Report Series No 19

# Office Systems Strategy

# July 1981





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## Abstract

## Report Series No 19

## Office Systems Strategy

## by Steve Mumby

## July 1981

Repeatedly over the past five years enthusiastic projections of a vast and exciting market for office automation have been put forward. Mainly, these projections have been made by the suppliers of equipment, and so many of the potential users of those suppliers' products are confused about the response that they should be making to the claims made for office automation.

In this report, we examine the pressures that are contributing to the interest in office automation, and we show that the logical reasons for its development — the rising costs of administration and overheads, and the tumbling costs of technology — remain unchanged. We then report on the results the pioneers in office automation, both in the United States and in Europe, have achieved to date.

Although many claims have been made for office automation, our research has shown that, so far, no organisation has really started to achieve results on anything like the scale promised. Because of this lack of progress, we examine critically the state of office automation as it exists today in commercial organisations. Finally, we identify the strategic issues that an organisation needs to consider when it formulates its response to office automation.

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- Through regular written reports that give detailed findings and substantiating evidence.
- Through management conferences for management services directors and their senior colleagues, where the emphasis is on the policy implications of the subjects studied.
- Through working groups where the members' own specialist managers and technicians meet with the Foundation research teams to review their findings in depth.

The Foundation is controlled by a Management Board whose members include representatives from the Foundation member organisations. The responsibilities of the Management Board include selecting topics for research and approving the Foundation's annual report and accounts, which show how the subscribed research funds have been employed.

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## OFFICE SYSTEMS STRATEGY by Steve Mumby

June 1981

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#### **CHAPTER 1**

#### INTRODUCTION

Computer-based applications have long been linked to the concept of 'automation' — the replacement of human effort by machine effort. During the 1960s and 1970s, data processing systems were widely installed to assist in the routine administrative tasks that all organisations have to perform. Indeed, those systems have had a dramatic impact on the productivity of the payroll office, the sales ledger office, etc. It is true to say then that computer-based systems have already made their mark on office automation for the specialised functions for which data processing systems have been used.

More recently, many people have realised that computer-based systems potentially have a much wider field of application in the office, and the concept of 'office automation' now embraces much more than the 'automation' that traditional data processing systems have provided. Repeatedly during the past five years, enthusiastic projections have been put forward of a vast and exciting market for office automation. Furthermore, many new products and companies have materialised to offer the promise of:

- Lower administrative costs, including lower costs for communications, paperwork, energy and office accommodation.
- Improved efficiency and performance of managers and professional staff.
- Reduced numbers of clerical and secretarial staff.

The concept of the 'office' is extremely vague, and inevitably this means that there are many interpretations of what the term 'office automation' covers. Throughout, Europe, an unusually broad spectrum of observers and commentators, many of whom have, of course, vested interests, have taken up positions on this subject. It is not surprising that their claims and beliefs often conflict with one another. The logic behind the claims made for office automation — the falling costs of technology and the rising costs both of administration and overheads — is, however, persuasive, and it has been strengthened by recent economic trends.

Even so, no organisation has yet really started to achieve results with office automation on the scale the various observers and commentators have promised. In fact, many organisations, and especially many large ones, find themselves in something of a dilemma about the way they should respond to office automation. On the one hand, they fear that their competitors may be moving more quickly than they are, and that, as a result, those competitors may achieve a commercial advantage either because their administrative costs will be lower or because the quality of their service will be better, or even both. On the other hand, they are experienced enough to be sceptical of what they hear and read about office automation. They are particularly aware that there are few reports that claim genuine successes (or advancements) that have been achieved with office automation.

#### DEFINITION OF OFFICE AUTOMATION AND OFFICE SYSTEMS

One of the underlying causes of the conflicting claims and beliefs surrounding office automation is, as we have already indicated, that there is no generally agreed definition of the concept. This state of affairs is not surprising if we consider the very different personal experiences and points of view brought to the discussion by the various parties involved, including managers, computer experts, clerical staff, trade unionists, and, not least of all, the many manufacturers of equipment.

A common working definition of office automation is a prerequisite for a report such as this. To start with, we offer a broad and non-specific definition, and we then narrow it to a working definition for the purposes of this report. The broad definition is:

"Office automation comprises the application of modern technology to improve the performance of office activities."

In terms of a broad definition such as this, office automation is not a new phenomenon. In the past, this definition would have included mechanically-operated large card index systems and ingenious invoicing systems based on the use of metal addressing plates, and today it includes every office machine from the typewriter and the desk calculator to the photocopier and the word processor. It also includes a great many of the computer applications that have already impinged directly on the office, such as automated payrolls and ledgers, and databases of various kinds. These types of computer systems have all contributed to reducing the human effort needed in offices.

This inclusive definition is too broad therefore, because traditional data processing is not the subject of this report. Nor is this definition what people generally mean when they talk about office automation today. Consequently for this report we adopt the following much more restrictive working definition of office automation:

"Office automation is the application of computer-based technology, in the form of standard products, to improve general-purpose office activities."

When we use the term 'office systems' in this report we are referring to those computerbased systems that are (and will be) used to implement office automation as we have just defined it. Such office systems include word processing systems and electronic mail systems, and, in the main they have been developed since the mid-1970s. We use the term 'existing systems' to describe the other systems that are already in use in offices. Those systems include both mechanically-based systems that may have been in use for several decades, and also the data processing systems that most organisations implemented throughout the 1960s and the 1970s.

Our working definition of office automation highlights two important differences between office automation and traditional data processing:

- 1. The use of standard office automation products that do not require either programming or customising by the user contrasts sharply with the bespoke approach used in data processing applications.
- 2. General-purpose office activities, such as text processing or facsimile transmission, are usually quite distinct from the specific-purpose data processing applications, such as sales ledger systems or stock control systems, that have been developed in the past.

In our view, the significant difference between office automation and data processing lies not in the applications themselves, but in the systems approach that is adopted for automating the work that is carried out in offices. This work can be divided, on the one hand, into business functions (such as sales accounting, order processing, etc.) and, on the other hand, into the office activities (such as processing information, retrieving information, etc.) that are common to many business functions. Each business function is executed by performing the various office activities. Office systems are used to automate the activities that are common to many business functions, whereas data processing systems are normally used to automate some (but usually not all) of the activities of one business function. Consequently, if office automation is to be truly useful it must include the complete set of activities that office workers perform. In other words, office systems need to provide the facility to enable office workers to integrate several activities that were previously performed separately. In this report we refer to such systems as 'integrated office systems'.

Because we have adopted a narrow working definition of office automation we discuss, in this report, only products and techniques that are available off the shelf to end users, and that also are general enough to be used in many different kinds of businesses. Standard products provide the means for packaged solutions to office automation applications that will enable office automation to have a major impact in large and small organisations alike. Very few organisations are large enough to be able to afford to develop their own customised office automation systems. And even if they could afford to do so, even fewer of them have the technical staff available to carry out the development.

Having said all that, we acknowledge that a great deal of office automation lies outside our definition. Nevertheless, most of the activity and discussion that surrounds the subject today falls within our working definition.

#### THE PURPOSE OF THIS REPORT

This report has two purposes. The first is to examine the present status of office automation in large organisations. The second is to provide guidance to Foundation members on the way in which they should respond both to the new products and to the companies that are attempting to exploit the office automation market. We begin in chapter 2 with a review of the pressures that are forcing organisations to examine the feasibility of installing office systems. In chapter 3, we report on the experience of early users of office automation products, in both Europe and the United States. Next, in chapter 4, we examine critically the state of office automation as it is practised today by commercial users. Finally, in chapter 5, we interpret our findings in the light of the many and conflicting claims that are being made about the potential of office automation, and, based on our findings, we identify what we believe are the important strategic issues for Foundation members as they formulate their response to office automation.

In this report, we do not attempt to examine either the full range of office systems equipment that is now on offer or the potential market for such equipment. (A different kind of study would be necessary for such a review.) Instead, we examine the progress that has been made so far in applying, to real problems, the office systems tools that are available today, and we also draw those conclusions that can be made on the evidence and the experience to date.

