the potential utility of information technology and its application to health service administration.

The project work was carried out primarily in Southend Health District and the Aslib project team worked under the guidance of a Steering Committee. The membership of the latter and details of the methods used in the study are shown in the appendices, as are details of other relevant projects.

We would like to thank all those in the DHSS, the North East Thames RHA, Southend Health District and the other sites visited for the valuable help and assistance given during the course of the project and the Aslib team for the speed and competence with which they fulfilled their remit. We would also like to acknowledge the contribution made by the King's Fund both for allowing us the use of the King's Fund Centre and for publishing this paper.

Alastair Mason *Chairman* Project Steering Committee

Chapter 1 : The district office

1.1 An office should not be thought of in purely physical and geographical terms but as a set of people and functions. Thus the district office has been regarded as comprising all those NHS personnel who have formal administrative responsibility for running the district. This then includes not only the general administrators but all the specialists, insofar as they contribute to the systems and procedures of the district office.

1.2 To put it another way, the office is an information system, responsible for the transfer, processing, generation and dissemination of management information. At the same time it is an open social system involving personal communication and designed to respond to external stimuli, albeit within a fairly tightly defined framework.

1.3 In considering how to apply information technology (IT) to parts of this system it is necessary to understand the main information flows within the whole organisation and within and between its component parts. It is also important that applications be moulded as far as possible to the needs of individuals and to the prevailing management style. This entails a consideration of:

a. present behaviour based on largely manual systems;
b. the implementation process; and
c. future behaviour relying on increasingly mechanised systems.

1.4 To design full-scale technology-based systems requires detailed mapping and measuring of the various flows and also analysis of individual roles and functions. However, for the purposes of recommending a strategy for the introduction of information technology into the district office, all that is needed is:

a. a model of information flows and of information processing

systems (the latter are considered in chapter 2); and
b. an analysis of functions, patterns of work and roles.

Information flow model

1.5 A general model illustrating the information flows in the NHS involving health authorities has been developed as a result of this project. The four levels, the DHSS and three NHS levels between which flows occur, are shown in figure 1.

1.6 Five types of information flow have been identified and defined as follows:

A is *operational feedback* flowing upwards concerning the current operations of the system such as costs, manpower and clinical activities, and it is used in the planning and review process.

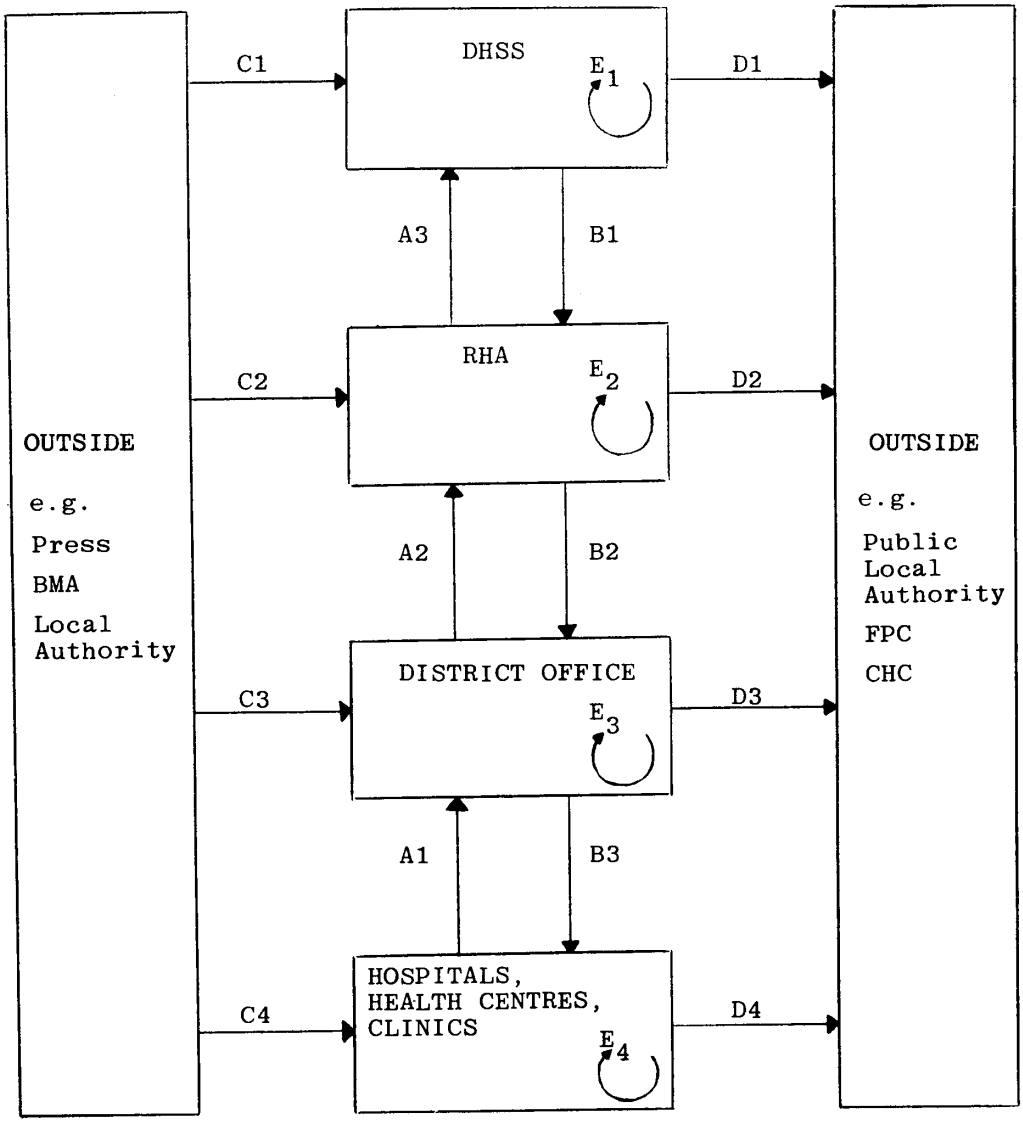
B are *line communications* passed downwards which in this context are defined as policy decisions, forward plans, resource allocations and other instructions from higher tiers. This flow also includes information to non health authority employees such as general practitioners.

C are *external information inputs* which are collected as an aid to decision making on any aspect of the organisation's activities. Although not explicit in figure 1, there may be mechanisms such as libraries at each level which collect, make available and disseminate this information.

D are *external information outputs*, a combination of public relations, health education, liaison with other bodies such as local authorities and Family Practitioner Committees.

E are the *internal information processes* which control the workings of the office itself and which involve processing inputs for local use, storage or into outputs. An example is the process by which a health circular is acted upon at district level. It may be indexed or

Figure 1 : Information flow diagram



A. Operational feedback
B. Line communications
C. External information inputs
D. External information outputs
E. Internal information processing (of all A, B, C and D)

stored for future reference; it may be summarised or merged with other input and translated into local policy or procedure and disseminated within the district office and passed down as a line communication to the next level.

Figure 1 does not include flows that leapfrog levels or involve the simple passing on of documents from level to level as will be common for B and C. Nor does it include flows between regions or between districts which are important from the point of view of sharing experience.

1.7 From the model, it will be seen that:

a. A1 to A3 is a process of distillation and blending.

b. B will tend to become more voluminous but less formalised between each descending level. In other words B1 is highly formalised through such established mechanisms as the distribution of health circulars, whereas B3 is more personal and passed on by internal 'memo' or face-to-face communication.

c. Each level has a high degree of autonomy regarding the selection of C.

d. D1 will differ absolutely from D4.

e. There might be at least as many different E systems as there are regions, districts and health care institutions.

