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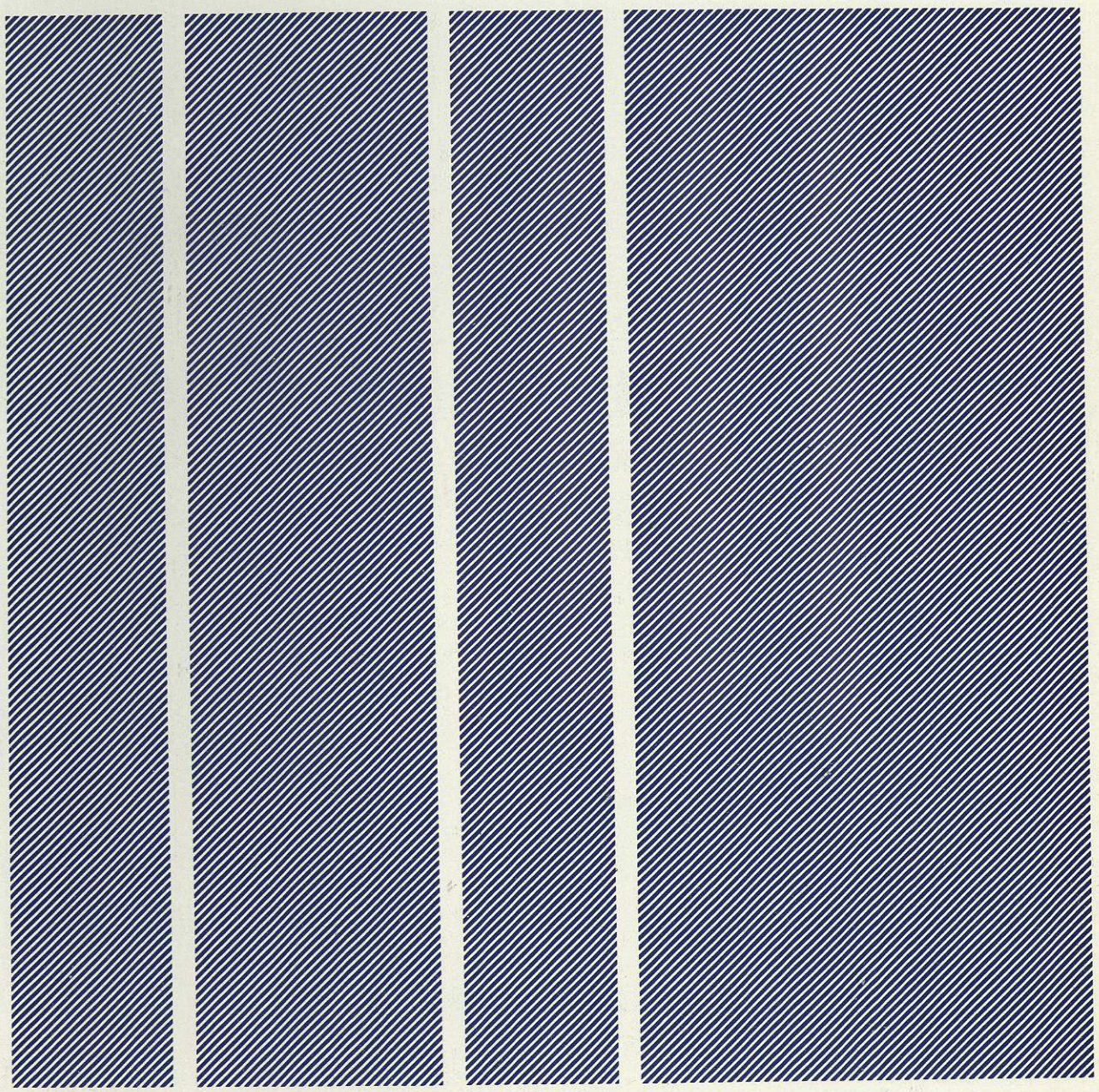
Managing the Microcomputer in Business

September 1984



The Butler Cox Foundation

THE BUTLER COX FOUNDATION

REPORT SERIES NO. 43

MANAGING THE MICROCOMPUTER IN BUSINESS

ISSUED SEPTEMBER 1984

Abstract

This report focuses on the desk-top use of microcomputers in business by managers and professionals. It shows that most Foundation member organisations are planning to install substantial numbers of these devices in the next two years or so. Initially, most of them will be used as stand-alone devices, most commonly by using spreadsheet packages for a wide variety of applications, many of which go beyond budgeting and financial forecasting. But plans are being laid also to interlink them, and to link them to corporate data processing systems.

The report is not a technical document. It concentrates on the management issues associated with introducing substantial numbers of business microcomputers into large organisations. It is aimed primarily at the executives responsible for defining an organisation's information technology strategy, particularly the business microcomputing elements.

Research Method

The report was researched and written by *David Seabrook,* a senior consultant with Butler Cox with extensive experience of applying systems technology in commercial applications. He has been involved in supervising the development of many Foundation Reports, covering most aspects of information technology.

In preparing for this report, David Seabrook drew on the accumulated experience and expertise of other Butler Cox consultants who have recent experience of assignments in the area of microcomputers, desk-top computing and end-user computing. Substantial contributions were made by *Charles Chang,* a principal consultant with Butler Cox who specialises in the strategic planning of information systems and end-user computing, and by *David Flint,* a senior consultant with Butler Cox who specialises in office automation and telecommunications. He is a leading figure in the field of local networks, and has contributed to several previous Foundation Reports.

The research for this report was carried out during the second quarter of 1984. It took the form of face-to-face discussions with executives in large organisations (many of which were Foundation members) in France, the Netherlands, Sweden and the United Kingdom. The experiences of a representative sample of these organisations are included as case histories in the appendix. We would like to record our thanks to the organisations that participated in the research and allowed their experiences to be published.

We have also drawn extensively on business microcomputing experiences in the United States, working from the mass of published material on this subject. Whilst this input has provided insights (mainly because products are available earlier in that country), we have concluded that business microcomputing is better coordinated in Europe than it is in the United States.

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MANAGING THE MICROCOMPUTER IN BUSINESS

CONTENTS

MANAGING THE MICROCOMPUTER IN BUSINESS

REPORT SYNOPSIS

Business microcomputing is a subset of end-user computing. It is growing rapidly, and organisations face serious problems in planning for this growth and in integrating microcomputing with corporate mainstream data processing systems. The introduction and growth of personal computing will also bring basic changes to the pattern of office automation and procedures; today's business microcomputer will become tomorrow's integrated management workstation. This report has two broad objectives: to explain what is happening in this field, and to suggest how management should respond.

The market performance of such machines as the Apple Macintosh and the IBM PC underlines the amazing growth of personal computing in business. At present such computing may account for only 5 to 10 per cent of an organisation's total data processing costs; by 1991, our research indicates, this could approach 50 per cent.

At present the business microcomputing scene reflects the dominance of the IBM PC as the preferred choice for the majority of large organisations, and the high popularity of spreadsheet applications. A familiar evolution has been from the Apple/VisiCalc combination to the IBM PC with Lotus 1-2-3.

The introduction of business microcomputers into large organisations is generally being driven by the users themselves, who tend to be junior or middle managers and professionals. Most users begin by applying their machines to familiar tasks; later the so-called '18-month effect' appears and new applications proliferate. Most of the applications represent new computing work; they do not replace or supplement mainstream data processing. And many of the perceived benefits cannot be quantified in terms of direct cost savings. These points are amplified in Chapter 2 of the report.

By 1990, up to 90 per cent of managers and professional workers will use business microcomputers on a regular basis. They will want to 'own' their own machines, but also will want to use them as terminals to access corporate data. Software rather than hardware will determine user choice. Likely developments in operating systems and general-purpose software are discussed in Chapter 6 of the report. In the longer term, the emergence of 'generic' processors able to provide a 'virtual environment' could enable users to switch rapidly from one operating system to another. Meanwhile, the race is on to find the market leader for the next generation of integrated applications-oriented software.