#### CHAPTER 2

### THE PRESSURES FOR OFFICE AUTOMATION

In this chapter we review the two pressures that have resulted in the recent upsurge of interest in office automation. The first pressure comes from those organisations that are potential users of office systems equipment, because they need to contain the rapid increase they are experiencing in the cost of office staff. The second comes from the suppliers of computer-based equipment, because they need to identify large new markets for their products.

## THE PRESSURE ARISING FROM THE COST OF OFFICE STAFF

In the Western industrialised countries, the numbers and the cost of office staff have increased in a rapid and pervasive way. As most of our readers will know, C. Northcote Parkinson observed that the growth of administrative staffs was effectively independent of the activities that they were to administer, and he summarised his observations as Parkinson's Law. In recent years, this growth trend has been viewed with alarm, or resignation, or contempt, depending upon the observer's viewpoint.

Nobody needs to be reminded that office staff are very numerous and that organisations spend large amounts of money on employing them. Figure 1 shows some fairly recent statistics about the number of workers employed in offices in the United Kingdom and in the United States. In the figure, office (white-collar) workers have been divided into the two broad groups of managerial, professional and technical workers, and clerical and secretarial staff. This division reflects the way in which official employment statistics are collected in both countries.

The rightmost column of the figure (which shows the total number of white-collar workers) gives the most significant information. White-collar employment accounts for 34.2 per cent of all workers in the United Kingdom, and it accounts for 50.0 per cent of all workers in the United States.

Figure 2, on page 6, confirms that the salaries of these white-collar workers constitute huge sums of money, and it shows the actual amounts involved. In the United Kingdom, the total salary bill for white-collar workers in 1980 was £43,520m per annum, or £5,585 per employee. In the United States, at \$15,946 per employee, the total white-collar salary bill amounted to no less than \$592,420m per annum.

It must be remembered, of course, that salaries are not the only element of the cost of office staff. The cost of office space is a significant element, and it is growing larger as commercial rents increase. This applies particularly to those many offices that are located in the centres of the largest conurbations, where rents are vastly higher than those for premises used as factories or shops elsewhere. Finally, of course, so-called fringe benefits form a not insignificant element of the total cost of office staff in many organisations nowadays.

To those who still regarded office costs as a minor overhead, the very high rates of inflation in salaries in the 1970s represented a heavy blow. In most companies, too, the increases in the 1970s in office costs of all kinds have far outstripped any genuine improvements in office productivity, no matter how these improvements are measured.

Any discussion of the productivity of white-collar workers is, of course, complicated by the fact that, except for the most routine of tasks, it is most difficult to measure productivity. The more abstract and conceptual a job is, the more arbitrary is any purely quantitative measure of the job-holder's productivity.

# Figure 1 Number of workers employed in offices in the United Kingdom and in the United States in 1980

	Occupational groups				
Number and percentage of white-collar workers	Managerial professional and technical	Clerical and secretarial	Total		
United Kingdom (March 1980)			euplaiblinet.		
Number of males	2,744,700	816,900	3,561,600		
Percentage of all male workers	20.6%	6.1%	26.7%		
Number of females	921,600	3,308,200	4,229,800		
Percentage of all female workers	9.7 <i>%</i>	34.8%	44.5%		
Total	3,666,300	4,125,100	7,791,400		
Percentage of total workers	16.1%	18.1%	34.2%		
United States (December 1980)					
Number of males	15,488,000	3,007,000	18,495,000		
Percentage of all male workers	33.9%	6.6%	40.5%		
Number of females	7,844,000	10,812,000	18,656,000		
Percentage of all female workers	27.5%	37.9%	65.4%		
Total	23,332,000	13,819,000	37,151,000		
Percentage of total workers	31.4%	18.6%	50.0%		

This figure shows some official employment statistics for full-time workers who are generally regarded as office staff. The survey methods used in the two countries to obtain these figures are not identical. Nevertheless, similarities are apparent, as is the greater degree of office employment in the USA (50 per cent of the total full-time workforce).

(Sources: New Earnings Survey, UK Department of Employment, February 1981; US Employment and Earnings, US Bureau of Labor Statistics, January 1981)

This background of increasing office costs has provided a very potent stimulus for the development of new office systems that could:

- Make office staff more productive.
- Enable office staff to be reduced in number.
- Facilitate improved job performance by managerial and professional workers.

El auro	2 National	evpenditure on	white-collar	workers'	salaries	in	1980
Figure	2 National	expenditure on	withe oonar				

	Occupational groups					
Average individual salary and total national salary bill	Managerial, professional and technical	Clerical and secretarial	Total			
United Kingdom						
Average salary per employee per annum	£7,100	£4,240	£5,585			
National salary bill per annum on office workers	£26,030m	£17,490m	£43,520m			
United States						
Average salary per employee per annum	\$18,710	\$11,280	\$15,946			
National salary bill per annum on office workers	\$436,540m	\$155,880m	\$592,420m			

This figure shows the average basic salaries paid each year to white-collar workers in the UK and the USA. The total national salaries bill has been arrived at by multiplying the average individual salaries above by the number of workers given in each group in figure 1.

(Sources: New Earnings Survey, UK Department of Employment, February 1981; US Employment and Earnings, US Bureau of Labor Statistics, January 1981)

Conventional data processing applications have, of course, already gone some way towards achieving these three desired improvements. Now, many organisations have high expectations that office automation will produce much or all of the remainder of the desired improvements. They base their expectations on the previous successes with the automation of non-office jobs, and the possibility that much office work may be able to be automated in a similar way. The financial incentive to do this is obviously extremely powerful, having regard to the enormous sums of money paid out in white-collar workers' salaries and overheads.

### THE PRESSURE ARISING FROM THE NEED OF THE SUPPLIERS OF EQUIPMENT

We commented in Foundation Report No. 15 — Management Services and the Microprocessor (and also in subsequent reports), that the computer manufacturers face an increasingly harsh commercial future. The cost of their basic elements of equipment (the electronic components) is declining by as much as 30 per cent per annum, and these companies will have to double their volume of unit sales every three years merely to maintain constant revenues. Inflation has made this problem even worse by debasing the real value of their revenues.

Our comments have been borne out by subsequent events in the computer industry. Worst placed are those companies that traditionally have a high cost of sales per unit sold. The diminishing real cost of each computer sold makes it necessary for their marketing departments to work ever harder just to maintain the existing position. Those companies need

desperately to identify large and promising new markets for their products, because the traditional computer markets are nearly saturated, and the competition in those markets is intense.

Many suppliers consider that the office systems market is just such a market. Its principal appeal is that it extends from the very largest organisations down to almost the smallest. All organisations are faced with rising office costs, and they all want to contain or even to reduce those costs. In addition, the presumed benefits of office systems do not have to be sold individually and speculatively, in the same way that the benefits of the early computers had to be.

Perhaps even more important to the manufacturers of computer-based equipment is that office products can be sold off the shelf to a mass market. The sales costs per product sold can be kept very low, and this is an extremely attractive feature to an industry that has traditionally been beset by high marketing costs. The type of marketing required, however, must change from the traditional brand-awareness style to a much more aggressive and benefit-oriented style.

Against this background, it is not surprising that much of the publicity being generated about office automation derives from the suppliers rather than from either users or researchers. A most comprehensive media campaign is being waged in an attempt to present office automation products as goods that can (and should) be purchased through retail outlets. This campaign includes advertising both on television and in national newspapers by the manufacturers of office systems equipment of all kinds. Much of this advertising has concentrated on the products and their individual features, rather than on the specific benefits the user can obtain from them.

Because there are no well-defined standards for even the simplest office functions, and because, also, the cost of entry into the office systems market is low, the plethora of confusing publicity is likely to continue. Its effect is to place considerable pressure on organisations to introduce or at least investigate office automation. Not surprisingly, the suppliers are creating the impression that office systems and products are well advanced, and that many companies are forging ahead with productive developments. One result of this is that many organisations are experiencing intense pressure to imitate this presumed success.

#### CHAPTER 3

### USERS' EXPERIENCE WITH OFFICE SYSTEMS

As part of the research for this report, we identified several organisations both in the United States and in Europe that have pioneered the use of office systems. We identified, in each organisation, the executive responsible for the organisation's office systems developments, and we carried out an in-depth interview with that executive.