1.8 The district office is an information system based on the procedures denoted by E3: having the inputs A1, B2, and C3; and the outputs A2, B3 and D3. While it is impossible to trace the information transformations in the district office, that is the effect of E on combinations of A, B, C and D, it is at least possible to see that there is scope to promote a necessary integration of information procedures and systems. Though no pretence is made that this is an

easy task, information technology can provide means to facilitate such integration.

1.9 Furthermore, it would appear that in the whole system the district has little say in the design and operation of the B and C streams which become virtually indistinguishable as far as it is concerned, and that there will be a tendency for it to become a post office for the A stream. The district office will not be properly equipped to make these flows effective and efficient without adequate E facilities and procedures for dealing with them.

1.10 Hence it is *proposed* that an essential part of the strategy for introducing information technology into the NHS should include the provision of IT facilities in the district office for making E flows more effective. It must be recognised that whatever can be achieved within the district office must be capable of interfacing with the external flows, even though many parts of the system are outside its control. Conversely, other levels must recognise that the end users and information providers are in the district office and take into account its needs and work patterns.

Functions, patterns of work and roles

1.11 At the functional and social level it is clear that the district office is not a single system but is made up of a number of sub-systems, to any of which the general model shown in figure 1 may be applied. Sub-systems exist for:

a. different functions, and
b. the roles of different disciplines.

The work patterns, roles and personalities within these sub-systems will affect the applicability and choice of IT equipment. Although districts will vary it is possible to describe some general characteristics.

1.12 The main functions of the district office are broadly:

a. planning and activities concerned with change, and
b. day-to-day management and administration.

1.13 *Planning or project based activities* involve all the main functionaries in the district office. These activities call for innovation, development of new ideas, reference to past decisions and precedents and the use of recorded information. They are the main preoccupation of the many committee meetings that take place. Senior staff in the district office may spend as much as 20 per cent of their time on committee work. The repetitive pattern of activity relating to committees is shown in figure 2. Much of it entails various kinds of information processing and communication and is therefore a prime area for introducing information technology.

1.14 A significant element of planning activities is the official annual planning and review cycle, the continuous process of preparing, updating and monitoring strategic and operational plans and reviewing progress. This process demands a large information input and generates a great number of records which require constant updating as well as discussion in and out of committees.

1.15 *Day-to-day management and administration* of on-going operations includes such tasks as staff management, budgets and performance monitoring – whether it be in running the district office overall, a hospital, a community service, the district works office or all the nursing staff. Such management tasks entail a lot of written and spoken communication with individuals and groups but limited use of recorded information except for reference to procedures. However, they also entail making returns and maintaining records and various checklists.

1.16 With respect to roles it is convenient to identify three different groups of people as part of the district office:

a. Specialist health professional administrators such as the District Medical Officer (DMO) and District Nursing Officer (DNO).

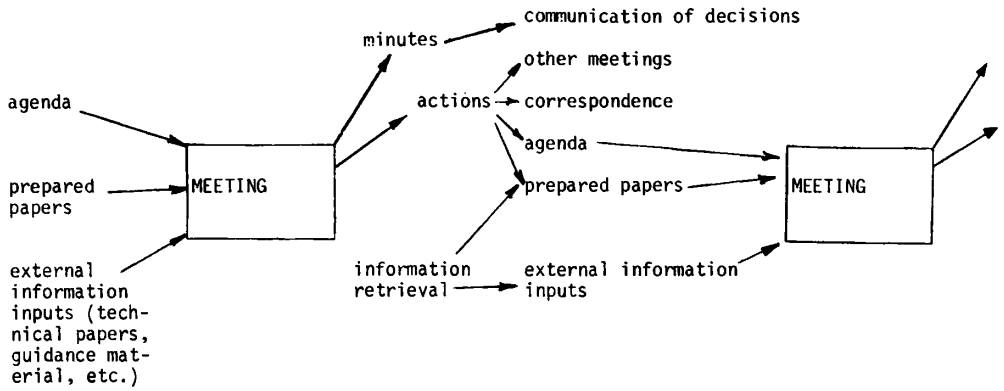
b. Specialist administrators such as those in finance, personnel, works and supplies.

c. General administrators including the District Administrator, Unit Administrators and their staffs.

1.17 The largest groups of *health professional administrators* are in community medicine and nursing. Both the DMO and DNO are nodes for receiving DHSS and RHA material relating to their fields, and for passing it on to their colleagues. These disciplines have an important role in communicating to the public on such matters as health education. There is a perceived need to keep up-to-date in their specialisations and thus a large amount of information is received from outside the NHS.

1.18 The District Medical Officer has a diffuse and wide range of responsibilities. Not only is he a specialist in his own right, he is also a focal point in the district for all medical matters. Much time is spent on committee work. The wide ranging nature and less formalised management structure of the DMO's areas of responsibility pose problems in the communication and dissemination of information.

Figure 2 : Information activities for committee meetings



1.19 The nursing cadre is a hierarchical organisation involving the hospitals, midwifery services and the community nursing services. The major problem here is personnel management and the deployment of resources within and between the hospital services and the community services. The hierarchical management structure and a degree of centralisation readily lend themselves to the dissemination of information and to eliciting response, including statutory statistical reporting back. However, the nursing population, particularly on the community side, may be scattered over a wide area and this can cause communication problems.

1.20 *Specialist administrators* are typified as working in self-contained departments with particularly strong links to the RHA and DHSS. Finance, personnel, works and supplies information systems are to some extent determined from above and, being more centralised, tend to be more systematised. They are thus more susceptible to mechanisation. The works and personnel functions act as information providers and advisers and are likely to spend much of their time in formal and ad hoc committee meetings, as do finance staff. All the district officers in these four groups are nodal points for receiving information in their disciplines and for disseminating it down their respective lines.

1.21 *General administration* falls into two distinct groups, central and unit. Central administration is the dynamo of the district office and is at the hub of the information system. It receives the widest range of documents from the DHSS and RHA levels. It therefore has to pay the greatest attention to filing and dissemination.

1.22 Unit administration in most districts is divided into hospital and community components. The former is complex but tends to be centralised at a few reasonably self-contained sites. On the other hand, community services are not only complex but diffuse and less

capital intensive. The health monitoring role has led to a multiplicity of records systems which are particularly susceptible to computerisation. There is considerable involvement with other agencies such as local authority departments. The dispersal of community services has consequent communication problems.

Chapter 2 : Information technology

Introduction

2.1 There are many different definitions of information technology (some are given at the beginning of this publication) but the definition adopted by the Department of Industry [1] for the IT82 campaign was:

'The acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a micro-electronics-based combination of computing and telecommunications'.

2.2 In the context of the district office the application of IT can enhance productivity in creating, using, moving and storing information by overcoming traditional technical constraints. However, this will have to be tempered with the realisation that traditional administrative practices are not geared to what the new technologies offer, and many fundamental changes in practice will have to be made in order to gain real benefits.

2.3 In conventional office systems, some 80 per cent of all communications on paper are internal to the organisation. But the amount of time and effort devoted to managing this flow is out of all proportion to that given to managing the 20 per cent which are external and, in the end, represent the reasons for the existence of the organisation. Information technology in the office provides a path to the more effective utilisation of skills by removing much of the need for repetitive work and paper handling. Once information is captured in a storable and retrievable form it can be accessed and manipulated for use and not simply transformed from one medium to another. In a situation where a great deal of record keeping has to take place a more rational approach to the gathering of data can allow more time to be given to the primary tasks. Thus,

instead of filling in forms which have to be transcribed and keyboarded later, data can be directly transferred to a computer, allowing for rapid analysis and presentation of management information. The revolutionary aspect of IT lies in the opportunity it creates for thinking anew about how and why certain tasks are done; and for asking some fundamental questions about present administrative and control procedures.