At present, most business microcomputers are being used as stand-alone devices. In the future, they will form the cornerstone of office systems generally. A battle for dominance between IBM (and the IBM-compatibles), AT&T and Xerox-derived developments such as Apple's Lisa and Macintosh will take place; few of the independent business microcomputer manufacturers will survive the decade.

For management, a key issue will be the impact of business microcomputers on an organisation's mainstream computing (see Chapter 4). So far there has been little impact on the structure and organisation of management services departments, though most organisations have set up small microcomputer support teams. Many managers believe that the lack of microcomputer knowledge among system development staff is a cause for serious concern.

There will be an increasing demand for microcomputer-mainframe links, but this may not happen as soon nor be as widespread as many management services staff believe. When the demand does appear, formidable problems will arise and the impact on mainstream computing will be considerable.

We foresee a gradual merging of the two main types of end-user computing: business microcomputing and in-house timesharing services. Those organisations with established information centres already have the basic infrastructure to enable business microcomputer users to access mainstream files and applications. Though there is evidence that the growth of business microcomputers is in part a response to the applications backlog suffered by most organisations, there is no prospect of this growth abolishing or reducing the backlog.

The role of the manager of the microcomputing sup-

port team is another key issue, addressed in Chapter 5 of the report. As a starting point, we strongly recommend that organisations set up such a team if they have not already done so. For the team manager, the first aim should be to act as a catalyst, not a dictator; to be successful, the initiative for business computing has to come from the users themselves. The manager should anticipate users' needs for support, and be responsive to their requests. He should be qualified to recommend hardware and software products, and to negotiate the best terms with suppliers. As part of a 'pump-priming' role, the manager should generate a general awareness of the potential benefits of microcomputing.

In addition, the manager should be able to allay the fears of data processing staff, encourage informal contact between users, provide applications development expertise, be prepared for change, and market the microcomputer team's services.

Our research has shown that although more business microcomputers are installed in the United States than in Europe, that country lags behind Europe in the formulation of relevant policies by management services departments. Chapter 7 provides eight broad guidelines for management distilled from our research. The guidelines are:

— *Recognise that there are different stages of development.* Give guidance in the first stage (Initiation); exercise 'soft control' as users experiment in Stage 2 (Proliferation); and plan for Stage 3 (Enhancement). Further stages of Integration and Maturity may follow.

— *Educate system development staff,* by means of specially tailored training programmes.

— *Plan for microcomputers to be the bridge between office systems and data processing.* Business microcomputers are the key to linking an organisation's data processing and office automation strategies.

— *Determine and anticipate the need for microcomputer-mainframe links.* User demands will have significant implications for data management, data administration and networking requirements.

— *Do not try to enforce redundant standards.* Users are interested in functionality and are influenced by the latest 'fashion'; do not assume that today's policies will satisfy tomorrow's users.

— *Beware of a backlash from dissatisfied users.* As users gain experience and confidence, they will question advice and policies.

— *Look out for alternatives to IBM's de facto standard.* The business microcomputer market resembles a mass consumer market; users will switch readily to the machine that they believe best meets their needs.

— *Beware of legal pitfalls and operational security problems.* Ensure that users are aware of copyright, data protection and security requirements.

Business microcomputers have provided substantial benefits to their early users. As they spread throughout the organisation, the benefits will multiply. If the management services department has a positive attitude towards these developments, the department can increase its influence and standing within the organisation.

CHAPTER 1

SCOPE OF THE REPORT

Microcomputers come in many shapes and forms, and are used by different types of people for a wide variety of applications. They range from simple and inexpensive home computers, which are not much more than educational toys, to sophisticated process-control devices. The focus of this report is on a clearly defined subset of machines and users: microcomputers as used in large organisations in Europe.

In this context, a business microcomputer has a minimum of a processing unit, screen, keyboard and one or more floppy disc drives. It will also have access to a printer (which may be shared between several microcomputers). Additional storage, in the form of Winchester-type discs (which may also be shared) may also be available. A business microcomputer may be a stand-alone unit, or it may be part of a cluster (or network) of similar devices sharing common resources such as correspondence quality printers or Winchester-type discs. It might also be connected, either permanently or on a dial-up basis, to one or more minicomputers or mainframe computers. There are literally hundreds of models of microcomputer on the market today. Those in most widespread use worldwide are probably the Apple II and the IBM PC range.

The report concentrates on the desk-top use of microcomputers. Typically, the users are junior or middle managers and professionals, although some of the use may be delegated to secretaries or other staff. In the context of this report, a key aspect is that, initially at least, there is some element of discretion in the use of the microcomputer. This discretion may take one or more of the following forms:

- —The user takes the initiative to acquire the microcomputer in the first place.
- —The user can choose whether to make use of the facilities provided by the microcomputer.
- —The user can choose to set up new applications himself.

Although the initial decision to acquire or use a business microcomputer is often discretionary, the machine may later become an indispensable tool for the manager or his staff. For the purposes of this report, an essential ingredient of business microcomputing is that users themselves decide what the machines will be used for, and they control the applications.

Business microcomputers, as defined above, may also be used for other purposes. They might, for example, be used as a replacement for an ordinary terminal linked to a mainstream data processing application. (We use the term 'mainstream' to describe conventional computing applications developed by professional computing staff. Such applications might be implemented as centralised mainframe systems or as distributed minicomputer systems.) Microcomputers might also be used to access an in-house timesharing service via an information centre. In these situations, the personal computing capability provided by the machines is, in essence, an 'optional extra', which can be provided at very little additional cost. Provided that at least part of the use of such microcomputers is initially discretionary, they are within the scope of this report.

The typical business microcomputer user as defined above does not necessarily spend all his time sitting at the same desk. He may be visiting different sites, or working whilst travelling on a train or aircraft. Our definition of a business microcomputer therefore includes fixed and portable devices, and we make no distinction between the two. In practice, we encountered very few examples of portable microcomputers being used as defined above. In these few cases the users tended to be travellers, such as salesmen or repair personnel. Often the prime use of microcomputers in these circumstances is solely to capture data — a use which we have excluded from the scope of this report.

Our definition of the scope of business microcomputers specifically excludes the following areas:

- —Dedicated word processing systems used by typists or secretaries.
- —Microcomputers used in factories for controlling production processes.
- —Microcomputers that are used only as an extension of a mainstream data processing system (as intelligent data-capture devices, for example).

— Portable hand-held devices used by an organisation's travelling representatives to capture data (for example to record customer data that will be used to generate invoices).

Each of these is excluded because the use of such systems is non-discretionary.

Thus, this report is concerned with the use of business microcomputers for personal computing. Usually, the equipment will be some form of standalone microcomputer system which can also be linked to other similar systems or to mainstream data processing systems. Sometimes, however, the personal computing capability may be provided as part of a shared resource that has been installed throughout an organisational work unit. Two examples are:

— The HiNet local area network installed in the Fison Group's head office in the United Kingdom. Users plug-in to the network with a DMS microcomputer, and have access to various software facilities (SuperCalc, Wordstar, etc.).

— The Xionics XiBus systems now installed in several organisations in the United Kingdom (including several Foundation members). Each workstation has a Z80 microprocessor with 256k storage. As well as messaging and electronic mail facilities, users are provided with discretionary personal computing facilities (Basic, SuperCalc, etc.). XiBus also provides access to external services, such as mainstream computers, telex, and videotex networks.

Business microcomputing is therefore a subset (albeit a rapidly growing one) of end-user computing, competing with the discretionary use of in-house (or external) timesharing services by managers and professionals. Many organisations have now established an information centre, whose role is to provide and promote the use of end-user computing facilities within the business, and business microcomputers are often seen as an extension of the information centre's activities.