Our purpose with each interview was to ascertain the organisation's approach to office automation, the motivation that lay behind its actions, and the development methods that it had used. In addition, however, we were able to form views about each organisation's methodology for planning the introduction of office systems. All of the executives discussed fully with us both the achievements and the failures they felt their organisations had made, and they also told us of their organisations' future plans.

The interviews enabled us to determine four main facts about users' experience with office systems:

- 1. There is no great gap between users' experience in the United States and users' experience in Europe. Although much of the early experience has been gained in the United States, many organisations in Europe have recognised the opportunities that office systems present. Several European users of office automation technology now have experience that is comparable to the experience of the pioneers in the United States.
- 2. Most of the experience that users have with office systems relates to the use of word processing systems, although a few organisations are now also experimenting with electronic mail systems.
- 3. Most office systems projects are at either the experimental stage or the pilot trial stage, and, as yet, office systems are not an important element of the overall corporate strategy. No organisation has yet implemented or has approved plans to implement integrated office systems on a wide scale.
- 4. The rate at which organisations are implementing office systems is not as rapid as is commonly believed.

These somewhat negative findings did not conform with our original hypothesis about the state of development of office automation. Consequently, we attempted to find out why organisations are not progressing with office automation as quickly as may be popularly thought. To do this, we decided to hold a series of focus group discussions with selected groups of Foundation members in the United Kingdom. The purpose of the focus groups was to discuss such issues as:

- The perception that senior managers have of the importance of office automation.
- The roles and the responsibilities of the various departments or functions concerned with planning for office automation.
- The obstacles and the constraints that organisations expect to limit the pace and the scale of the introduction of office automation.

Although a few of the organisations that were represented at the focus groups could be described as office systems pioneers, many others were organisations that felt they ought to be doing something about office automation, but were not really sure what it was they should be doing.

In this chapter, we present a sample of the experience of the office systems pioneers. We have chosen to report the experience of pioneers in the United States, not because there are no pioneers elsewhere, but because the experience of United Kingdom users is reported later in the chapter.

#### EXPERIENCE IN THE UNITED STATES

As we discussed in chapter 2 (on page 4), office employment in the United States costs an enormous amount of money, in terms both of direct salary costs and the associated overhead costs. The United States therefore represents a huge potential market for those office automation products that can either displace costs in the office or improve the effectiveness of office workers. Many organisations in the United States now have some experience of using those products, and we present below the experiences of four office systems pioneers as individual case histories. As will be apparent, the experiences of these four organisations are not typical, because they represent the leading edge of the application of office systems technology.

In all the four organisations, our study included detailed discussions with the vice-president responsible for office automation. Three of the organisations in our case histories are banks, and the fourth is a large manufacturing company. We have chosen to include three banks because, if any one industry sector can claim to be the pioneer in office automation, it is the banking and finance sector.

#### **Case history 1**

The first case history is of a large bank that has its headquarters on the West Coast of the United States. In 1978, the chairman of the bank became aware of the increasing number of budget proposals that included a provision for word processors. He concluded that the acquisition of word processors ought to be controlled centrally, and as a result, he made the bank's industrial engineering department responsible for all aspects of word processing throughout the bank. The industrial engineering department quickly decided that, to obtain the maximum benefit from their word processors, the bank should concentrate the equipment in just one department. This department would then provide a centralised word processing service to all the headquarters staff.

The move to a centralised word processing service was a radical change for the bank, because previously there was no centralised typing service. The plan to establish the new word processing centre was cost-justified by predicting the reductions in secretarial costs that would be achieved when the centre was established, and also by assuming that most managers would relinquish their local typing facilities.

The word processing centre is now operational, and it is equipped with machines (mainly Wordplex systems, but also a few IBM MC82s) that have been 'liberated' from managers' offices. The plan is to replace all of the equipment with Wang word processing systems.

The centre accepts any kind of typing work from any of the 2,800 employees in the bank's headquarters, either in manuscript form or via a telephone dictation system. All work is read by trained proof readers before being returned to its originator. The average turnround time for work is five to six hours, although urgent work is handled more quickly than this.

Even though the plan was fully supported by the board, there was considerable initial reaction against the new centre by those professional and managerial staff who were to lose their private secretaries. Now, however, most users are very satisfied with the centre because it has concentrated on providing a first-class service. The predicted reductions in secretarial costs have been achieved, and only the bank's most senior vice presidents now retain any kind of local typing facility, and that is for the typing of highly confidential documents.

Although the move to the word processing centre was carefully planned, and has achieved the predicted benefits, the bank does not yet have any formal plans to link its word processing system to other types of information processing system. The bank has not yet considered introducing a formal link between its office automation (word processing) applications and its data processing applications. Data processing staff have, in fact, not been involved at all with the current word processing developments.

The industrial engineering department has, however, developed prototype designs for simple 'management information' terminals. If the bank adopts a terminal of this type, that terminal could form the basis of a wider office automation strategy, because the prototype designs include not only word processing functions, but also information storage and retrieval facilities and an electronic mail capacity. The word processing functions provided by the prototype designs are deliberately simple. For example, the keyboards use a non-QWERTY layout to discourage managers from typing.

As the next step, the industrial engineering department plans, as a pilot trial, to install several of the prototype management information terminals in one user department. The department is not sure, however, that the bank will finance this pilot trial, because it is unable to provide the board with an adequate cost-benefit justification for the proposed expenditure. The department has the users' full support for the pilot trial, and it hopes that this will help to persuade the board to allow it to proceed with the trial.

#### Case history 2

When the data processing department of another major bank on the West Coast of the United States realised that there was a growing demand from user departments for word processing facilities, it took the initiative and decided that word processing needed to be carefully introduced into the bank. A small team of people was established for this purpose within the data processing department, and this office automation team was given the responsibility for creating several word processing centres throughout the bank. The proposal to create the centres was cost-justified on the basis of estimated reduced secretarial costs, and the assumption that many managers would lose their local typing facilities.

Some of the word processing centres were subsequently established, and they have proved to be successful. Initially, they were equipped with Lexitron equipment, but this is now being replaced by Wang equipment. The reason for the change is the communications facilities that are expected to become available with the Wang equipment. Two of the centres were not successful, however, and they have now been abandoned. Those two centres were designed to serve several of the smaller and geographically-dispersed offices, but it was not possible to solve the problems of providing an effective working link between the offices and the centre. These smaller offices now have their own locally-based word processors, and, as a result, the expected savings in secretarial costs have not been fully achieved.

The office automation team also decided to explore the concept of administration support units. It proposed that each unit would contain staff who would support either a group of managers or a group of professional staff. The administrative support unit staff would not be regarded as secretaries, but as 'administrative assistants' who could handle some of those simpler and more routine tasks that managers' secretaries perform at present. A senior secretary, a manager, and a member of the professional staff were drafted into the office automation team to assist the team in defining the requirements for and the functions of administration support units.

The team has spent a considerable amount of time and effort in trying to acquire an understanding of the manager/secretary relationship, and in assessing those managerial tasks that could be delegated to a well-trained (and well-supported) administrative assistant. The office automation team has, however, neither received nor sought board-level commitment to the concept of administration support units.

The next step will be to establish a pilot administration support unit, probably within the data processing department. The office automation team would also like to develop an executive terminal system, but at present it has not fully identified the facilities that such a system should provide. The team believes that the pilot administration support unit will produce information that will help the team to identify the facilities that are required.

The office automation team also believes that there is considerable support within the bank for an electronic mail system. The team bases this belief on the reactions of those staff members who have access to a rudimentary electronic mail system that the data processing staff have developed to run on the bank's mainframe computer. Although this system is said to be extremely difficult to use, it has proved to be popular with those who have access to it.

#### **Case history 3**

Towards the end of 1977, a large Midwestern bank in the United States recognised that it had a serious problem in handling the growing volume of printed outputs produced by its computer systems. As a result, the bank decided to change its systems philosophy, and the printouts are now held in computer files that are accessible to users through visual display terminals equipped with a simple enquiry system. This enquiry system has since been expanded to provide a more general enquiry system, which is able to access all the major computer files.

By the end of 1978, the bank possessed an internal network that linked all the bank's locations to its head office. It also had an internal network that provided the enquiry system. This meant that it had the basis on which to develop an electronic mail system. The team that had developed the enquiry system renamed itself 'the office automation team', and it began to develop the bank's first electronic mail product.