2.4 The 'electronic office' attempts to exploit to the full this opportunity by offering a generalised system with certain capabilities but no fixed mode of operation. The 'electronic office' concept can be considered in three different ways:

a. components of the system;
b. machines; and
c. functions and operations.

Components of the system

2.5 The components of the system are:

a. entry devices,
b. information transmission,
c. storage systems,
d. retrieval systems,
e. output devices,
f. networks, and
g. telecommunications and teleprocessing.

2.6 The main *entry device* is still the keyboard or keypad. The trend towards more widespread use of computer terminals as standard pieces of office equipment means that an increasing volume of data will be captured at source rather than written on forms and then transcribed by keypunch operators. The use of word processors will mean that a growing proportion of textual information will be

in machine-readable form from the moment of its origin and hence suitable for machine processing.

2.7 Optical character recognition (OCR) devices offer a practical means of converting existing printed or typed text into machine-readable form. Other technologies such as magnetic character recognition (MCR) find a use in high volume applications like banking and postal services where the expense of this technology is justified.

2.8 Information technology is concerned with pictorial as well as textual and numerical information and two methods of *transmitting information* in these forms are in common use:

a. Character transmission is the conventional method used by computers. Each character which can be generated is assigned a unique code and can be manipulated as part of a character string to form words, numbers or points on a graph or picture. However, for diagrams and graphic forms this technique is limited in terms of the image quality that can be achieved.

b. Picture or digitised transmission has until recently been typified by facsimile and photocopy machines. A text which contains graphics is scanned in parallel series which may be as dense as 200 strips per inch. These scans register the presence or absence of segments of characters and graphics. The resulting strips are stored in digital form for recreation of the original. With this technique the data cannot be processed or manipulated as single characters or character strings.

2.9 The same channels can be used for both methods of transmission and are at present the same as those used for the public telephone network. This area of technology is developing rapidly.

2.10 An important form of information transmission is electronic

mail. Computer bureau services have offered an electronic mail facility for some time and the Post Office launched its own service in March 1982. Certain message facilities are also available via Prestel; and terminals connected to a central computer, however far apart, can often send messages to each other. An important characteristic of electronic mail is that no immediate connection has to be made between sender and recipient. The message is keyed in with its address and stored in a computer until the recipient next logs on to the system. Much of the frustration associated with telephone communication can thus be avoided by this 'store-and-forward' facility.

2.11 Present day *storage systems* are based on magnetic media – disks, diskettes and tapes for long-term storage of data and semi-conductor memories for storage within processors. New devices, including 'bubble' memories, are promised in the near future. These will have very high reading and writing speeds coupled with ultra-high density storage so that the speed of retrieval of data from memory can begin to approach the speed of instruction execution within a computer.

2.12 Until a few years ago, disks were found only on mainframe computers and required expensive and sensitive disk drives. Today, in the form of Winchester cartridges, they are a cheap and rugged mass-storage device for microcomputers and word processors. Diskettes or 'floppy disks' are commonly used for low cost, convenient, random access storage, not only in micros and word processors but in other devices as well. However, there are few recording standards for diskette formats and lack of compatibility between different manufacturers' equipment can give rise to problems.

2.13 Tape is mainly used for archival storage in large installations or as the permanent storage medium in the form of audio cassettes for

microcomputers. Its cheapness has to be weighed against the length of time needed to search it for a given record.

2.14 Videodisc technology is one of the most recent developments of significance in IT. A videodisc is a form of storage for video (tv) signals. It has two distinct advantages over videotape; access to a particular 'frame' is very rapid because no serial search is involved, and the picture quality is far superior. The videodisc was first seen as a replacement for videotape in the domestic market. However, it was quickly realised that it had great utility in areas where bulk storage of searchable video frames opened up exciting possibilities. A micro linked to a videodisc player can, for example, be used in training. As a pure storage device the videodisc is at present limited by the inability to record or erase during use; these deficiencies will be corrected as the technology develops.

2.15 Microforms (film and fiche) are finding a place in IT both as a simple bulk storage method for little-used records and as an element in hybrid systems. Film frames on endless loops storing many millions of documents can be kept in a few filing cabinets. Each frame is encoded and retrievable under computer control by commands from a terminal. The frame selected is digitised and transmitted to the terminal where it is recreated with a very high accuracy as a picture of the original.

2.16 There are two basic types of *retrieval system* – those that retrieve references as in a traditional card index or library catalogue and those that retrieve actual documents. Often the two are connected. Early development was almost exclusively focussed on reference retrieval systems and these are now widely used in Europe and North America. Now as storage costs diminish and other technologies come into play there is increasing interest in electronic document retrieval and delivery systems. A particular example is electronic filing, the idea being that documents generated in an

office should be stored electronically rather than in cumbersome, space-consuming filing cabinets.

2.17 Three different ways of locating documents or document references should be noted:

a. Inverted file is the technique most widely used in the present generation of computer-based information retrieval systems. This is simply an ordered list of keywords, index terms, authors' names and other identifiers extracted from or allocated to the file of references; each entry term having linked with it the address of the reference(s) in which it appears.

b. Content-addressable file searching (CAFS) utilises hardware specially developed for rapidly searching serially through a complete file of references or complete texts of documents to match specified identifiers. Until recently, serial searching was not a practical proposition for any major document collection but refinements in programming techniques have made possible the more rapid searching of text files on conventional computer disk stores.

c. Hierarchical or menu-driven searching is the technique on which viewdata systems such as Prestel are based. The references or pages are organised according to a hierarchical arrangement. The user of such a system is offered a series of choices or menus which gradually lead to the information required.

2.18 An important difference between menu-driven searching and the others is that it provides for only one path to the document. The document can only be found according to the identity it was given by the indexer. With the other techniques there is scope for retrieving a document on the basis of quite unforeseen combinations of identifiers but their use may require a trained intermediary. Viewdata systems, by contrast, are simple enough for

anyone to use. Therefore there is a trade-off in that sophisticated systems become difficult to operate, while easy-to-use systems have only limited powers of retrieval.

2.19 The unit of information in a viewdata system is the page or screenful of information, and this tends to have a strong influence on the form in which information is stored. Generally, it would be extravagant to store the complete text of existing paper documents on any viewdata system. The system works best if the information is tailored to this particular medium. Prestel is the best known viewdata system in this country and is now an established public service. A Prestel facility worth noting in the present context is that of the Closed User Group. An organisation such as the DHSS can use part of the Prestel service as a private system for the benefit of a specific group of users who can access it via the public telephone network. Private viewdata systems are now available from about a dozen suppliers in this country, including major computer firms such as ICL and IBM.

2.20 *Output devices* broadly divide into those which provide a permanent record, such as printers and plotters, and those which display transient information, such as screens. Permanent record devices also comprise phototypesetters, electronic composers and other printing devices including the direct production of 'computer output microfilm' (COM) where, under computer control, a laser 'writes' directly on to photosensitive film and no intermediate paper copy is involved.

2.21. Printers may be high or low speed, daisy wheel, dot matrix, ink jet or thermographic and may be used either off- or on-line. As with storage systems the type of printer chosen must depend on the application. A dot matrix printer may be adequate for simply 'dumping' a screen of information on to paper but will be unsatisfactory for generating letter-quality copies.

2.22 Transient display systems conventionally use a cathode ray tube (CRT) as a screen. Flat screens are now being developed which do not require heavy and delicate tv tubes but instead use liquid crystal display (LCD) light emitting diodes (LED). These are already common in pocket calculators. Considerable effort is presently going into the development of high-definition CRTs which allow the overlaying of displayed information on the screen. In other words, parts of the screen image can be moved about or modified just like papers on a desk.