Business microcomputing is also inextricably linked with the concept of 'office automation' for managers and professionals. A number of organisations perceive the large numbers of business microcomputers now being installed as the means of providing one terminal per desk. The business microcomputer, it is now widely believed, is likely to evolve into the integrated management workstation of the future.

Purpose of the report

This report focuses on the management issues associated with introducing substantial numbers of business microcomputers into large organisations. Technical issues are of secondary concern. The report does not therefore address issues such as the relative technical merits of different operating systems, or the technological merits of 16-bit processors versus 32-bit processors.

The specific issues addressed in the report are:

— What are the business motivations for installing business microcomputers?

— What are business microcomputers being used for, and by whom?

— What software tools are being used to implement business microcomputer applications, and who is using them?

— What is the organisational impact of business microcomputers on the business in general, and on the management services department in particular?

— What are the criteria for using business microcomputers most effectively in large organisations?

— How should an organisation's policy for microcomputers relate to its overall information technology policy?

The report is aimed primarily at the executives responsible for defining an organisation's information technology strategy. It will also be of interest to those involved in the day-to-day implementation of the business microcomputer elements of the overall strategy, and to managers of business units using (or contemplating using) business microcomputers.

Research carried out

In preparing for this report, we drew on Butler Cox's accumulated knowledge and expertise in the field of business microcomputing. We have carried out several consulting assignments in which we have advised clients on how best to establish a policy for introducing microcomputers into the business. Also, as part of the Butler Cox Strategic Studies Programme, we have carried out research for suppliers into the way in which the market for business microcomputers is likely to develop. In addition, we reviewed several hundred papers and articles relating to the business use of microcomputers.

The most direct input to the research, however, came from our discussion with large organisations. We reviewed in depth the business microcomputing activities of 38 large organisations, three-quarters of which are Foundation members. Twenty-six of the organisations are based in the United Kingdom, six in France, four in the Netherlands and two in Sweden. We would like to record our thanks for the time given by the people we interviewed and for the candour of the views expressed. An aggregated overview of these organisations' uses of business microcomputing is included in the next chapter, and some of the experiences are reported in depth in the case histories in the appendix.

CHAPTER 2

EVOLUTION OF BUSINESS USE OF MICROCOMPUTERS

Research carried out by the Butler Cox Strategic Studies Programme suggests that, while microcomputers and related in-house timesharing account for typically 5 to 10 per cent of an organisation's data processing costs today, this proportion might approach 50 per cent by 1991.

When Apple launched its Macintosh personal computer in the United States early in 1984, Peat Marwick, Mitchell & Co. ordered 3,500 units within weeks of the product being launched. Apple claims that 70,000 Macintoshes were sold in the first 100 days following the launch. Earlier, in 1982, Connecticut Mutual Life Insurance Company in the United States placed a single order for 1,000 IBM PCs. In 1983, IBM shipped 650,000 PCs and PC-XTs, and expects to deliver worldwide more than 1,000,000 of these machines in 1984.

THE CHANGING MARKET FOR BUSINESS MICROCOMPUTERS

The leading supplier in the United States has been IBM, with more than 30 per cent of the market. We expect IBM to be the market leader in Western Europe in 1984, with 26 per cent of the market, in terms of numbers of units costing more than $1,000. (In 1982 IBM was not even a contender in this market in Europe.) Figure 2.1 shows the market share of the leading suppliers in Western Europe in 1982, 1983 and 1984, and Figure 2.2 shows similar information for the major national markets in Europe in 1983. The figures show that there are significant differences between national markets, and that the marketplace is highly volatile. Commodore's share of the West European market fell from 22 per cent in 1982 to a predicted 9 per cent in 1984, whilst IBM's share rose from zero to 23 per cent in the same period.

However, IBM is unlikely to dominate the microcomputer market as it has in mainframes (an estimated 70 per cent of the world market).

The corporate market for business microcomputers in the United States is growing at about 40 per cent per annum. The growth in Western Europe is predicted to be less than in the United States, but it

Figure 2.1 Market leaders' share (%) of business and professional microcomputer market

Supplier	*1982*	*1983*	*1984*
Commodore	22	18	9
Apple	19	21	18
Tandy	9	—	—
Osborne	5	—	—
Olivetti	5	9	12
ACT/Sirius	4	9	12
IBM	—	16	23
Others	36	27	26
Total units shipped	203,000	280,000	426,000

Figures relate to units costing more than $1,000 sold in Western Europe.
(Source: IDC-Europe)

Figure 2.2 Market share (%) by country in 1983

Supplier	*UK*	*West Germany*	*France*	*Italy*
Apple	17	17	30	16
Commodore	17	18	4	16
IBM	15	15	14	9
ACT/Sirius	15	10	6	—
Olivetti*	—	7	7	34
Tandy	5	6	4	—
Triumph Adler	—	6	—	8
Bull	—	—	8	—
DEC	5	—	—	—
Hewlett Packard	5	—	—	—
Leonard	—	—	4	—
Osborne	5	—	—	—
Sharp	—	6	—	—
SMT	—	—	6	—
Total units	85,000	54,000	53,000	32,000

*Olivetti and Logabax in France.
Figures relate to units costing more than $1,000.
(Source: IDC-Europe)

will still be substantial. Microcomputer manufacturers' revenues in Europe from the business and professional sector are set to grow from $1.4bn in 1984 to $3.6bn in 1988 — an annual growth rate of nearly 30 per cent. If software and ancilliary supplies are also included, the annual growth rate could be as high as 50 per cent.

Although there are more than 150 suppliers in this marketplace, Figure 2.2 illustrates that, in each of the four countries listed, the top four suppliers account for between 60 per cent and 75 per cent of all units sold. Figure 2.1 shows that, in 1984, five suppliers (Apple, Commodore, Olivetti, ACT/Sirius and IBM) will account for three-quarters of all units sold in Western Europe.

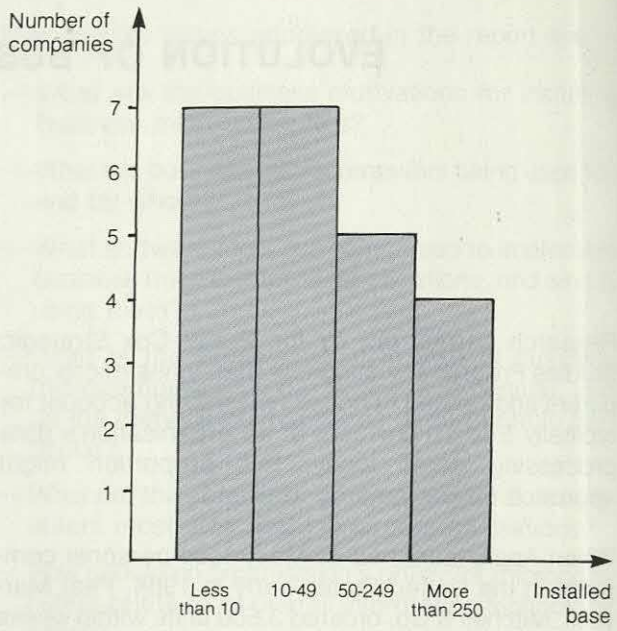
Business microcomputers in use in large European organisations

These trends were even more pronounced among the 38 organisations we examined in depth. All of them had standardised on (or had a preferred list of) equipment, and 28 had standardised on just one particular range. Of these, 18 have now standardised solely on the IBM PC, and a further nine included this machine in the short-list of preferred machines. Of the 27 organisations that had included the IBM PC in their list of standard equipment, only eight, at the present time, would be prepared to purchase IBM PC compatible microcomputers. Where the IBM PC was just one of several recommended machines, the organisation expected to install more IBM PCs from now on than any of the other machines. At least two of the remaining 11 organisations which had not included IBM in their recommended list expect to do so in the near future.