The electronic mail system the team developed now spans the United States, and it also provides links to the bank's European offices. There are about 1,700 users of the system, and most of them are satisfied with the system's facilities and make extensive use of them. The users have not felt it necessary to establish a quantitative measure of the benefits of the system. Indeed, many of the more recent users have acquired mailboxes as a result of pressure from their colleagues and their immediate superiors who were already using the system.

After it had developed the electronic mail system, the office automation team installed several word processing systems, and these were used to form a shared word processing centre. These word processors were linked into the electronic mail system. The team also installed word processing systems in the homes of two employees. These home systems were linked into the bank's network, and thus into the electronic mail system and the word processing centres.

The word processing centres are now extensively used, and together with the message

system they have provided the bank with a very easy means of permitting staff at several locations to work on the same document. However, the word processing systems installed in the homes of the two employees were not successful. One of the two involved decided to give up work altogether, and the other asked to be transferred to one of the bank's word processing centres.

The office automation team also experimented with the use of telephone answering machines. These machines were linked to managers' telephones, and they enabled the managers both to receive messages when they were away from the office and to record messages when they did not want to be disturbed. About 120 managers now have telephone answering machines attached to their telephones, and some of them claim that the answering machines have cut by nearly half the amount of time they spend on the telephone. As with the electronic mail system, there has been no formal attempt to quantify the benefits of the telephone answering machines. The managers believe the service is worth to them what they have to pay for it.

The office automation team now intends to design a special desk that has incorporated in it a terminal, a telephone and a telephone answering machine. The desk will be designed to appeal to the bank's vice-presidents and senior vice-presidents.

Despite the existence of the office automation team, there is no formal plan for co-ordinating office automation plans throughout the bank. The bank regards the office automation team as a small in-house vendor of systems and services, and line managers have full authority to decide whether or not to buy the team's products. The office automation team believes that its opportunistic approach is the right one, and it points to the success of its products as justification for that belief.

#### Case history 4

In mid-1978, the board of directors of a large manufacturing company that has its headquarters on the East Coast of the United States decided that office automation had developed sufficiently for them to consider the benefits it might bring to their company. The board also recognised that they had only a very vague understanding of exactly what an 'office' consisted of, and only a vague idea of how much their offices were costing them. They decided therefore to appoint a vice-president for office automation, whose first task would be to assemble a comprehensive financial and organisational picture of the company.

Four months later the vice-president had constructed this picture, and he then presented his report to the board. The board then asked him to produce a further report to answer four basic questions about the company's office operations:

- 1. Why should we consider changing our office operations?
- 2. What will happen if we do not change our office operations?
- 3. In what different ways could we change our office operations?
- 4. In what particular way would you recommend that we change our office operations, and for what reasons?

The board subsequently approved the approach that the office automation vice-president recommended. He then developed a more detailed methodology for implementing the initial stages of the approach. Although the company operates a large data processing department, he did not involve that department in the formulation either of the documents or the methodology.

The company subsequently established a small office automation team headed by the office automation vice-president. The team has now installed five pilot word processing installations, and each one is shared by two or three secretaries, who can elect to use either the word processor or their typewriter. The pilot installations will continue to be monitored closely, and, if they are eventually judged to be successful, more systems will be installed throughout the company.

The office automation team believes that its greatest achievement to date has been to gain a full understanding of the company's present office environment, and to establish clearly the company's reasons for developing office systems. Further progress will be slow because funding both for the word processing systems and the office automation team has been difficult to obtain. Although the board recognise the potential benefits of office automation, corporate priorities have dictated that available funds be channelled into other developments.

#### EXPERIENCE IN THE UNITED KINGDOM

In late 1980 and early 1981 we conducted a series of focus group meetings, and these were attended by representatives of twenty-seven United Kingdom Foundation member organisations altogether. Our aim with these meetings was to determine the stage of development that member organisations had reached with their use of office systems technology, but more importantly it was also to determine the real obstacles that were preventing office systems being implemented at a faster rate. We chose to use focus group discussions because we were aiming to collect qualitative information (rather than quantitative information) from member organisations, and focus groups are generally recognised to be an excellent way of obtaining this type of information. In addition, it was essential that we should be able to compare easily the different experiences of member organisations, and we believe that discussion (rather than individual interviews) both aided and enhanced that comparison.

Foundation members are typically large diverse organisations, so clearly the opinions their representatives expressed during the focus group meetings cannot be taken as representative of United Kingdom organisations as a whole. Nevertheless, the use of office systems technology is likely to be pioneered by large firms, and so the views of the representatives of twenty-seven Foundation members are significant.

The member organisations whose representatives attended the discussions came from nine different industry sectors as shown in figure 3. We had originally excluded from the discussions those members that supply office systems equipment, because we wanted to research the experiences of only the users (or potential users) of office systems. We did, however, admit the representatives of two supplier organisations to the discussions because they both came from their organisation's own internal management services department. In the event, the only distinguishing feature between these two supplier organisations and the other twenty-five organisations was that the former were obliged to install and use their company's own products if at all possible.

The Foundation members' representatives who attended were mostly the senior managers responsible for office automation. Two of the representatives, however, were internal consultants. Each participant in the focus groups claimed that his organisation had some kind of office systems plan, but it was clear that the scope, the level and the aims of those plans varied greatly. The participant whose view most closely represented a consensus view said that his organisation required a planning mechanism that sets the proposed short-term actions in the wider context of what the organisation thought it was aiming for. In particular, this participant needed to be reasonably certain that anything new he did now would not debar any important options at a later date.

Industry sector	Number of organisations
Brewing	2
Chemical	4
Engineering and construction	3
Finance	2
Food processing	5
Government	2
Oil and energy	4
Retail and service	3
Suppliers of equipment	2

## Figure 3 Organisations represented at the focus group discussions

We now summarise, under four headings, the main conclusions that we have drawn from the focus group discussions. First, we discuss the way in which the organisations whose representatives participated in the discussions control their office systems developments. Second, we report on the involvement of trade unions in office systems developments. Third, we discuss the achievements to date of those Foundation members whose representatives participated in the focus groups. Finally, we discuss the factors that the focus group participants believed were determining the rate at which office systems were being developed.

#### The control of office systems development

It became clear early in the discussions that no two member organisations controlled their office systems developments in exactly the same way. Nevertheless, we were able to identify five general types of control that encompass all of the twenty-seven organisations whose representatives participated in the discussion, and we discuss these types below:

- 1. In eleven of the organisations, the end user has overall control of the office systems developments, either because he has the ultimate decision-making responsibility or because the equipment was acquired on his budget. There is, however, also some form of central advice and co-ordination.
- 2. In three of the organisations, the end user has overall control of the office systems developments (for the same reasons as in 1 above), but the information systems department has the authority to veto the end user's decisions.
- 3. In two of the organisations, the end user has overall control of the office systems developments, but a central body either imposes certain standards (such as the communications interfaces) or determines the buying policy.
- 4. In nine of the organisations, the information systems department has total control of all

aspects of office systems developments. In these organisations, the end users have an advisory role only.

5. The remaining two organisations have no central control or co-ordination of their present office systems developments.

Apart from those organisations that came from the finance sectors, both of whose method of control was of the type quoted in 4 above, there was no correlation between industry sector and the method of control. However, both of the organisations that had no central control or co-ordination of their office systems developments were highly decentralised organisations.

The five types of control that we identified showed that in more than half of the organisations whose representatives participated in the focus group discussions (sixteen out of twentyseven), the end users have overall control of the office systems developments. During the discussions, however, it became clear that even amongst these sixteen organisations, the office systems plans and policies are determined centrally. Even so, the representatives of most of the organisations (including a few of those that controlled all of the developments from within the information systems department) said that their organisations would permit (or else would not be able to prevent) some end users from acting independently.

#### The involvement of trade unions

The focus group participants were invited to dicuss the role of trade unions in the development of office systems, and the discussion showed that the involvement of trade unions varies considerably from organisation to organisation. Two of the organisations do not have any of their clerical staff represented by a trade union, and the representatives of a further nine organisations were unwilling to comment. Ten of the participants said that their organisations had not involved their trade unions in their office systems development plans. The representatives of the remaining six organisations said that their organisations had involved their trade unions in their office systems development and, in general, they had found that the trade unions had been prepared to examine the issues rather than adopt an immediately defensive stance.