2.23 Voice output has been achieved by the formation of sentences from recorded words or of words from stored syllables (voice synthesis). True voice response is still very much in the future.

2.24 *Networking*, and from that the local area network (LAN) concept, has arisen out of developments in both micro-electronics and communications technology. Widely differing types of machines such as terminals, storage devices, printers and processors are interconnected to share common data and, where applicable, common programmes. The devices in the network may individually incorporate a considerable amount of 'intelligence' or local processing and storage capabilities. Thus computing power may be distributed among workstations. A central processor may act as little more than a switching centre between devices or it may be a powerful minicomputer in its own right. LANs operate in a variety of modes:

a. star (processor at the centre of a cluster of devices to which each is connected).
b. ring (a continuous loop around which data travels being picked off by devices as required) and
c. Ethernet (point-to-point).

These each have their respective merits according to size, cost of installation and speed of data transfer. An advantage is that the

LAN concept allows for cost-effective utilisation of capital equipment and especially of expensive items such as printers and disk drives.

2.25 Perhaps the most important feature to be noted is that these systems make it possible to provide a range of facilities such as data processing, word processing, information retrieval and communication close to the individual worker in his office at a reasonable cost.

2.26 *Telecommunications and teleprocessing* were terms first used to describe the transmission of analogue and digital signals via cables and wires. Now the definition must be widened since international communications networks are likely to comprise satellite, microwave and optical fibre transmission in addition to landline. Television signals are routinely transmitted world-wide while on-line access to large databases across national boundaries is commonplace. EURONET is a system which provides a pathway through the European Community and other countries for the interconnection of multiple computer systems. In this type of network individual computers in each country serve as database hosts while other computers control the transmission network itself. To a large extent the complexity of switching is 'transparent' to the user who may not even be aware of the location of the central computer with which he is working.

Machines

2.27 A number of types of machines incorporate specific directions in which IT has developed. They include:

a. microcomputers,
b. word processors,
c. electronic switchboards,
d. phototypesetters and photocopiers, and
e. multi-function machines.

2.28 *Microcomputers* vary in price from less than £100 for a personal home use machine to about £10 000 for a large commercial one. There are tremendous variations across the range in the memory sizes, programming languages and peripherals supported. At the lower end, memory will be about 64 Kb or less, the processor may be a relatively slow 8-bit and disk drives and printers will tend to come as add-on extras. At the upper end the range blurs with mini-computers. There are now complete systems being offered with built-in disk drives and networking facilities, high-speed printers, fast processors and a wider range of systems software.

2.29 *Word processors* (WP) may be regarded as microcomputers dedicated to one task. They are used to store, manipulate, edit and print out text. This is carried out under the control of a complex suite of programmes driven by a set of function keys to invoke specific types of operation. On one level, word processors are seen as making the existing workload of a typist more tolerable by removing the need to retype unchanged portions of a draft when re-formatting or amending. However, on another level word processors are viewed as a means to handle vast quantities of text with keystroke rates as high as 12 000 per hour expected from each operator during a full working day. Word processors have come a long way since the days of automatic typewriters and now offer a complex, powerful office tool requiring considerable skill to achieve their full potential. Some are available with limited computing facilities. For example, once a table of numeric data has been keyed in, it can be totalled down and across columns with the totals forming part of the text. WP machines come in a variety of configurations:

a. stand-alone (all facilities at each individual workstation),
b. shared logic (a number of workstations sharing a central processing and storage unit), or
c. shared device (a number of workstations sharing a printer).

They can also communicate with each other or with computing facilities and act as nodes in a network, receiving and sending blocks of text in conjunction with other devices. Their use in the office opens up the possibility of electronic filing, and electronic mail for those with a communications capability.

2.30 *Electronic switchboards* have moved far from their original role of providing telephone lines between an organisation and the public networks. Small exchanges are replacing PABX systems in offices and there is an increasing awareness of the potential for such machines in handling the voice and data traffic of the public networks. PABX-replacement systems provide highly reliable connection of subscribers with lines of sufficient quality to handle high-speed data transmission. But it is as an automated switching system that they really come into their own. Most manufacturers now offer facilities such as abbreviated dialling, three-way conference connection, automatic re-dial, priority interrupt and temporary number transfer. In addition it is normally possible to log the frequency of use of individual extensions, analyse which numbers are called, produce usage reports for internal budgeting and even monitor security and surveillance devices.

2.31 *Phototypesetting and photocopying* is an area where the application of IT amply demonstrates the potential for the multiple use of text once it has been captured in machine-readable form. Once coded and formatted text has been produced on a word processor it can then be transmitted to a computer-driven phototypesetter for the production of high-quality printed output.

2.32 Intelligent photocopiers now coming on to the market are able to accept output direct from a computer which can be merged with normally copied text under computer control. Similarly it should be possible not only to scan a document in order to photocopy it

but also to use that scan as a means of input to a storage device, thus capturing the text in a usable form.

2.33 The microchip has brought about the development of *multi-function machines*. Whereas at one time machines would have been dedicated to one particular task the possibility now of incorporating into them a greater amount of processing and control capability has meant that they can be used in other ways as well. 'Convergence', or the blurring of functional divisions between what were once considered to be different types of machines is evident in a number of the devices mentioned in the preceding paragraphs. For example:

a. Microcomputers which can double as word processors, intelligent terminals or communications controllers.

b. Word processors which contain the full capabilities of microcomputers.

c. Photocopiers which in scanning a document also produce a digitised record of that document for computer storage and processing.

d. Facsimile transmitters which double as local photocopiers in addition to providing digitised output.

e. Analogue/digital telephone exchanges which in addition to their switching function can also operate as network controllers and data collection devices.

f. Viewdata systems which can combine videotext and videographic output on the same screen.

2.34 The common theme is that data, once captured electronically, can be handled in many different ways to make possible a variety of tasks which would be impossible without information technology.

Functions and operations

2.35 Definitions of office automation vary, but the following functions and operations have been identified by Barcomb[2]

a. word management,
b. electronic mail,
c. electronic filing,
d. micrographics,
e. teleconferencing, and
f. integrated systems.

Some idea of what the office automation concept implies is given by the following brief scenario.

2.36 A mailbox facility will largely replace memoranda, at least in physical form. By signing on to a desk-top terminal the user will be told what 'mail' is waiting to be read. This mail can then be viewed, commented on, immediately filed, or re-directed, stored or merged with other material as appropriate.

2.37 Reports and similar documents in draft form will not appear on paper until they are finalised. All concerned will be able to add their comments or contributions while seeing what others have offered. The final report will be processed against a dictionary to trap spelling errors and may eventually be printed, sent to another office over a satellite or microwave link and stored in a corporate database for later retrieval. The original basis for the document may have been created through a word processor, or even directly through the accumulation of comments during the drafting stage.

2.38 All system users will maintain their own diaries on their terminals. This means that the scheduling of meetings can be done by the computer analysing all diaries to find common free time and then advising all concerned of the dates which are possible. The

same diary function can be used by an individual at the start of the day to remind him of appointments, critical dates in projects and matters which have been 'brought forward' for further attention. The diary facility is already available on a number of office automation systems.

2.39 The use of portable terminals will further enhance such systems. Being out of the office will not preclude reading and answering the day's mail or sharing in a conference.

2.40 At present much of the equipment required to deliver all of this as a package is only available from a very few manufacturers although this will undoubtedly change. A most important point is that all incoming mail and paperwork is inaccessible to the electronic office until it has been re-keyed or scanned by OCR equipment; at present these are both expensive applications.