After the IBM PC, the next most popular machines were DEC and ACT/Sirius personal computers (each mentioned by just four organisations), and Wang (mentioned by three organisations). The 11 companies who had not included IBM PCs in their short-list of preferred machines listed a total of 11 different business microcomputers between them.

One Foundation member — George Wimpey plc, the London-based construction company — has adopted an unusual and possibly unique approach in its choice of a standard microcomputer. Wimpey decided to assemble its own standard machine using proprietary parts. This decision was made in mid-1981, when few of the then commercially available systems appeared adequate for the type of business applications envisaged by the company. By the beginning of 1984, 150 Wimpey Standard Micros had been assembled, and were in use throughout the company. A few had also been sold to its clients for use with applications software developed by Wimpey.

Figure 2.3 Installed base of business microcomputers



Twenty-two of the organisations provided us with information about the number of business microcomputers installed (typically as at March 1984), and predicted the number likely to be installed in the next year or so. As Figure 2.3 shows, a very wide range of installed numbers was reported, from fewer than ten to more than 400. Each machine was typically being used by two to four people. The predicted annual growth rates were equally varied, the lowest being 40 per cent and the highest 1,600 per cent. (The latter figure is an exception, since the company concerned is just embarking on its initial push into using microcomputers for the first time.) Interestingly, there was no correlation between the size of the present installed base and the rate of predicted growth. The majority of the companies predicted annual growth rates between 50 per cent and 400 per cent.

THE TYPICAL EVOLUTION PATH

Our investigations into the ways in which business microcomputers are being installed in large European organisations show that the machines are not being installed in an ad hoc or uncontrolled manner. By all accounts, this situation contrasts with that in the United States, where two factors seem to have contributed to a much more disorderly introduction of business microcomputers:

—Central MIS staff in the United States have only recently begun to appreciate the corporate significance of business microcomputers. Hitherto, microcomputers had been viewed as insignificant devices which did not warrant their attention.

— Potential users of business microcomputers in the United States have been more prepared to seek out and purchase their own equipment. This trend has been promoted by the growth of retail stores ostensibly established to serve the home computer market. Market research has shown that a very high proportion of machines bought from these stores have ended up on the desks of managers and professionals in America's largest companies.

A further important difference is the lower cost of a microcomputer as a proportion of the American user's salary. For a European user, this relative cost would be three times as high.

Management services departments take the initiative

In Europe, the typical evolution path has been different. Two or three years ago, a few pioneering users took the initiative and acquired their own microcomputers (typically an Apple or Tandy or Commodore). However, corporate management services departments reacted very quickly, realising they had to take a position on the installation and use of microcomputers. Senior management services directors realised the need for a coherent policy that would prevent an uncoordinated proliferation of microcomputers throughout the business. (A representative sample of the policy approaches adopted is given in the case histories in the appendix.)

In Europe, therefore, most large organisations had a microcomputer policy in place before the machines began to be installed in large numbers. A common element of these policies is that the management services department is aware at least of the microcomputers that are being installed, and the software facilities available with them. In most organisations, the decision to purchase a microcomputer has to be agreed by and/or signed-off by the management services department.

In all but seven of the organisations we examined in depth, the management services department had the final say on the type of microcomputer to be installed. The corporate culture of these seven organisations prevented the management services department from dictating to the business units. Nevertheless, each of these seven has been remarkably successful in 'persuading' the business to use its recommended standard equipment. (Examples of their experiences are included in the case histories in the appendix.)

First-generation microcomputer policies

Typically, the 'first-generation' microcomputer policies were formulated during the period mid-1981 to mid-1982. Usually, they specified one (or a small number) of standard hardware configurations (Apples, Commodore Pets, etc.) or, less commonly, they specified that the hardware was to be able to run a standard operating system (usually CP/M).

Many organisations also set up a microcomputer support team as part of their first-generation policy. These were small groups (two to five people) whose role was to provide a corporate centre for expertise about all aspects of business microcomputing. The majority of end users (and potential end users) welcomed the services provided by these groups. Users are more than happy to listen to and accept the advice provided.

The microcomputer support team is usually part of the management services department. Sometimes it reports direct to the management services director but, where an organisation has already established an information centre, the role of this centre is often extended to include the microcomputer support team. Other organisations have located the microcomputer support team as part of the office automation function.

The soft-control approach

In those organisations where the management services department cannot dictate and explicitly enforce the policy, the team provides what one organisation described as "soft control". In this situation, the team's role is to 'encourage' users to purchase the preferred hardware and software. One of the ways this is achieved is by a policy to provide support only for the recommended hardware and software products. Users are free to buy any other products they wish but, if they experience any difficulties, the team will not help them. Another tactic is to ensure that users who purchase the recommended products through the team's services will obtain a larger discount than they could by purchasing direct themselves.

Second-generation policies evolved in mid-1983

The first-generation microcomputer policies remained intact until about mid-1983. During the period from about March to September 1983, however, many of the policies were updated to reflect new business microcomputer products that had by then become available. In particular, there was a switch away from the original first-generation machines to the IBM PC. (The scale of this was reported on earlier in this chapter.)

The launch of the IBM PC has done more than anything else to make the concept of business microcomputing respectable. Many argue that the IBM PC is technically inferior to other business microcomputers. But, by early 1984, the IBM PC had become the de facto standard for business microcomputers

in large organisations in Europe. In particular, its operating system (PC-DOS) had been adopted as the de facto software environment by the independent software vendors.

However, it is not true to say that the launch of the IBM PC caused management services departments to take business microcomputers seriously for the first time. As we have already noted, all of the large organisations we examined had developed a microcomputer policy long before the IBM PC was announced. Why is it, then, that so many organisations have now standardised on the IBM PC?

When we asked this question, we were consistently given two answers:

—Because of the need to communicate with mainstream computers.

—Because there will be a wider range of software available for the IBM PC than for any other business microcomputer.

These replies are very interesting when they are compared with the way in which business microcomputers are actually being used in large organisations. Most of them are being used as stand-alone devices, and most are being used to run just one type of software — a spreadsheet package (VisiCalc or Lotus 1-2-3).

Most organisations are experimenting to prove that, technically, they can link their microcomputers to the mainstream systems. But many of them told us that they are unclear as to why or how this link will actually be used. We return to this topic in Chapter 4.

Only one organisation (ICI in the United Kingdom) provided us with a reasoned argument for having adopted the IBM PC as its standard machine. ICI perceives the IBM PC as a means of providing a standard framework for business microcomputers. All IBM PCs installed in ICI will be customised to meet ICI's specific requirements. IBM's 'open' policy towards hardware and software for the PC makes it easy to carry out such customisation. But if IBM were to attempt to include proprietary hardware or software in future developments of the PC, ICI would stay with the 'old' standard. (ICI's experiences form one of the case histories in the appendix.)

There is little doubt that a major factor in the success of the IBM PC is related to the dominance that IBM has in other computing markets rather than the technical merits of the product. Users feel safer buying it and, perhaps even more importantly, independent software vendors feel safer developing new products for it.

BUSINESS MICROCOMPUTER APPLICATIONS

At the present time, the majority of business microcomputers installed in large organisations are Apples. Many of these are being used mainly to run VisiCalc applications (or one of the other popular spreadsheet packages). From now on, however, most of the organisations we reviewed are planning to install more IBM PCs than any other equipment. Most of those PCs will be installed to run Lotus 1-2-3 spreadsheet applications. It has been estimated that the main purpose for more than 70 per cent of all IBM PCs installed so far is to run Lotus 1-2-3, and this was confirmed by our own research. This product has effectively superseded VisiCalc as the clear leader in the spreadsheet package marketplace. Yet Lotus 1-2-3 is itself likely to have been superseded by the time this report is published — either by Lotus' Symphony or by competitive products from other independent software suppliers (see Chapter 6).