#### The achievements to date

The participants discussed the achievements that their organisations had made in developing and implementing office systems. Twenty-five participants reported on the progress their organisations have made to date. Most of their organisations' achievements have been in word processing, although two organisations have had some experience of electronic mail, and a few have had some experience of multifunction systems. The remaining two organisations are not implementing office systems at the present time. The representative of one of these two organisations said that the right products and the necessary interface standards did not yet exist. The other representative said that his organisation was not implementing office systems at present because those systems could not be justified in cost terms. One other participant commented that, although his organisation had implemented some office systems, it was holding back from implementing any more systems because he himself was not sure whether they would help to achieve his organisation's objectives.

With only one exception, the twenty-five participants who reported on their organisations' progress to date thought that their current office systems implementations should be regarded as experimental. However, a few of these participants claimed that their organisations have achieved general cost savings with these experiments. Several participants commented that they considered experimentation to be an essential part of developing an overall corporate strategy for office systems. Others, however, considered that office systems would always be implemented in a piecemeal way, without any need for a general strategy.

As with the control of their office systems developments, no two member organisations have had exactly similar achievements. However, we were able to group the achievements of the twenty-five organisations into the following seven categories:

- 1. Five organisations claim that they have achieved savings in expenditure (usually on secretarial salaries) through the use of word processing.
- Seven organisations believe that they have improved the productivity of some of their staff, although the representative of one organisation admitted that this improvement was based on a very subjective judgement.
- 3. Three organisations claim that they have accommodated growth in their businesses without a corresponding growth in staff. However, all three organisations have also been increasing their use of data processing at the same time, and it was not clear whether this accommodation has been facilitated by data processing systems or by office systems.
- 4. Four organisations consider that their biggest achievement is that they have learned a great deal about the subject they were dealing with.
- 5. One organisation, in contrast, considers that its biggest achievement is the new problems that it has created by what is has already done.
- 6. Three organisations believe that their biggest achievement is that they have put in a lot of 'building blocks' that will help them with their future office systems developments.
- 7. Finally, two organisations believe that they have achieved very little, and their representatives commented that it was much easier to see what their organisations have not achieved.

#### Factors determining the rate of development

The focus group participants were also invited to discuss the factors that they thought had determined the rate of development of their office systems. All the participants contributed to this part of the discussion, and in every case the factors identified were seen to be inhibiting progress rather than promoting it. We were able to identify five factors that most of the participating organisations thought were inhibiting their progress with developing office systems, and we discuss them below:

1. The perceived need for, and the perceived benefits of, office systems

Many of the participants were convinced that most of the potential end users of office systems had not perceived any need for office systems. This lack of perception seemed to manifest itself in many ways. Most often, however, it manifested itself as the end user's inability to determine why change was necessary. One participant commented that this limited awareness of (and enthusiasm for) office systems made it difficult for him to find suitable applications for office systems that would show quantifiable benefits.

In addition, most participants said that they were still uncertain whether or not office systems would produce measurable benefits. Several participants took this point further by commenting that they were still not sure whether office systems would contribute directly to the profitability of their organisations.

One participant commented that the suppliers of equipment did not help organisations develop a perception of genuine needs. He thought that suppliers already had too many equipment solutions looking for problems, and they neither knew how to identify the real problem nor helped the user to do so.

#### 2. Cost justification and the availability of finance

Nearly all of the participants said that their organisations have justified their existing office systems experiments by some kind of cost-benefit analysis. Most participants considered that intangible benefits (such as better information, better decisions and other 'added-value' benefits) were specious ones which, in the prevailing economic conditions, no organisation would risk paying for. The participants recognised, however, that cost-benefit analysis was difficult when the quantifiable benefits of office systems were so uncertain. With the limited amount of money available for capital investment at the present time, many participants considered that an unsound cost-benefit analysis for office systems would not be well regarded by those responsible in their organisations for allocating the limited funds available.

Several of the participants thought that the limited sums of money their organisations had spent so far on developing office systems had contributed to the credibility gap that still existed concerning the value of office systems. A very limited expenditure, they considered, could not achieve any worthwhile return. They argued that, to be able to provide an office system that is valuable to its users (and so provides a financial return), it is necessary to use network systems and database systems that require much higher levels of expenditure. Those participants thought that, even if the benefits of office systems were substantial, the cost of achieving them would be very high.

#### 3. Existing investments

Most participants commented that the value (and the cost) of their organisations' existing investments tend to be too easily forgotten in any discussion of office systems. These investments relate not just to equipment, but also to the staff in an organisation whose knowledge, skills, and desire to maintain the existing 'corporate culture' are very high. One participant considered that the correct timing of any change that affected the existing investments is an essential prerequisite to the successful introduction of office systems. He admitted, however, that he did not know when the time would be right to introduce office systems.

Most participants believed that the attitudes of office staff, and the desire of those staff to maintain their status and their vested interests, would be inhibiting factors when new office systems are introduced.

#### 4. The availability of products

Nearly every participant felt that the progress of his organisation was being hampered by a lack of suitable office systems products. A few participants qualified this by saying that the lack was really a lack of suitable products at a realistic price. The consensus view was that most suppliers lacked suitable products because they were unable to decide on their future course of development. However, nearly all those participants who commented on this lack of products found it difficult to say exactly what they did need. All that they could say was that today's products were not what they wanted.

#### 5. The availability of skills

A few of the participants believed that their organisations were being hampered by a lack of staff skilled in the various aspects of office systems. They considered that data processing systems analysts did not have a good understanding either of office procedures or of office staff. They considered, moreover, that, even if the data processing staff were suitable, they would not be available to work on office systems developments because they were working exclusively on the higher-priority data processing systems. One participant considered that if Organisation and Methods (O & M) departments were rebuilt, or even if they were revitalised, they would have an important role to play in the development of office systems. He considered that the use of O & M staff has the particular advantage that they do not have a vested interest in the existing data processing systems. Overall, the participants in the focus group discussions considered that the above five factors that inhibit the development of office systems represent serious constraints that it would not be easy to overcome. In addition, several of the participants considered that, because of these inhibiting factors, office systems would not have a major impact on their organisations until at least 1983 or 1984. Most participants were even more pessimistic than that. They believed that office systems would not have a major effect on their organisations until 1985 at the earliest.

#### **CHAPTER 4**

#### THE STATE OF OFFICE AUTOMATION TODAY

In this chapter, we summarise the main findings of our research, and we examine critically the state of office automation as it has been achieved in practice by commercial users today. First, we examine the gap that exists between the popular conception of the state of development of office automation and the situation as it actually exists today. Second, we identify those issues that still need to be resolved before this gap can begin to be closed.

#### THE GAP BETWEEN THEORY AND PRACTICE

The experiences that we described in chapter 3 show clearly that the achievements of office automation suggested by some of the advertisements for office products (and, indeed, by many of the papers and articles presented by consultants and industry experts) are highly exaggerated. There is, at least as yet, no technological wonderland in which armies of clerks have given way to all-purpose integrated office systems. So far, executives do not browse through automated filing systems in preference to either retrieving documents from conventional filing systems or asking their secretaries to unearth the documents for them.

In fact, the implementation of office systems to date has been rather pedestrian. We did not come across a single organisation whose achievements in office automation (as we have defined the topic in this report) went very much beyond simple text processing and internal communications systems. We met several experiments with office systems that were in progress, but some of these were speculative ventures intended either to broaden the organisation's experience or to determine more precisely what its real needs are.

Two findings of our research were particularly interesting:

- 1. Few organisations have been able to prove, on economic grounds alone, that their expenditure on office systems has produced a worthwhile return.
- 2. No ideal (or even common) strategy has become evident for guiding the development of office systems within organisations.

The implications of these rather negative findings are far reaching. If the sample of organisations that we studied represents the leading edge of the use of office systems then we can conclude that the practice of office automation is a world apart from the 'theory', which consists largely of hopeful predictions made by the marketing departments of the suppliers. Although we know from the data presented in chapter 2 that the potential savings from effective office automation are enormous, the practical savings achieved so far have been modest at best.