2.41 In the meantime, information technology offers a lot of scope for substantial improvement in methods of data processing, word processing, information storage and retrieval and communication. The fully automated office will come later. The next chapter looks more closely at the potential application areas for IT specifically within the district office.

Chapter 3 : IT in the district office

3.1 Information technology in the district office may be applied to the following functions:

a. data processing,
b. word processing,
c. information storage and retrieval, and
d. communications.

3.2 The main application areas for the functions a to c are:

a. database systems mainly involving quantitative data,
b. planning systems involving a mixture of text and data,
c. text management systems for internal information, and
d. external information systems.

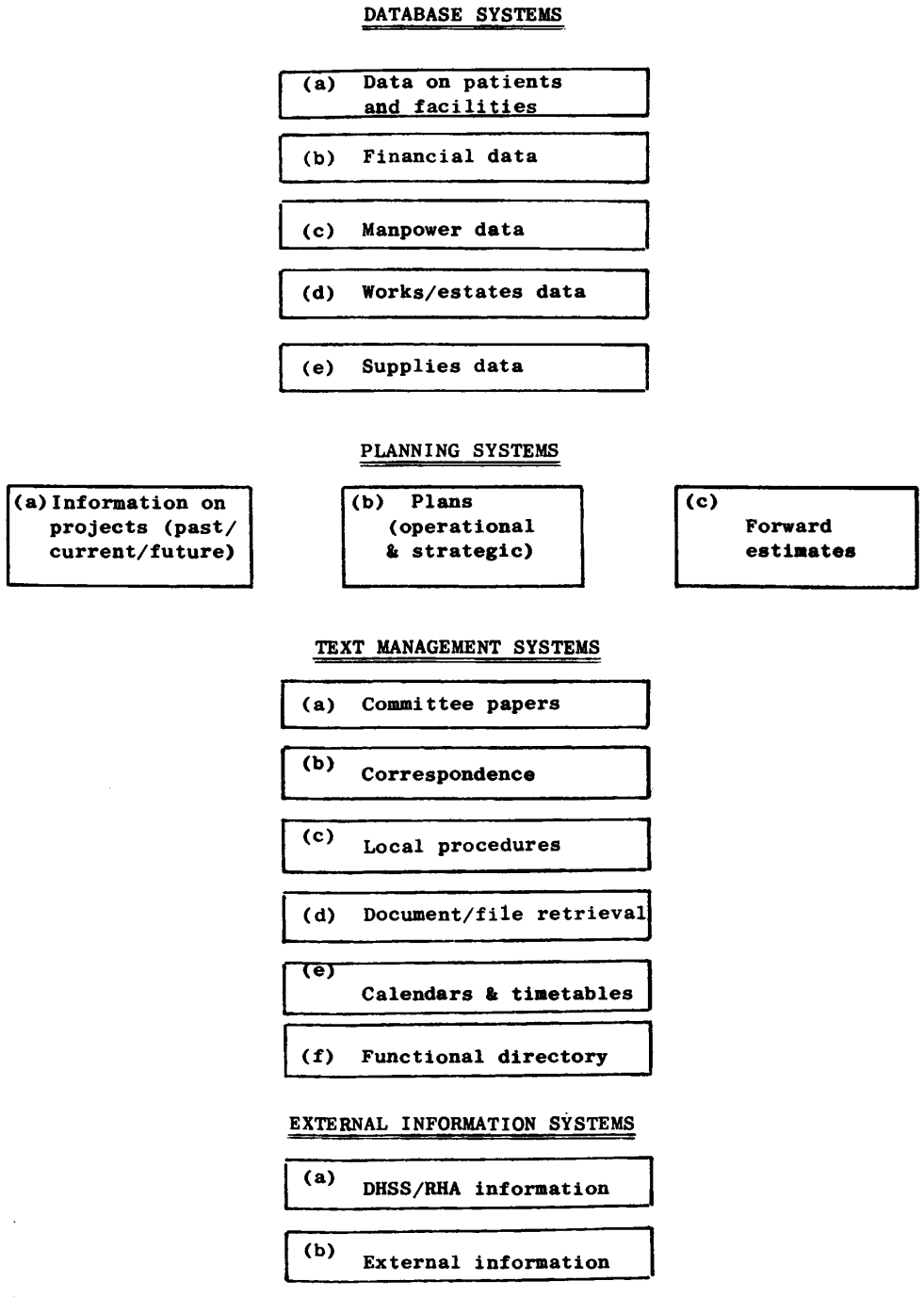
Further details of these applications are shown in figure 3.

Database and planning systems

3.3 *Database systems* are fairly common in the NHS and many national groups have been concerned with developing them. In addition to nationally determined systems there is scope for local initiative for introducing methods of data capture or managing local records required for administrative purposes. A paper in this series about a district approach to these systems will be published shortly.

3.4 The three types of *planning systems* are deliberately shown side by side in figure 3 to emphasise their inter-relationship. Each system has to be accessed separately to consult the information and/or to amend/update the files. But changes in any one affect the other two. Amending the text of a project description is simply a word processing function; adjusting the resources allocated to a project affects the overall estimates and some data processing

Figure 3 : Applications of IT in the district (other than communications)



capability is required.

3.5 At the simplest level the documents required for the planning process could be prepared and updated with a word processor but more could be done with a microcomputer. This type of application is a fairly classic one in business management and not surprisingly a range of software packages is available for use on most of the well-established microcomputers. These are generally referred to as 'spreadsheet' systems such as Visicalc or Multiplan. However, to adapt such software packages to the specific requirements of a district office requires some competent systems design work.

Text management systems

3.6 These are concerned only with documents and papers generated within the district. It is technically possible to design IT based systems that would dispense with most of this paperwork and even most of the committee meetings. Minutes and papers could be disseminated electronically and consulted by committee members at their private terminals and during the actual meetings. Such developments seem unlikely in the near future because the investment required in an organisation as large as the NHS would be prohibitive. There is ample scope, however, for the use of IT to enhance each of the applications noted in figure 3.

3.7 The quantity of *committee minutes and papers* is considerable. The frequency of meeting of some committees is such that speedy production and circulation of minutes is essential. Many important papers such as operational policy documents go through many stages of drafting and redrafting. Minutes and papers usually follow a standard format. It will be seen that these are all good reasons for using word processors. It is important that there should be some means of tracing records of matters discussed and decisions taken by committees. Solutions to this problem will be discussed in paragraphs 3.10 and 3.11.

3.8 The advantage to be gained by preparing *correspondence* on a word processor is marginal except under conditions such as:

a. sending the same letter to several addresses, or
b. composing a letter on the basis of standard paragraphs.

But if word processors are introduced to handle typing generally, correspondence should obviously be handled in this way. This will open up the possibility of electronic filing at a later stage.

3.9 Office, personnel and other *local procedure* documents could well be produced and subsequently updated with the aid of a word processor.

3.10 Ease of *document and file retrieval* is largely dependent on the effort invested in identifying the content of documents when they are input to the system. All too often the office or personal filing systems are the main means of storage and retrieval. These may be well organised but have limitations so far as retrieval by subject is concerned because the investment of input effort is relatively small and is applied only to files not to individual documents. There is often no formal system for tracing individual committee minutes and decisions. There may be no formal system for retrieving DHSS or regional guidance material, statistical documents, technical documents and reports. Good solutions can be offered using IT but the microcomputer alone does not provide a total answer. Additional human effort is needed to prepare input to the retrieval system. To some extent this can be traded off against the time saved in finding information.