Apart from spreadsheet applications, business microcomputers are also being used to run bespoke applications. Very few of these applications have been developed using a conventional programming language such as Basic. The exceptions have usually been written by microcomputer experts from the support team, not by the end users themselves. We came across very few examples of users programming in Basic (or any other language). Users do talk in terms of 'programming' in Lotus 1-2-3, however.

Bespoke applications are much more often developed using an application-generator tool such as dBASE II or Condor. Again, these tools tend to be used more by members of the microcomputer support team, with individual projects taking from two to four weeks to complete. Some organisations, however, encourage users to develop their own applications using this type of tool. Chapter 3 contains a more detailed discussion of the uses to which business microcomputers are being applied.

There is also evidence that business microcomputers are increasingly being used for word processing. Thirteen of the 38 organisations specifically mentioned word processing as one of the applications, with Wordstar and Multimate being the most commonly used word processing packages.

On the other hand, we found very little use of application packages with business microcomputers. One organisation told us that, as a matter of course, it tries to find an application package to meet a particular business microcomputing need, but invariably fails to do so. Most application packages have a functional or departmental focus, whereas personal computing tends to imply doing something which is unique or non-standard in some respect. The few exceptions involved an accounting package which was being

used in a small, self-contained subsidiary business unit of a large organisation.

In a few organisations, the mainstream system development staff were using business microcomputers to build prototype systems that would later be implemented on corporate minicomputers or mainframes. In general, however, traditional system development staff make very little use of business microcomputers.

OTHER REASONS FOR USING BUSINESS MICROCOMPUTERS

Another trend is for business microcomputers to be installed as replacements for dumb terminals. Two IBM mainframe users told us that their data processing people "woke up" to the potential of business microcomputers when they realised that an IBM PC plus an inexpensive printer could cost less than a conventional dumb terminal, controller and printer. Many IBM mainframe users are waiting for the 3270 PC to become available in Europe. They see this device as a potential upgrade path for the existing 3270-type terminals. The added bonus is that personal computing facilities can be provided at very little additional cost.

We have already mentioned that most organisations are proving that, technically, they can link their microcomputers to their mainstream systems. But we did not discover any real examples of these links being used to download data to microcomputers for discretionary use. There are examples of downloading data from mainstream systems to microcomputers, but all of these were in situations where the microcomputer was being used as an extension of the mainstream system.

Interestingly, we found several examples of microcomputers being used to upload data to a mainstream system. In this situation, the microcomputer is usually being used as an intelligent data collection device. For example, Rowntree Mackintosh, the York-based confectionary firm, is building a new automated warehouse. All pallets will have a bar code attached to them as they enter the warehouse. IBM PCs will be used to control the bar-code printers, and will then transmit the details of the pallet recorded in the bar code to the mainframe computers. This application is outside of the scope of this report, because there is no element of discretionary use.

SUMMARY

In this chapter, we have reviewed the evolution to date of business microcomputers in large European organisations. Our research has shown that, although large numbers of business microcomputers are now being installed, they are not being installed in a haphazard or uncoordinated way. Furthermore, we have shown that the majority of business microcomputers are being used predominantly with spreadsheet software (previously VisiCalc, but increasingly Lotus 1-2-3). Most organisations anticipate that in the next phase end users will want to access corporate data held on mainstream systems, and they are testing the technical links to allow this to happen.

Our research suggests that the growth in the number of business microcomputers will continue for the next three to four years, until the late 1980s. By that time, many of the organisations we talked with will have installed one business microcomputer for every two junior or middle managers and professionals. The implication is that, for this category of office worker, the business microcomputer is the office automation tool of tomorrow.

CHAPTER 3

BUSINESS MICROCOMPUTER USERS AND USES

Our research confirmed that the introduction of business microcomputers into large organisations is, in the main, being driven by the users themselves. In this chapter, therefore, we focus on business microcomputing from the point of view of the users. We identify the type of job in which business microcomputers are used, what they are being used for, the motivations of the job holder for acquiring a microcomputer, how they set about acquiring one, the benefits they believe they receive, and whether they have to cost-justify their use of a microcomputer.

USERS OF BUSINESS MICROCOMPUTERS

We encountered a wide variety of users of business microcomputers, ranging from senior executives to secretaries. The majority of users were junior or middle managers and professionals, with only a few examples of senior executives using microcomputers. We discuss the possible reasons for this later in this section. First, we give some typical examples of the types of users we encountered during our research.

Insurance claims manager

The insurance department of a large British chemicals company uses Delta and SuperCalc respectively to record and analyse the insurance claims made on behalf of the group. The system is used extensively by the claims manager (he spends about a quarter of his time using the system, and usually spends two hours or more at a time at his terminal). His assistant probably spends more of her total time using the system, but in shorter sessions (typically 15 to 30 minutes). The assistant uses the system to enter data. The claims manager uses the system to analyse the data and produce management reports.

Assistant to accounts manager

The accounts department in a manufacturing company uses Commodore Pets and VisiCalc for a variety of accounting functions. Much of the use is now routine (that is, not really discretionary) to produce monthly and quarterly reports for various managers in the company. Many applications have been developed using VisiCalc by the assistant to the accounts manager. Most of these involve the gathering together of large amounts of numeric data, which is then analysed, and finally produced in report format. Typical applications are records of company cars and of personnel.

This user has found VisiCalc easy to learn and easy to use. He was introduced to the package by the accounts manager, who gave him a ten-minute demonstration and then expected him to "get on with it". His usage of the Pet varies from continuous use for two weeks (when he is preparing quarterly reports), to two days a week at other times.

Trainee development manager

This microcomputer user works in the personnel and training department of a large hotel group. He is responsible for the training and development of 160 management and accountancy trainees. He is also responsible for running courses for other trainees as well. He uses an Apple and a records management and word processing package (OMNIS) to help him cope with the volume of paperwork his job generates.

The Apple is used exclusively by the manager and his secretary, who share the workload equally. During the first half of 1984 they were entering details of new applicants and existing trainees, using the system for about three hours a day. Once the system is fully loaded, it will be used mainly for information retrieval and for producing standard letters. From mid-1984, the usage of the system was expected to stabilise at about one hour a day.

Product marketing manager

A product marketing manager in a large chemicals company uses his shared-resource business microcomputer facility for about four or five hours a week, typically in three sessions of about 90 minutes. He routinely uses the system for:

—Word processing.

—Electronic mail to his secretary (who also has a workstation), and to the factory.

—Telex links.

—Three spreadsheet applications for financial planning.

—Access to three corporate mainframe systems (for sales information; for a divisional messaging system; and for business modelling).

—Viewdata communications with the sales offices.

Manager's assistant in a bank's regional head office

This microcomputer user reports to the assistant regional director (operations) in a major bank's regional head office. Microcomputers (ACT Sirius, with a specific set of applications software) have been installed in each regional head office by the bank's microcomputer support team. The regional offices had been advised to "find someone who is interested and get them involved with developing the Sirius".

Five applications were provided with the Sirius:

—Access to the corporate database.

—Electronic mail.

—Word processing.

—Data filing.

—Spreadsheet (Multiplan).

The system is used by three different people for about two or three hours a day. The manager's assistant has been nominated as the 'local expert' (in addition to his normal duties), and he regards most of the present use as non-productive. His opinion is that it will take between one and two years before the system begins to produce any real benefits. (When we interviewed the manager, the Sirius had been installed for just three months.)

One particular complaint was that the package which provided a link with the corporate database is not of much use. The format and content of the data is not appropriate for, or usable by, the regional head office because it does not reflect a recent organisational change in the bank's area/regional structure.