In developing and implementing office systems, users receive little practical help from outside their own organisation. This situation contrasts with the early days of the mainframe computer industry, when the computer manufacturers were often prepared to assign their systems engineers to customers' sites (for no additional charge) to assist in developing the users' first computer applications. This was, in effect, a 'free' consultancy service, the true costs of which were bundled in with the hardware. Today, the economics of manufacturing electronic products has changed. Competitive pressures now prevent the manufacturer from including anything more than rudimentary assistance in the basic price of his equipment. The user is left to his own devices with the products that he buys off the shelf. This means either that he may not purchase wisely, or that he may not use the products effectively.

Ironically, although there are plenty of well-advertised office products on the market at keen prices, users appear to be approaching them in a tentative and experimental fashion. Our research indicates that this reticence stems from a fundamental uncertainty in users' minds about what their specific needs really are, rather than from any doubts they have about the intrinsic merits of the products on the market. Users seem, in effect, to be asking whether they really have the problems for which these devices are the solutions. They are unsure about the answer to this question, because they believe that their real problems may be quite different from those that the existing products purport to solve.

The users' dilemma is not eased by the apparent contradictions in the claims made for office automation. For example, several industry sources, in their predictions about the office of the future, have made a great play of the concept of the 'paperless office'. This concept rests uneasily alongside the current generation of office products (text processors, photocopiers, telex-like devices, and so on), which appear to be designed specifically to increase the amount of paper used within offices.

Some of the organisations that have experimented widely with such devices regard this conflict as more than just an amusing irony. The concept of 'information pollution' is one that we have heard mentioned more and more frequently. This term refers not only to the proliferation of paper documents, though this may be wasteful in its own right. It refers mainly to the increasing number of separate interruptions to an employee's normal work that the growing flow of messages of one kind or another within an organisation causes. It is becoming ever easier either to generate and circulate messages or to create and circulate additional copies of interesting, but non-essential, information. These messages may now be transmitted and presented electronically rather than physically, but this improves the end result very little. The proliferation of messages and interruptions can actually reduce the quality and the effectiveness of the work of office staff, which is the reverse of what these office systems were intended to achieve.

With results such as this now commonly being talked about, and with little sign of impressive achievements in office systems by the pioneers of the use of office systems, it is not surprising that potential users have adopted a circumspect and rather sceptical view of office automation and its benefits. Even so, we consider that office automation still offers considerable potential benefits.

#### THE ISSUES YET TO BE RESOLVED

Our research has suggested that office automation has somehow outpaced itself. The economic needs of the manufacturers have combined with the cost pressures on the potential users to cause the launch of many new office products onto the market before there was any kind of conceptual framework for them. Until a solid body of practical experience has been built up, this lack of a conceptual framework is likely to lead to some disappointment both for manufacturers and users.

The eventual outcome of the experience to date is still in doubt. The very fact that so many important questions have not yet been resolved must mean that, when the answers are finally determined, some of the outcomes that some people assumed will be proved wrong.

Many organisations have told us that, in the present economic conditions, they are unable to

progress rapidly with speculative office automation developments. These conditions are undoubtedly holding back many organisations' plans for office automation, but meantime we have identified, and discuss below, three other important issues that still need to be resolved. These issues, and the way in which they are eventually resolved will have a great influence on the future development of office automation.

#### 1. The nature of office work

This is the most vital and the most pressing of those issues that have not yet been sufficiently addressed. Office work is for the most part knowledge work, and, unlike work on an assembly line, knowledge work is seldom machine-paced. Instead, it depends upon the intelligence and the abilities of each employee. Furthermore, the more senior an employee is (and the more valuable he is to the organisation), the more varied and the less predictable are his duties and the tasks he sets for himself. Millions of such jobs exist, and each has its own unique requirements. It may well be that the individual job requirements are just too diverse for standard office automation products and systems to make an important contribution to very many of them.

The history of automation itself has a bearing on this issue. The substitution of machine effort for human effort lay at the heart of the Industrial Revolution, and so there is nothing new in the idea of automation. But, in office work, computer applications (at least in the larger organisations) have already automated most of the completely routine clerical tasks. This means that, in those organisations, only the non-routine (and intrinsically more difficult) tasks remain to be automated. It is not yet clear whether it is reasonable to expect a standardised approach to make an appreciable impact on that kind of work.

Studies of offices and of the people who work in them have tended to be biased to a particular aspect. For example, some studies have concentrated on the people and the processes in offices and have taken insufficient account of the capabilities and the limitations of the technology that might support office work. Other studies have placed too much emphasis on existing technologies such as word processing or electronic mail, and have taken no real cognisance of their potential role. This emphasis on existing technologies tends both to focus on individual tasks and to lead to piecemeal mechanisation, rather than to automation in its full sense.

#### 2. Preoccupation with hardware

The computer industry has always emphasised the latest hardware and techniques at the expense of a better understanding of the problem. This approach has not prevented good applications from being developed, but it probably has not helped the process. In this respect, office systems are likely to differ from bespoke computer applications for two reasons:

- The users and the administrators of office systems are unlikely to share the computer professional's enthusiasm for new technology per se.
- The hardware will not be merely a basis for system development, as it is with bespoke applications. Rather, the system as delivered will either perform as needed or it will fail altogether.

In other words, office systems products (unlike computers) will probably be judged strictly by the benefits that they actually bring to an organisation. Novelty and gadgetry will become far less attractive than they have been in the past.

### 3. Social and psychological factors

Most office automation is directed either towards reducing the number of staff in offices, or towards changing the ways in which staff perform their jobs. Although many office systems enthusiasts appear to overlook the prospect, these changes may well be resisted, and they may well be resisted by individuals other than those whose jobs may be automated out of existence.

Another factor is that administrative support staff in offices usually have many more informal duties than their job descriptions suggest. Personal secretaries to senior managers may be categorised as typists and filing clerks, but often they act on their superiors' behalf in many important ways. Also, their superiors view them as corporate status symbols, which they would relinquish only very reluctantly.

In addition, the office is a social and a political melting pot in which a good deal of informal communication takes place, much of it non-verbal and extremely subtle. Any system of office automation that attempted to reduce the level of personal interactions in offices would probably fail.

An indication of the difficulties of implementing office systems has been demonstrated in the experiments that some organisations have conducted in allowing clerical employees to work from home and to communicate with their offices via keyboards and telecommunications links. (We mentioned one such experiment in our third case history on page 11.) Despite their initial enthusiasm for working at home, some members of staff changed their minds after just a few months, and preferred to commute daily to their offices.

In summary, our research has shown that, although many organisations are experimenting with office systems, there is as yet no widespread application of office automation. Many organisations are well aware of the difficulties that still have to be overcome before the development of office systems can proceed beyond the experimental stage, and they are now seeking advice as to the direction their developments should take. In the final chapter of this report, we provide such advice.

#### **CHAPTER 5**

#### STRATEGIC ISSUES

Although there is, so far, no conclusive evidence that office automation will deliver largescale benefits, the underlying case for office automation — the apparently poor productivity record of the office, coupled with the increasing cost of maintaining it — remains as persuasive as ever. For this reason, many organisations will at least wish to establish a policy and to prepare the ground for the time when conditions become more favourable. Some organisations, and particularly those whose future competitiveness may depend heavily on the efficiency of their office staff, may choose to proceed as quickly as they usefully can. In this chapter, we offer guidance to those organisations. We base this guidance both on the limited experience there has been so far, and on our own assessment of future developments.

### A STAGE THEORY FOR OFFICE AUTOMATION

Richard Nolan put forward his four-stage theory for data processing in 1973, and later extended it to six stages, as shown in figure 4 overleaf. The key aspect of his theory, demonstrated by the classical 'S'-shaped learning curves in the figure, is that organisations take time to learn about and to adjust to new information systems, and that these information systems inevitably alter the way the organisation operates. Because of the differences between data processing and office automation (summarised on pages 2 and 3), organisations must inevitably undergo a separate learning process in installing office automation. Yet there are sufficient similarities between office systems and data processing systems to suppose that the learning process for office systems can also be expressed in terms of a number of stages. We postulate three stages for office automation, which we discuss below in terms of their technological characteristics:

### Stage 1: Stand-alone/activity-oriented automation

The word processor is most obviously characteristic of this stage. Other stand-alone devices, such as microcomputers, are also likely to feature in this stage by undertaking activities such as financial modelling or personal filing! It is also more than possible that some organisations' developments in the data processing area will already have brought those organisations either into or through the first stage of office automation. For example, those organisations in which the data terminal is already an accepted piece of office equipment may be well positioned to move immediately into stage 2.