3.11 These problems touch on those recently investigated in Cambridgeshire Area Health Authority by Sue Smith[3]. One of the outcomes of that project has been the development of a micro-computer-based information retrieval system (see Appendix C). Preliminary trials have indicated that this system provides an

effective means of retrieving references to documents or parts of documents such as committee minutes and that it can handle a sufficient volume of entries. This kind of system could serve as a good short to medium term solution to the problem of retrieval of locally-generated documents and modest collections of external documents. However, it must be emphasised that this kind of system retrieves only a reference to a document; it has not got the capacity to store complete original documents.

3.12 Strictly speaking, *calendars and timetables* come under the heading of time management rather than text management. Electronic calendars and reminders are a common feature of automated offices and though fairly modest as a concept can help to save a lot of time. This facility requires that all users have terminals connected to a common computer system.

3.13 *Functional directories* such as the district staff locations and telephone numbers require regular updating and this could easily be done with a word processor.

External information systems

3.14 Although the district should be competent to organise its own locally-generated documentation, it would be wasteful for all districts to establish separate systems for storing and retrieving documents generated within the DHSS or at region or from the general mass of literature from the world at large.

3.15 Responsibility for improving the systems for distributing or communicating policy and guidance information should rest mainly with the DHSS or RHA. However, the district office is a starting point from which the application of new technology should spread and its requirements should contribute to the functional design of regional and national systems. Whatever IT is used it is important

that the external information is accessible through the same terminals that are adopted for other purposes within the district.

3.16 A vast and growing amount of external information is available through on-line computer retrieval systems. Districts are already making modest use of these and demand will grow along with the competence to use these facilities.

Communications facilities

3.17 Communications techniques provide the means whereby information can flow from one place to another. As mentioned in chapter 2, IT provides several interesting alternatives to traditional channels of communication. Some kinds of communication at present effected vocally through the telephone can be more effectively handled through electronic mail. Better ways of handling voice communication through improved telephone equipment and store-and-forward facilities may encourage substitution of voice for written communication. Some kinds of written communication such as certain records of activity can be converted to semi-automatic electronic methods.

3.18 Management of a health district calls for a vast amount of communication of all kinds particularly because of the policy of full consultation between the various disciplines on all major issues. Intelligent use of new techniques could undoubtedly save a great amount of time especially for the senior officers. Progress toward the adoption of modern electronic PABXs is certain to be beneficial as would some form of electronic messaging or electronic mail. The vital characteristic of such equipment is that it allows messages to be transmitted whether the recipient is at his desk or not.

3.19 Facsimile transmission is already in use within the NHS generally. This will continue to be a useful auxiliary method of sending certain

kinds of document from one place to another and the equipment available will improve in the next few years.

3.20 Equally important is the need to ensure communication between computers which may be in the same or different locations and also between computers and other devices such as word processors. Data needs to be moved as well as messages. This requires that the equipment itself is capable of communicating. In addition there must be a means of communication in place. This might be:

a. connectors or cabling between the two devices,
b. dedicated or occasional telephone system connections, or
c. a local area network.

Present means of connecting devices tend to be expensive and do not become cost-effective until a substantial volume of message traffic can be assured.

Chapter 4 : Strategy and policy

Strategy

4.1 Information technology can be introduced:

a. where it will offer a clear, immediate advantage in carrying out certain tasks;
b. where it can subsequently be used more widely but still essentially as an alternative means of carrying out present operations and procedures; or
c. in the form of an automated office in which the pattern of work would be substantially changed, if only by the different amounts of time required to perform certain tasks.

The progression from a to c in most districts will not be immediate but can be based on the IT applications outlined in chapter 3.

4.2 When all the applications are brought together and interconnected the 'electronic office' can become a reality. It is *proposed* that the electronic district office should include the following components:

a. The workstation. It has been forecast that by 1991 all senior management in the UK will have desk-top terminals.

b. Local area communications linking the district office to its hospitals, health centres and clinics, including an electronic telephone switchboard.

c. Access to central facilities such as the region and DHSS.

d. Access to other external facilities such as other databases and databanks elsewhere in the NHS and outside.

e. Access to local records of all kinds.

4.3 It is *proposed* that progress to this objective should be by

controlled evolution. This approach has been outlined by Simpson[4] as follows:

'The first lesson to learn is the triumph of gradualism. Walk first, run later. Evolution not revolution. There are many aphorisms to choose from but they all emphasise the need to advance cautiously. In practical terms this means that one relatively simple application (say conventional word processing) can be economically justified in its own right but can also provide unused excess capability at marginal or zero cost . . . The strategic plan which every manager needs for office automation consists of a series of building blocks. The lowest level of block is the simplest system but it creates excess capacity for the next level.'

4.4 Barcomb[2] has described five options for an implementation strategy:

a. A horizontal strategy where one functional tool at a time is put into use across the organisation.

b. A vertical strategy in which a full range of tools is implemented in one department at a time.

c. A matrix strategy which introduces one or two tools horizontally throughout an organisation then expands them vertically in selected departments on an as-needed basis.

d. A shotgun strategy which implements random tools in random departments with little or no overall coordination.

e. A chorus-line strategy which involves implementation of selected tools in selected departments on an as-needed basis in a coordinated fashion as part of a grand plan.

4.5 It is *proposed* that a matrix strategy be adopted for the introduction of IT into the district office. The development of computer systems in the NHS has traditionally been on the basis of either a

vertical or shotgun strategy. This pattern should be broken and IT developments in the future should be planned on a broader front.

4.6 Associated with the introduction of IT there will be a need to set up appropriate management arrangements and utilise appropriate manpower to provide a district information service. These matters are discussed in the first paper in this series 'Converting data into information'[5] and in the report of the Cambridgeshire AHA project.[3]

Development policy

4.7 A health authority can start to apply new technology in the district office in various ways, either acquiring lavish or quite modest amounts of electronic equipment. It is *proposed* that in all cases the goal should be to reach a stage of office automation with a large degree of systems integration. The latter will only be possible if the developments are information led and if integration is achieved at functional and operational levels before the technological level.

4.8 A good practical example of the degree of office automation to which a district office could aspire in the 80s is described in Appendix C. The installation in Huntingdon Health District offers a range of facilities that can be put into operation quickly without making the office so far advanced that it is incompatible with the rest of the region. At the same time, the equipment offers ample scope for further development and extension. The big difference, however, between Huntingdon and other district offices is that it is newly-established in freshly converted buildings. To transform any existing district office to the same extent will present considerable problems and certainly entail some disruption. At the very least any such transformation will call for a substantial input of planning effort and technical expertise.

4.9 The following development plan is therefore *proposed* as one which any health district could pursue. The stages outlined can be matched to the acquisition of specific elements of IT discussed in paragraphs 4.19 to 4.27.

4.10 STAGE 1. *Word processing* should be introduced as a first step using either dedicated equipment or a facility as provided by a general-purpose installation. Prime candidates for using a word processor are the senior secretaries especially those of the district administrator, the district medical officer and the district nursing officer. Immediate applications will be for committee papers and other documents that go through stages of redrafting and revision. Word processing equipment should not be seen simply as a new, faster way of typing documents but as a way of greatly extending the role of the secretary.

4.11 There are many obvious applications for word processing in other parts of the district office; notably in personnel, works and in unit administration. These applications will tend to be for high-volume repetitive tasks and may be better considered in the context of overall systems design in these areas.

4.12 STAGE 2. *Planning systems* can be facilitated by providing desk-top computing power for senior district managers. The applications are those described in paragraphs 3.4 and 3.5. Typically, they will involve maintaining up-to-date records of district plans and their component projects and enabling administrators to plan the deployment of resources in a systematic way. Much can be done with commercially available software that will run on a range of business computers or on local networks. More elaborate systems can be developed later as familiarity with the equipment is acquired.