Strategic planner

This user is an internal management consultant in the strategic planning division of a plastics company. His main task is to produce reports for coordinating the various divisions' strategic plans. He uses an IBM PC-XT, both as a TSO terminal and for personal computing. His system has a colour screen, plotter and printer, and he uses Lotus 1-2-3 and Wordstar. His main use of the system is to produce high-quality reports incorporating colour graphics.

Customer accounting planning officer

The customer accounting planning officer in a public utility company runs a planning department of 13 people, seven of whom regularly use an Apple, and three Wang terminals linked to corporate mainframe systems. The customer accounting function includes reading the meters of more than two million consumers and billing them. The terminals in the planning department are used mainly for routine tasks, although there is some discretionary use as well. About one-third of the use of the Apple, which is completely stand-alone, is also for discretionary personal computing. All seven users are proficient in Basic, VisiCalc and VisiPlot. They received some internal training, but are largely self taught.

Lack of use by senior managers

The sample of typical business microcomputer users given above illustrates clearly that, at present, these devices are infrequently used by senior managers. There are exceptions, but surveys (particularly in the United States) suggest that no more than 10 per cent of senior managers use a microcomputer themselves, or even feel comfortable about the prospect of using one. (The same applies to other types of computing devices.)

The business microcomputer will certainly have an impact on what senior managers do, but it will be an indirect effect caused by people further down the organisational hierarchy using these devices.

The principal effect (at least in the United States) on the few senior managers who have begun to use a business microcomputer has been to blur further the dividing line between home and office. Many of them have an equivalent microcomputer at home, and they find it is easier to carry home the corporate budget on floppy discs than it is to carry large volumes of paper. Another advantage comes from being able to link their computer at home to the corporate network. The director of data processing at United Technologies in the United States has been quoted as saying "I think we are getting an extra hour from them at night after dinner".

Many reasons have been put forward to explain the low rate of use of business microcomputers by senior managers. The most common are:

—Fear of new technology.

—Fear of being seen to be typing (loss of status).

—Fear of making a fool of himself (performance anxiety).

—Fear of not knowing what to do with all the information he gets.

—Fear of losing hard-won interpersonal skills.

Another reason sometimes put forward is that senior managers are deterred by the training time required. A typical reaction is for executives who have attended a one-day microcomputer introduction course to

order machines, not for themselves, but for the level of people below them.

All of these reasons have an element of validity in them, but they are all peripheral to the main reason. The most important factor preventing senior managers from using business microcomputers is stunningly obvious but, often, it is barely perceived by the managers themselves. The technological marvels of business microcomputers have, as yet, little to offer them. Their work is largely unstructured and, as such, is not well-suited to computerisation. Unless or until senior managers perceive real personal benefits from business microcomputers, they will make little use of them.

User groups

The announcement of the IBM PC in the United States in 1981 has spawned more than 100 user groups. These groups do not yet have the influence or the stature of the traditional IBM user groups (SHARE for users of the larger mainframes, GUIDE for users of 4300s and above, and COMMON for users of models 34, 36, 38 and Series 1).

At present there is no formal association between the diverse PC user groups, although there is an informal exchange of newsletters and software. These groups have been formed by individuals who have congregated to get the best out of their IBM PCs and, relatedly, out of IBM.

One example is the Philadelphia group, which began in November 1981 with 20 members. By April 1984, its membership had grown to 200, 60 per cent of whom were business users, 20 per cent people who used an IBM PC for business purposes at home, and the remainder hobbyists. The New York group has grown from its initial 30 members to more than 1,200 during the same period.

Those involved with the user groups have expressed surprise at the lack of active co-operation by IBM. One member of the New York group attributes this to the fact that IBM has not yet realised how strong the representation is from large corporations in the groups.

The established IBM user groups (SHARE, GUIDE and COMMON) are also having to extend their activities to encompass the IBM PC. For example, the COMMON group's conference in October 1983 attracted 1,400 attendees, 500 of whom declared an interest in the PC. There were 207 sessions at the conference, of which 23 of the best-attended were devoted to the IBM PC.

We did not encounter any similar user group during our research in Europe. In many respects, the microcomputer expertise teams being established by large organisations in Europe are fulfilling the roles played by the user groups in the United States. This supports our view that large organisations in Europe have been more prepared to embrace business microcomputing at the corporate level than have their American counterparts.

BUSINESS MICROCOMPUTER APPLICATIONS

Most business microcomputer users are, at the present time, using their machines to help them do what they have always done. The difference is that microcomputers help them to do their tasks more thoroughly, more completely, more accurately and more frequently than before.

However, research in the United States suggests a phenomenon which has been called the "18-month effect". During the first months of using a new technology, most people use it for tasks with which they are familiar. In the case of personal computing this might mean using it for spreadsheet calculations or for word processing. Then after a period of time — typically about 18 months (according to professors Hiltz and Turoff at Stanford University) — users become more confident and are willing to try new things.

If this theory is valid, many Foundation members will soon be experiencing a proliferation of microcomputer applications from their first generation of microcomputer users.

Nevertheless, the reality of today is that the majority of business microcomputers in use by managers and professionals in large organisations are being used with spreadsheet packages. Even so, these packages are being used for a wide variety of different applications, including:

—Consolidating monthly accounts.

—Inter-company accounting.

—Financial planning.

—Budgeting and forecasting.

—Analyses of expenses, company car use, bank branch profiles, and so forth.

—Claims analysis.

—Tax planning.

—Debt analysis.

—Monthly and quarterly reports.

The newer spreadsheet packages (such as Lotus 1-2-3) that have graphics facilities are being used also to prepare histograms and pie charts which are included in reports.

Other uses to which business microcomputers are being put include:

—Records keeping (automating manual files).

—A limited amount of personal word processing.

—Electronic memos and messaging (rare).

—Maintaining mailing lists.

—Diary management (but not by many organisations and not with much success).

—A limited amount of access to mainframe systems.

EDP Analyser has identified 11 main categories of business microcomputer applications. We summarise these below because they correspond very closely with our own findings.

1. Accounting, reporting and calculating aids
Applications in this category include the use of a spreadsheet package for budgeting, financial planning, etc. Also included are systems for recording expense claims and sales reports; and systems for calculating loan repayments, cost allocations, etc.

2. Writing aids
In this category, microcomputers are used for preparing memos, diary entries, meeting minutes, and so forth; or for preparing documents that incorporate data retrieved from a file search. Often, the software used provides spelling dictionaries, and allows the user to edit and revise documents written by others.

3. Search and retrieval aids
Microcomputers are used also to obtain answers to ad hoc queries. To do this, they may be used to search large data files and retrieve selected data; or to search correspondence files and retrieve selected letters and memos. They might also be used to research commercial information files.

4. Communications aids
In this application category, business microcomputers are used as an essential element of an electronic messaging system. Specific applications include:

—Making travel arrangements using network services (usually a value added network service).

—Participating in a computer conferencing system.

—Exchanging draft documents.

5. Presentation aids
An increasing trend is for business microcomputers to be used to prepare presentation slides (overhead foils or 35mm) generated by computer graphics. Another presentation aid is the use of microcomputer packages to prepare customised standard proposals (such as insurance proposals).

6. Planning, scheduling and monitoring aids
Business microcomputers are used also to develop and revise meeting plans or work plans; and to run project management and control packages, and business and financial planning packages. In addition, they are used to monitor customer orders and payments, supplier deliveries, staff utilisation, and so on.

7. Analysis aids
A major use of business microcomputers is in analysing data in many different ways. Typical uses might be to analyse sales data to identify customer buying patterns, salesperson performance or product profitability. Purchasing data might also be analysed to determine cost trends or supplier performance.

8. Memory aids
Typical applications in this category are an appointments calendar, use of a 'things to do' package, or an online business-card file.