## Stage 2: Co-operative/activity-oriented automation

Electronic mail is an obvious example of this second stage of office automation. As soon as an element of co-operation is introduced into office systems, other than on a very localised basis, the demands placed both on the equipment itself and on the user organisation increase substantially. The move from batch data processing to on-line data processing provides a parallel from the technical point of view. The organisational impact stems from the need for all the affected individuals to change their working habits more or less simultaneously, and also to adopt new and broadly compatible working methods.

WP

EMa/EMe



# Figure 4 Nolan's stage theory of the way in which information technology is absorbed into an organisation

## Stage 3: Process-oriented automation

In a process-oriented approach to office systems, the office is viewed as a set of procedures or processes, each of which contributes to the objectives of the department and hence to the objectives of the business. Each process consists of a number of activities. Thus, the staff recruitment process which is carried out by the personnel department, will usually include communication activities (for example, by mail and by telephone), interviews, document preparation and document filing, and so on. - + F(NANCE + ROTUN)

## Implications of a stage theory for office automation

Some researchers have argued that the process-oriented approach to office systems is the only valid one and, by implication, that an activity-oriented approach (like word processing) is unsound. In terms of office systems design this argument has some merit, and we discuss this point on page 29. When it is considered in practical terms, however, and when account is taken of the limitations both of current technology and of the collective understanding of office systems, the argument becomes much less convincing. Although we agree that the design of office systems should seek to focus on procedures or processes, we would nevertheless expect the implementation of office systems to go through some interim stages.

The process-oriented approach implies that several diverse office activities are co-ordinated within the office system, either in terms of technology (for example, by a multifunction work-station) or in terms of information structures and information exchange. This approach, of course, implies that sophisticated equipment and software will be used. Also, it will inevitably severely strain the ability of office staff to collectively assimilate new methods of working. In most office environments, therefore, a gradual approach will be essential.

We deliberately used the term 'co-ordinated' above, rather than the term 'integrated', which might normally have been expected in this context. The reason for our choice of term is that the essence of office systems is, we believe, that they should act as utilities that support office staff. They should not, we suggest, seek to automate processes totally. We make this assertion not because of any romantic desire to preserve the office in any way like its present form, but because the essential function of the office must be preserved if the office is to continue to serve the organisation to which it belongs.

The office generally serves as a communication centre and as a buffer between the production units and the distribution and control mechanisms within the organisation. It also serves as a buffer between the organisation and the outside world. In that capacity, it provides much of the flexibility that every organisation needs if it is to be able to respond to changing circumstances and unexpected events.

That flexibility depends to a large extent on the exercising of human judgement and human discrimination. If office systems are to contribute to the effectiveness of the organisation as a whole they must seek to improve productivity in the office. In doing that, however, they must not detract from the ability of office staff to apply judgement where it is needed. The effective support for human judgement is part of the potential gain to be had from office automation.

Two important implications of our stage theory for office automation deserve particular emphasis. First, each stage tends to be a prerequisite for the next stage, and so it cannot easily be skipped. For example, in terms of our postulated office automation stages, a cooperative grouping cannot be formed until stage 1 has built up a sufficient 'critical mass' both of devices and of people who are adept at using those devices. Generally speaking, such a grouping will need to include all, or at least most of, the people with whom the members of a group co-operate in performing the activities that are to be automated.

Second, the benefits to the organisation tend to increase with each successive stage. This tendency is clear from the nature of the benefits that it is reasonable to expect at each stage. Activity automation (stage 1) is clearly most likely to displace administrative costs, whereas co-operation (stage 2) should improve both the organisation's response and its administrative effectiveness. Process automation might reasonably be expected to carry the gains one stage further and to begin to enhance the quality of decision making.

## JUDGING THE PACE OF THE OFFICE AUTOMATION EFFORT

Our stage theory for office automation suggests that organisations need to be content with limited gains in the initial stages, in anticipation of their being able to achieve faster progress at a later date. Our theory does not, on its own, indicate what the right time is for an organisation to embark on stage 1 to enable it to be ready for stage 2 as soon as the technology appropriate for that stage is sufficiently advanced.

Although Nolan submitted the thesis that an organisation must learn about data processing, and that the learning process cannot be accelerated beyond a certain pace, many people may believe, with hindsight, that their organisations would have benefited more had they

embarked on data processing later than they actually did. Those organisations are likely to be cautious when they consider whether or not to embark on a programme of office automation. As we have shown in this report, the understanding both of office automation and of the technology available to undertake it are immature. It follows from this that if an organisation makes a major effort now to automate the office, it risks paying the penalty of being a pioneer. If, on the other hand, it waits, it risks being left behind by those of its competitors who have taken the gamble of starting early. It will then be at a disadvantage because they will have built up the experience necessary to progress more rapidly to the later stages of office automation, where the benefits do become significant.

Any attempt to address this issue at present would inevitably be speculative. We believe, nonetheless, that there are three possible approaches to office automation that organisations can adopt, as we discuss below:

1. Wait and watch the developments

This approach is valid for those organisations that are under no real and immediate pressure to reduce their office costs. Because they are not under pressure, those organisations are unlikely to gain senior management support for a serious assault on office automation, bearing in mind that this would almost certainly entail significant expenditure for uncertain gains.

Those organisations for which this approach is valid will be best advised to put their resources into data processing (or, if appropriate, into process automation) while they wait for office equipment both to improve in functionality and to reduce in price.

### 2. Respond pragmatically to opportunities

Those organisations that are labour intensive or that operate under intense competitive pressure are less likely to be willing to adopt the passive approach to office automation implied in 1 above. Without clear and convincing strategies to pursue, most organisations that do see the need to take action on office automation must, we consider, respond pragmatically to any opportunities that present themselves. In addition, they might usefully carry out controlled experiments. The objective either way would be to build up experience with office systems, although, of course, they might, in the right circumstances, also achieve either some genuine cost reductions or some gains in effectiveness.

#### 3. Force the pace

Those organisations that are determined to press forward quickly with office automation will undoubtedly gain support from the suppliers of equipment. But whether they will succeed in implementing office automation projects will depend heavily on their own efforts and determination. Assuming that an organisation can define a valid systems approach, any success it has will almost certainly depend on one or more of the following three factors:

- The ability to reorganise office staff to suit the tools available at present.
- A major investment in bespoke software, and possibly in bespoke hardware.
- A major education and training programme.

### DETERMINING THE FOCUS OF THE OFFICE AUTOMATION EFFORT

Irrespective of whether an organisation takes a pragmatic approach or a determined approach to office automation, it will need to determine the focus of its efforts so that it may

narrow both the scope of the necessary investigative work and the range of options it will have to consider. We put forward below three alternative (but not mutually exclusive) ways in which an organisation might determine the focus.

#### Focus on following the technology

Although it might seem like an abdication of responsibility for an organisation to follow the technology, in practical terms such an approach has much to recommend it at present, because it probably represents the most economical way to gain experience. For that experience to be valid, however, an organisation must devote great care both to determining the office systems' objectives at the outset, and to measuring the results and drawing the correct conclusions from what it achieves.

#### Focus on particular types of staff

Leaving aside senior management, who are undoubtedly the most difficult group to support with new office technology, many organisations will be able to recognise certain types of staff who are particularly crucial to the satisfactory performance of the organisation. Then, having identified them, an organisation might focus its office automation effort on them. Alternatively, an organisation might focus on a particular type of staff merely because the existing systems used by those staff provide a good launching platform for new support systems.