4.13 STAGE 3. An improved method for *local document storage and*

retrieval is the next order of priority particularly for those documents generated within the district office. In the immediate future, a retrieval system is needed that will locate the reference to a document according to its subject, content, origin, series identification and author. Electronic filing will no doubt come later, making it possible to retrieve all or part of the text of a document in one operation. Various kinds of software are becoming available for this purpose.

4.14 The software to be chosen will depend not only on the hardware but also on the resources available for preparing input. Advanced information retrieval systems with inverted files are only worthwhile if trained staff are available to identify the characteristics of the document at the input stage.

4.15 STAGE 4. The introduction of *systems for handling activity, manpower and finance data* constitutes the most difficult, complex and resource-consuming stage of all, and will need to be broken down into a programme of system design and development tasks related to the operation of hospital departments, health centres and clinics. It will also involve a consideration of links to regional mainframe machines. A strategy for approaching this task will be described in the next paper in this series.

4.16 Whereas the applications covered by the three previous stages could all be introduced with quite modest investment in equipment, this stage will undoubtedly call for more powerful resources such as a local area network or a minicomputer. The systems will also require appropriate data capture equipment at the workface with telecommunications links to the main processor.

4.17 STAGE 5. The access to *external information systems* required is described in paragraphs 3.14 and 3.16. The equipment needed to access other computer-based information services is modest,

consisting of a terminal, a modem or acoustic coupler and a printer or communications interface added to a microcomputer. The use of these external systems on any serious scale calls for a trained intermediary.

4.18 STAGE 6. The *integration of systems* will follow the development of a number of the separate systems to deal with different types of activity. Once these have been designed it should be possible to develop ways of linking them together, providing that the information technology used is compatible. This interlinking, making many kinds of information available through one device, has far greater potential for increasing effectiveness than the improvement of any single system. The final stage in the plan must therefore be to integrate all these systems with the financial, personnel, supplies, and works administration systems. The end result at this stage should not only be the district electronic office referred to at the beginning of this chapter but also a region-wide information network.

IT elements

4.19 It is *proposed* that the development policy be based on the concept of a starter kit. This describes certain equipment configurations of various degrees of capacity and complexity which can be used immediately and are capable of expansion. An important aspect of the concept is that a starter kit should not only serve the specific purpose for which it was installed but also serve to demonstrate the uses of a particular type of IT to a spread of other potential users.

4.20 The options are:

a. word processors,
b. microcomputers,
c. a local area network, or
d. a composite installation (minicomputer with linked terminals).

The prices quoted in the following paragraphs are simply rough, order-of-magnitude costs as precise specifications for hardware and software cannot be given.

4.21 Whatever equipment is obtained the growing need for interconnection between systems should be borne in mind. Good communications features should rank highly as a factor in choosing between different types of equipment. Attention to technical standards here is essential to ensure compatibility.

4.22 High quality *word processors* are desirable and they should have ample disk storage, which means that each unit will cost in the region of £8 000–£10 000. Equipment with communications capability is to be preferred as it offers scope for a wider variety of applications. It would be reasonable to start with one machine but it is to be expected that its capacity will be absorbed quite quickly.

4.23 The cheapest *microcomputer* on the market today costs about £50 and for a few hundred pounds one can obtain a really useful machine complete with floppy disk unit and printer. But to get a micro that can do a practical daily job in an office something far more robust is needed. A CP/M-based micro suitable for a wide range of available software with a 10 Mb hard disk and a 120 cps printer will cost about £8000. There are many potential suppliers of this kind of equipment and the price for any particular configuration could vary by plus or minus £2000. Off-the-shelf software for a variety of business applications can be obtained at prices ranging from £100 to £500. As already indicated, a machine of this kind could be used for information retrieval and for spreadsheet applications.

4.24 An intermediate option between this and the next options would be some mixed installation of micros and word processors. However, any such mixtures soon approach the cost of the cheapest network.

4.25 A *local area network* offers both data and text processing capabilities. Any function can be performed from any workstation. An attraction is that a network of this kind is essentially modular. It can be started with a very small amount of equipment and gradually extended. An even more important feature is that it incorporates high capacity communication channels between workstations and also provides for fast data exchange with other systems. A LAN such as that at Huntingdon DHA (see Appendix C) with five workstations and a communication link to an external computer costs in the region of £45 000, including operating software, and can be extended by adding further terminals at a cost of about £2 500 each.

4.26 *Composite installations* comprise a minicomputer with generous disk storage to which a number of 'intelligent' or 'dumb' terminals can be connected. Both data and word processing capability can be provided and there is the possibility of communicating with external computers. The possible permutations and combinations of equipment are endless and in some cases the interconnection would be such that there would be little difference from a LAN. But essentially this option has most of its computing power in one central device whereas in a LAN this is distributed amongst workstations. This option is therefore of advantage for applications requiring a larger amount of processing power with more centralised storage. Because of the wide variation possible in the size and complexity of the equipment the price variation will be even greater than for the previous options.

Conclusions

4.27 At the end of the day a district, faced with many conflicting priorities, can only do what it has the resources to do. By way of conclusion, however, there are several justifications for applying information technology:

a. Better information systems are essential to improve the quality of decision-making at all levels.

b. Intelligent use of information technology can greatly increase the efficiency and effectiveness of medical, nursing, administrative and other specialist staff.

c. By providing new or better channels of communication IT can improve the quality of management.

d. Information technology can greatly improve the productivity and usefulness of secretarial, clerical and ancillary staff.

4.28 It can also be argued that information technology in the form of office automation is inevitable. In the same way that electric typewriters have been gradually replacing manual ones, word processors will increasingly displace electric typewriters. That being so, it is in the interest of any well-run organisation to take advantage of the benefits of these new tools as soon as possible.

4.29 Detailed work is required before the various applications described in this paper can be implemented. A thorough analysis of requirements needs to be undertaken in all cases and the requisite software, hardware and manpower skills specified accordingly. For each information system, data has to be collected about:

a. what types of information/data are collected?

b. from what sources does it come?

c. by what means is it collected?

d. how is it collated, processed and analysed and by whom?

e. how is it disseminated and in what form?

f. to whom is it disseminated?

g. how is it stored for future access?

h. how is it indexed for retrieval?

4.30 The work of the NHS/DHSS Health Services Information Steering Group has identified the crucial role information must play in effective health services management. The merging of statistical and documentary data and the ready availability of the resulting management information are essential prerequisites to informed decision making. The introduction of information technology into the district office will not only greatly assist the internal workings of the organisation but also contribute significantly to the production of timely and relevant information for district senior managers.

Appendix A

MEMBERSHIP OF PROJECT STEERING COMMITTEE AND PROJECT TEAM

Project Steering Committee

Dr A Mason (Chairman)	ISG Secretariat
Mr D Brereton	DHSS
Miss A Kahn	DHSS
Mr F Doyle	DHSS
Mrs B Rivett	DHSS
Mr L Valentine	DHSS
Dr B Barber	North East Thames RHA
Mr M Jefferies	Southend DHA
Dr J Dawson	British Medical Association

Project Team from Aslib Research and Consultancy

Peter Vickers	Blaise Cronin
Susan Barry	Peter Gillman
Alan Gilchrist	

Appendix B

METHODS OF STUDY IN THE DISTRICT

The investigation at Southend District Health Authority offices was deployed in five directions:

a. orientation interviews;

b. examination of systems, procedures and files;
c. attendance at a cross-section of committees;
d. case studies;
e. systems study of the community services function; and
f. in-tray/out-tray analysis.

a. *Orientation interviews*

These were carried out to gain an understanding of the way in which the district operates, the work patterns of key people in the district office, and thus of patterns of handling and using information.