9. Record processing aids
In this category, the business use is beginning to move out of the non-discretionary area. The microcomputer would be used to perform routine transaction entries, or to perform the complete transaction processing. It may also be used to maintain records on a personal basis, for the work group or for the department.

10. Learning aids
Sometimes business microcomputers are used as a means of making available a computer-based training package.

11. Program development aids
Finally, a business microcomputer may be used to develop simple application systems or decision support systems. The user can develop, maintain and enhance his own programs on his business microcomputer.

USER MOTIVATIONS

Some commentators have tried to explain the business pressures for business microcomputing in terms of dissatisfaction with the service provided by the corporate data processing function. This is an oversimplified view, because the typical business microcomputer user has not been the main direct user of traditional mainstream computing.

In general, the types of application discussed earlier in this chapter represent new computing work, in that they are not replacing or supplementing mainstream computing applications. The typical business microcomputer user may not have approached the systems development department because of an unspoken belief that the proposed application was unsuitable

for mainstream computing or would take too long. Thus, the applications now running on business microcomputers have never been part of the formal applications backlog.

One of the attractions of business microcomputing is its immediacy. Equipment can be installed in days (or even hours), and useful applications can sometimes be implemented in a similar timescale. It is this characteristic of business microcomputing that is focusing users' attention on the potential business benefits of microcomputers.

Another attraction is the feeling of independence that a microcomputer provides. The typical microcomputer user likes to feel he is in control of his destiny. Many of the users we spoke to are reluctant to allow the equipment to be used by others, even though they may use it themselves for only a couple of hours a day. They like to feel that the equipment is available for their own personal use as and when it is convenient for them. This is part of the 'territorial' attitude that humans have. It applies to business telephones, desks and now also to microcomputers.

But, without doubt, the main user motivation for acquiring a microcomputer concerns the perceived business benefits that the machine will provide. One of the organisations we studied had tried to correlate attitudes to using microcomputer with age, job function, length of service, and so forth. The only correlation found was with business attitudes. Those who were strongest on identifying and meeting business needs were keenest on using microcomputers.

The general attitude amongst the most likely users (and potential users) of business microcomputers — that is, amongst middle and junior managers and professionals — is to accept the machines as "a matter of fact, a way of life, nothing exceptional". Increasingly, business microcomputers are accepted as a worthwhile aid that can be used as and when appropriate to help the user do his job better. Furthermore, those who have yet to take their first steps in business microcomputing regard the typical entry price of about $7,500 as an inexpensive way of getting on to the computing learning curve.

Nevertheless, more subtle pressures are also at work. Consumer advertising of business microcomputing products (hardware and software) on television and in the press is undoubtedly raising the general awareness level amongst business managers. The increasing use of microcomputers in schools throughout Europe is prompting many parents to unravel the mysteries of computing. Peer pressures, both within an organisation and within professional groups, are also prompting many managers to realise that they too can benefit from using a microcomputer. Through our consultancy work, we know of accountants in large organisations who have purchased IBM PCs and Lotus 1-2-3 for use in their own departments because Lotus 1-2-3 was receiving "rave notices" in the professional accountancy trade press.

One final pressure that is motivating users to acquire a business microcomputer is the low-key 'marketing' that many in-house microcomputer expertise groups are carrying out.

The case histories in the appendix contain specific examples of this type of activity. Typically, they take the form of awareness programmes, capability days, demonstrations, newsletters, etc. Such activities have played a significant role in motivating business managers to take their first steps in using a microcomputer. They have the added advantage of 'persuading' the users to adopt the organisation's (that is, the management services department's) preferred microcomputer hardware and software.

PERCEIVED BENEFITS

In the above discussion we made it clear that users will only acquire a business microcomputer if they believe it will provide them with a real business benefit. We now review the benefits that business microcomputer users believe they receive from their personal computing activities. These perceived benefits were reported to us by actual users, not by management services staff speaking on their behalf.

The trainee development manager mentioned earlier in this chapter (on page 8) told us that he had installed installed a microcomputer to help him be more efficient, by enabling him to respond faster to applications and other general correspondence. Savings in time were frequently mentioned as a benefit by a wide variety of users. A management accountant using two Apples (with Micromodeller and Multiplan) said he installed the machines to save the time required to manually calculate the accounts and to have them typed. He believed that the time savings brought about by using the Apples was equivalent to three clerks. A financial accountant made a similar point. His Commodore Pet was installed to make life easier for the two people running the financial accounting function. Now, only one accountant is required.

Another accounting manager, discussing the benefits of VisiCalc, also mentioned time savings. In addition, he listed the following benefits of using a microcomputer spreadsheet package:

— He can ensure that all the required data is present.

— It removes the need to carry out repetitive work.

— He is immediately made aware of any obvious errors.

—It reduces the office space required for storing paper files.

Time and effort savings are not restricted only to accounting functions. A technical manager in the process design section of an engineering manufacturing company described the benefits he and his colleagues gain from using a Commodore Pet for large numbers of repetitive calculations. The section originally had ten people; now it handles the same workload with four people, although the Pet was not introduced specifically to reduce manpower. Each member of the group makes extensive use of the Pet, and this can sometimes lead to queues forming.

The drawing office manager in the same company told us that his department's use of a Pet had halved the time (from two weeks to one week) to produce the stress calculations that must accompany the detailed engineering drawings. An additional benefit is that the calculations themselves are more accurate. Before using the Pet, the coordinates which are fed into the stress calculations had to be read manually from A5-size graphs. With the Pet, they can be calculated from the formulae that are used to create the graphs.

Often, the time saved by using a microcomputer does not translate into direct economies in terms of reduced staff. More commonly, the benefits are in terms of improved effectiveness, rather than just efficiency. The insurance claims manager mentioned earlier in this chapter (on page 8) told us that his use of personal computing facilities enabled him to produce more and better reports than he otherwise would have been able to do. He is able to perform more non-routine tasks than hitherto and, as a consequence, he estimates that his productivity has improved by between 10 and 15 per cent.

Another frequently mentioned benefit of using a business microcomputer is that of being able to try out more combinations of data before making a decision. For example, a member of the leakage control unit in a gas utility company told us about his use of VisiCalc on an Apple. The unit's role is to analyse different methods of controlling leakages in old gas mains. The VisiCalc application enables this user to compare the cost of internal, preventive and semi-automatic sealing of old gas mains with the cost of external repairs and largely manual sealing. He is able to carry out 'what if' comparisons that would be impossible to do manually. The application has been extremely successful, and has enabled the unit to identify large potential cost savings in this area of the gas utility's business.

The examples quoted above are representative of the benefits that users of business microcomputers believe they are receiving from using these machines.

Many of these benefits cannot be quantified in terms of direct cost savings — the benefits are often more in terms of quality (or effectiveness), rather than efficiency. We therefore now turn our attention to the way in which users can justify the initial expenditure required to acquire and install a business microcomputing system.

ACQUISITION AND JUSTIFICATION PROCEDURES

Most of the organisations we examined have a formal procedure for acquiring a business microcomputer. Some organisations insist that this type of equipment (or software) be acquired via the management services department, or via the purchasing department, which then notifies the management services department of any intended microcomputer purchases. Others encourage their users to purchase their systems via an in-house 'dealer' service, although they are not compelled to do so. In reality, most users do use the in-house service, and do conform to the 'preferred' standard.

In most organisations, the users have to take the initiative to acquire a microcomputer. Indeed, the less successful business microcomputing applications occurred where the users had had a microcomputer imposed on them. The case for acquiring a microcomputer usually has to be made to the user's own management or budget holder, not to the management services department. Once the expenditure has been approved at that level, the management services department acts as little more than a rubber stamp, and checks that the policy guidelines are being adhered to. (One of our interviewees described the management services department as "being on the receiving end of a fait accompli".)