Briefly, the five main categories of office staff and their key characteristics are as follows:

1. Back-office clerical staff

Conventional data processing systems have concentrated on supporting and/or displacing back-office clerical staff. Sometimes it is possible to build a form of front-end to existing data processing systems either to cope with the non-routine activities of the work of back-office clerical staff or to help with ancillary information-handling activities. Both of these activities represent areas where data processing has always been ineffective.

2. Professional staff

Professional staff can be defined as those who make a specialised contribution to the organisation through intellectual work. They tend to be heavy users of timesharing services and personal computing services. Electronic filing systems, information retrieval systems, modelling systems and possibly decision support systems all appear to be relevant to this type of staff. Networked personal computers seem also to provide a promising technical solution to the needs of professional staff.

3. Managerial staff

Line managers, who supervise either people or plant, are, like senior managers, difficult to help directly with office automation. The reason for this is that so much of their work tends to be informal, and it is characterised by diversity and fragmentation. Improved voice communication systems or electronic mail systems, or possibly decision support systems might be appropriate to meet the needs of these managers.

4. Sharp-end staff

Salesmen are typical of what we term here sharp-end staff. Like the professional staff, their contribution is individual, but it is less specialised. Through their direct contact with customers, with suppliers, and with others, they tend to have a high business impact, and their work is characterised by a fast pace and an absence of a formal basis. Although many sharp-end staff are not strictly office staff, they are relevant to this report because the support that office staff provide to them might be either displaced or improved through the use of office systems.

#### 5. Secretarial staff

Through word processing products, the secretarial group of staff has received most attention from the suppliers of office automation products. It has now become clear that automation has only limited impact on these staff. As a result, the focus of attention both of suppliers and organisations has turned instead to automating the activities of managers. However, indirect gains in the productivity of secretarial staff achieved through more effective filing systems or support systems might yet prove to be fruitful areas of office automation.

#### Focus on particular departments

Finally, it is possible for an organisation to focus on particular departments. The mechanisms an organisation uses to identify those departments may vary from the purely subjective (choosing those who either are most likely to respond well or are most in need of help), to the formal (carrying out a wide-ranging analysis of office procedures). Either way, it is important that an organisation should not be overly influenced by existing departmental boundaries, but instead should concentrate on identifying functions.

Those functions may be carried out within one office or they may span several offices. The Office Automation Group at MIT define a function as "an aggregate of all the detailed activities that collectively manage and maintain some resource that relates to the business goals of the larger organisation". For example, the personnel function may well span the personnel department, the wages office and the internal training group. Focusing on functions as a whole does not necessarily mean that they must be automated as a whole, but the emphasis on functions is essential both to set valid objectives for office systems and to measure all the effects. Otherwise problems may merely be displaced, rather than solved.

#### ANALYSIS TECHNIQUES

Methods to analyse office procedures are beginning to emerge, although none to our knowledge can yet be described as proven. The MIT Office Automation Group has published a paper entitled "OAM: An Office Analysis Methodology", and it is from that paper that we quoted briefly above. We ourselves have developed and use a simple method for evaluating the results of an analysis of office procedures. It consists of a matrix, in which the rows represent types of office activity and the columns represent departments and/or functional groupings.

Each cell in the matrix contains a 'score', which represents the size of the potential gain from providing office systems tools to support that particular activity in the department/grouping concerned. High-scoring rows will suggest those tools or techniques that should be adopted, whereas high-scoring columns will suggest those departments/groupings that should be concentrated on first. (High scores could, however, be indicative of problems that new technology cannot address.) The choice of the targets on which to focus could be further conditioned by management priorities, such as a desire to improve sales performance rather than to reduce costs.

Two assumptions underlie this method that we have developed. The first assumption is that common office systems will be implemented across all the departments/groupings surveyed, starting in one or two departments and propagating the systems to other departments as appropriate. The second assumption is that new capabilities will be added onto the initial office systems to convert them progressively from activity-oriented systems to process-oriented systems.

#### **MIGRATION STRATEGY**

The migration path for office automation that organisations most commonly adopt begins with word processing, then leads through electronic mail into electronic filing and/or integration with data processing applications. This migration path has two particular points in its favour:

- It suits the technology that is available now.
- It complements most existing data processing operations. (Indeed, it is the approach that mainframe computer suppliers typically recommend.)

Additionally, and for two main reasons, word processing has great attractions as a first step on the path to office automation. First, it can often be cost-justified on tangible savings, although at present equipment cost levels the justification usually requires that the support staff be reorganised into pools or smaller units. Second, the initial resistance to office automation can be overcome more easily than if new technology and new ways of working are 'imposed' on the more senior staff in the organisation.

The combination of the factors mentioned above makes a powerful case for beginning office automation with word processing. For certain organisations, particularly those that depend heavily on data processing systems and that have sophisticated communications networks, this migration strategy may well be completely appropriate. Even so, there undoubtedly are (or there will later be) alternative migration strategies, and this particular strategy is open to question on several grounds. The most important of these are:

- Word processing is not necessarily the route (or even a route) into electronic mail.
- The disruption that the widespread introduction of word processors causes and the consequent reorganisation that is necessary, may actually set back the cause of office automation for those staff (namely managers and professionals) who stand to gain most from it.
- Because executives are not themselves directly affected by office automation, their support for and understanding of office automation may remain nominal.

At this stage, it is difficult to offer clear alternatives to the commonly-adopted migration strategy. But, bearing in mind that it now seems probable that the major benefits of office automation will accrue from offering tools directly to professionals and managers, networked personal computers appear to be a promising possibility.

Additionally, the process-oriented approach to office automation implies mechanisms for shared access to common information that may be stored on either minicomputers or micro-computers, at either departmental or section level.

In planning a migration strategy, an organisation must therefore give attention to the basic communications infrastructure. In our view, this infrastructure has both a physical dimension and a logical dimension. The physical dimension will be a switched corporate communications network. The logical dimension will be a common understanding of the format and the significance of information that is shared and exchanged. That common understanding already exists to some extent within offices, but new technology will change some of the rules and will create new relationships. Consequently, we believe that data analysis techniques, or, alternatively, some development of those techniques, will play a key role in the later stages of office automation.

#### **CHAPTER 6**

#### CONCLUSION

The case for office automation is based on a combination of two factors — the increasing cost of the staff who work in offices and the declining cost of information technology. This case, advanced some years ago and much discussed since, remains as persuasive as ever. For all that, neither the products currently available to automate the office, nor the understanding of what can be and should be attempted, are sufficiently advanced for organisations to embark on office automation at present without incurring some of the risks associated with pioneering.

It is instructive to compare the present state of development of office automation with the development of data processing in its early years. Many organisations, with the benefit of hindsight, may now reflect that their early data processing systems did not deliver the expected results. Indeed, many of those early systems would not have been implemented at all if the organisations had been aware of the ultimate cost of developing and running the systems. Yet the experience gained with the early failures (or the partial successes) of data processing has been the foundation on which many of today's highly successful data processing systems have been built.

We believe that it is correct to view the present state of development of office automation in a similar way to the development of data processing in those early years. For those organisations that are prepared to take the risks of being a pioneer in office automation, the time is now right to carry out experiments and pilot projects. Organisations that embark on such a course of action need, of course, to be aware that the benefits of office automation will not be achieved either easily or quickly.

An alternative strategy for an organisation to adopt is to attempt nothing in the field of office automation until the nature and the scale of the opportunity that office automation represents take on a more solid form, and until, also, the products improve. The implication of adopting this alternative strategy is that, when the organisation does later embark on an office automation programme, it will already be several years behind those organisations that have accepted the risks of starting early. Those organisations that do decide to start early will already have built up the experience necessary to take full advantage of the technology as it matures.

This report has provided guidance to Foundation members as they choose the course of action to follow for office automation. The Foundation will continue to monitor and report on developments in the field of office automation, and Report No. 29 will provide guidance to those organisations that wish to implement office systems.

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## **Report Series 19 Office Systems Strategy**

The author of this report and the researchers who gathered the original material would welcome the opportunity of discussing the findings of the report with small groups of members. Would you therefore please list below (and overleaf if necessary) any points on which you would like the author and the researchers to expand at such a discussion. Also, would you please record your interest in follow-up work on the subject of this report, highlighting those aspects of the topic that are likely to be of most interest to your organisation. We will then contact you to arrange a suitable venue and date for the discussion.

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