The following people were interviewed:

District administrator
District medical officer
District nursing officer
District treasurer
Consultant member of the DMT
GP member of the DMT
District works officer
District personnel officer
Unit administrators (acute, community services, psychiatry)
Directors of nursing services (community, psychiatry, geriatrics)

b. *Examination of systems, procedures and files*

This concentrated on those information handling systems used by or at the disposal of the above key people.

c. *Attendance at a cross-section of committees*

In order to gain a clearer understanding of communication patterns and more optimistically to try to relate document types to the decision-making process, the project team attended a number of

committee meetings as observers. These were:

District management team
Meeting of officers of the DMT
Medical executive committee
Community health council
Community services administration meeting

These represented a wide cross-section of meetings in terms of attendees, purpose and conduct. Clearly, attendance at any one of these meetings could provide only an indication of their work but it was intimated that those meetings which were attended were reasonably typical.

d. *Case studies*

The purpose of the case studies was to enable the project team to focus on multidisciplinary issues; to gain some idea of personal interactions and, more hopefully, the documentary inputs to the issues. A good deal of thought went into selection of the case studies and a list of criteria was drawn up. Each case study had to relate to an issue which was:

a. multidisciplinary,
b. live or recently completed, and
c. supported by substantial files of papers.

Furthermore the set of case studies was to provide a reasonable cross-section of district activities. Eventually seven were chosen and the files for each were examined in some detail. The key people associated with each were interviewed.

e. *Community services systems study*

Recognising that the community services side was so different from the hospitals area and finding it difficult to identify a suitable case

study, it was decided to take a quick snapshot of this area by interviews. Those included were:

at the *District Office*
Unit administrator (community services)
Assistant unit administrator (community services)
Director of nursing services (community)
Specialist in community medicine (child health)

in two *Health Centres*
General administrative assistant
Health visitors
District nurses

f. *In-tray/out-tray analysis*

A technique used by Aslib in a previous study of document flow in a government department was applied at Southend. For one week certain key people and their secretaries were asked to record details about the documents arriving in their in-trays and action taken on them and similarly for those despatched through their out-trays. The time period was not long enough to collect quantitative data but, in any case, the method is better suited to providing a qualitative indication of size and type of traffic.

The key people were chosen as being those based at the district office to whom documents from outside would, in most likelihood, be addressed. They were:

District administrator
Unit administrator (acute services)
Unit administrator (community services)
District treasurer
District works officer
District personnel officer/senior assistant personnel officer

District medical officer
Specialists in community medicine (child health, elderly)
District nursing officer
Director of nursing services (community)

Appendix C

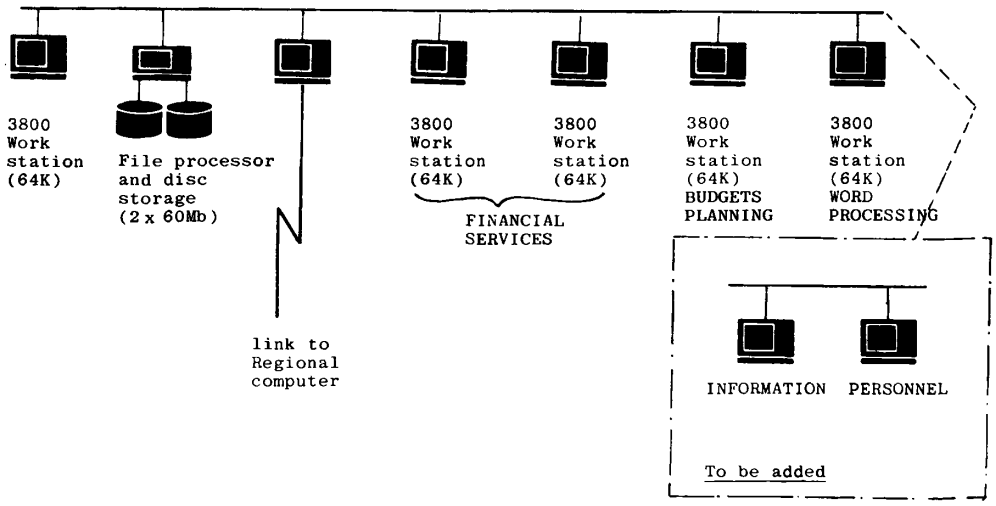
OTHER RELEVANT PROJECTS

a. *Huntingdon Health District local area network*

This was the only example of a local area network found in the NHS. It has been supplied by Datapoint (UK) Ltd and recently installed in the newly established Huntingdon Health District.

The present configuration (see figure 4) comprises five workstations linked by coaxial cable and sharing two 60 Mb disk drives. Another microprocessor permits communication between the network and the ICL mainframe computer at the Regional Computer Centre. Current applications include financial services (cheques, invoices, income, and so on), budgets and planning. Word processing is also provided. The

Figure 4 : Local area network installed at Huntingdon DHA



software available includes a spread-sheet system called Multiplan, a text file handling system and a fast information retrieval facility. Two more workstations will be added soon mainly to deal with personnel and information services.

All workstations have equal access to available disk storage (subject to security controls) and other resources on the network. An electronic mail facility is available between all terminals.

An important feature of this installation should be noted. Because the district is a new one the equipment could be installed in an empty building with no disruption. Even more important, staff of the district office are being recruited to perform their jobs using these resources rather than having to change from one set of procedures to another.

b. *Cambridge Health District Information System*

This system is under development for Cambridge Health Authority, following the recommendations of the research project.[3] It uses a software package called CORMORANT, developed by Kent-Barlow Information Associates, which has been demonstrated on a variety of CP/M-based microcomputers. Trials have proved the feasibility of using this system to maintain and search a series of local databases covering:

journal articles
press cuttings
DHSS circulars
statistical reports and tables
DHA and DMT papers and minutes
district office filing system

The intention now is to develop the system as an operational one using a Modata DSC3 micro with a 10 Mb hard disk and a 120 cps printer.

The CORMORANT system is undoubtedly a useful one for the specific purposes identified at Cambridge. It is, of course, a *reference* retrieval system rather than a system to retrieve and display original documents.

c. *Brighton Health District electronic office project*

This project is part of the Department of Industry's office automation programme. Under this scheme, launched in June 1981, 20 public sector offices are being equipped with 20 manufacturers' versions of the latest in integrated technology. For the purposes of the scheme an integrated electronic office system is defined as one which handles text creation and reproduction, information storage and retrieval, voice communications, text messaging, imaging and graphics. Up to £250 000 has been set aside for each pilot installation to cover hardware, software and development work. Consultants have been engaged to monitor and evaluate the projects throughout their two-year life. It is expected that progress reports will begin to appear soon. To date there has been little precedent on which to base any guidance on the introduction of information technology into an organisation as large and complex as the NHS and this programme should provide an important source of experience.

In Brighton, workstations have been installed in the district office, the supplier being Allied Business Systems Ltd. Workstations will be interconnected, and there will also be links to two local hospitals. Initial applications are word processing, records of approved contractors, medical students' programme, doctors' appointments and locums, WIMS (works information management system) and a diary system. Electronic mail will be added soon.

References

1 Great Britain. Department of Industry. The age of electronic information. London, Department of Industry, 1982.

2 Barcomb D. Office automation. Bedford, Massachusetts, Digital Press, 1982.

3 Smith S E. Cambridgeshire area information service research project: Final report 1979-1982. Cambridge, Cambridgeshire Area Health Authority (Teaching), 1982.

4 Simpson A. ed. Planning for the office of the future. London, Gower, 1981.

5 Great Britain. Department of Health and Social Security. Steering Group on Health Services Information. Converting data into information: proposals formulated by members of two workshops held in March 1982. London, King's Fund Centre on behalf of the NHS/DHSS Health Services Information Steering Group, 1982.

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