There are a few exceptions to this general rule, however, where the management services department requires that the proposed system or application be cost-justified.

Where cost-justifications are carried out, they are not particularly rigid, and attempts are rarely made to check that the anticipated benefits are actually being received. In general, if a user can persuade his own management of the need for a business microcomputer, he will get one, even if it means indulging in what one Foundation member described as "creative accounting".

CHAPTER 4

IMPACT ON MAINSTREAM COMPUTING

In this chapter we assess the impact that business microcomputers have had, and will have, on an organisation's mainstream computing. We examine these issues both in terms of the way in which the management services department is organised and operates, and in terms of its development and operational workload.

THE IMPACT TO DATE

Several management services directors told us that the biggest impact to date of business microcomputers had not been organisational or quantitative. Rather, the impact had been to bring about an attitudinal change — but amongst the user community, rather than amongst management services staff. We were told that the increasing use of business microcomputers had raised the general level of computer literacy throughout the organisation. In turn, this had made life very much easier for management services staff because, for the first time, users were able to appreciate and understand the problems and constraints faced by system development staff.

Not everybody agreed with this view, however. Others told us that the greater level of computer literacy amongst users had made life more difficult for the management services department. Their experience had been that users found it difficult to understand why it took so much longer to develop and implement a mainstream system, when they could do "something similar" on their microcomputer in a few days (or even a few hours). Similar discontent had surfaced regarding response times. "Why does my microcomputer always respond immediately, whilst your mainframe system, costing millions of dollars, takes seven or eight seconds?".

Our main finding on the organisational impact of business microcomputers may, at first sight, appear surprising. It is that, so far, the introduction of business microcomputers has had very little impact on the way in which the management services department is organised and structured. Most organisations have established a small microcomputer support team (usually no more than three or four people), but this team has been grafted into the existing organisational structure. In some organisations the same function has not even been formalised into a separate team, the microcomputer responsibilities being dispersed amongst several existing job functions.

Sometimes, however, the formation of the microcomputer team has helped to solve a minor organisational problem. Often, the team leader appointed is a mature computing professional who has reached a senior technical position (chief programmer or systems development manager, for example). The move to microcomputer manager comes as a refreshing new challenge which helps the individual concerned to get out of a technical rut (though, good technicians do not always make good user support persons).

Where a team does exist, it operates in virtual isolation from the mainstream computing activities of the organisation. The only real exception is the work that has been done to prove that, technically, the preferred business microcomputers can communicate with the organisation's mainframes or minicomputers. But in terms of the mainstream systems that are developed, or the way in which they are developed, the introduction of business microcomputers has had virtually no effect. Nor have business microcomputers significantly altered the mainstream computing workload. As we demonstrated in the previous chapter, most of the microcomputer workload consists of new work.

Apart from the specific activities of the microcomputer team (described in Chapter 5 of this report), the only measurable change in the workload of many management services departments has been in its administrative workload. At its most basic, this could be no more than a 'bookkeeping' function to record who is installing microcomputers and what they are being used for. But often, it also includes purchasing microcomputers on users' behalf and recharging the costs to them.

With the exception of the impacts listed above, business microcomputers have had virtually no effect on the way in which the majority of management services staff perform their jobs. In general, system development staff do not use microcomputers as part of their jobs as yet (but the availability of the IBM

XT/370 might alter this for IBM installations). Nor do they have microcomputer applications skills or expertise. In many organisations, business managers in user departments know more about applying business microcomputers than do system development staff.

There are exceptions, however. In a few organisations, system development staff are using microcomputers as a means of building prototypes of mainstream systems. The prototypes go through several iterations over a short period of time to enable the analysts and users to arrive at a consensus about what the requirements really are. The microcomputer manager in one organisation that has now installed 150 or so machines told us that he could not understand why his system development colleagues did not use microcomputers as a prototyping tool.

Many microcomputer managers and management services directors told us that they believe that the lack of knowledge about microcomputers amongst system development staff is a cause for serious concern. Senior analysts, with many years of mainstream computing experience, do not know when to consider using a microcomputer as part of an overall system. They are not designing the next generation of mainstream systems to take account of business microcomputers and their users.

Many of the people we spoke with believe that the biggest education and training need in the field of business microcomputers is amongst system development staff. This is a view we thoroughly endorse. So far, the lack of microcomputing skills amongst system development staff has been of little consequence, but we believe that this situation is about to change. Pressures are building up which will mean that development staff will have to take account of microcomputers as an integral part of mainstream computing. Not least amongst these pressures is the '18-month effect' we noted in the previous chapter.

MICROCOMPUTER-MAINFRAME LINKS

Many people believe that the big impact of business microcomputers on mainstream computing activities will occur as more microcomputers are linked to mainframes and start to access corporate data. The underlying assumption is that this is the next major stage of development and, as we have already observed, most organisations are testing out the technical links between microcomputers and mainstream systems. However, very few such links are yet being used for any practical purpose.

Interestingly, it is the management services staff who assume there will be a demand for microcomputer-mainframe links. Although much data is re-entered into business microcomputers from print-outs which have been produced on mainframes, we encountered very little explicit demand for mainframe links from users themselves, perhaps because they see little prospect of such a demand being satisfied.

Our view is that there will be an increasing demand for microcomputer-mainframe links, but it may not necessarily happen as quickly, nor be as widespread, as many management services staff currently believe.

When the demand does arise, however, many data processing departments will face major problems. The difficulty is that the data stored in mainstream systems almost certainly will not be formatted or structured in the optimum way for use by business microcomputer users. Much of the existing data is oriented towards detailed records of individual business transactions. Microcomputer users will typically require data in a summarised form related to trends and patterns, and the requirements are likely to differ from user to user, and from application to application. The difficulty will be compounded because many of the data extraction requirements will be 'one-offs', used once for a particular project.

A more significant problem is that data held on mainstream systems is often incomplete and the rules for its interpretation are poorly documented. Thus there is a danger that 'amateur' users might draw the wrong conclusion from the data they obtain.

Thus, management services staff quite correctly perceive that they cannot anticipate what data will be required. Neither can the users themselves. What is certain, though, is that when the users do require data they will probably find it is not available, or that it is incomplete for the required purpose. Data captured for one purpose is rarely entirely suitable for another purpose. The problem is how to restructure, or re-present, data captured as part of yesterday's transactions for use by today's managers and professionals. Many of the structural assumptions underlying the original data (market segmentation, company structure) could have changed in the meantime.

These are formidable problems, and they will not be solved easily or quickly. Our view is that business microcomputer users will not find it particularly useful to have access to 'raw' transaction-oriented data. The requirement is more likely to be for a new type of 'decision-support' database, as we discussed in Foundation Report No. 40 — Presenting Information to Managers. This type of database requires a very different type of design philosophy to traditional mainstream databases. The emphasis needs to be on the quality of data, rather than on quantity and completeness. To be useful to the typical business microcomputer user, data does not need to be completely accurate, and it does not need to be the most up-to-

date data. A snapshot of the data as it stood at the end of last month (or quarter or year) is often quite sufficient. There is also the need to combine externally obtained data (for example, government or industry statistics) with data collected in-house on the mainstream systems.

We believe that the potential impact on mainstream computing in this area is enormous. The impacts will be felt specifically in the following areas:

— Data management and data administration. Probably for the first time, the organisation as a whole will have to treat data management as a serious issue. The demand for data management will come from the users, rather than (as in the past) from management services staff trying to drum up enthusiasm for an abstract concept which is of no direct relevance to users.

— Development effort. Once users begin to take the initiative in data management issues, a massive development effort will be required to build, create, maintain and manipulate the databases so they can be useful to business microcomputer users.

— Processing power. The data manipulation will require large amounts of mainframe processing power.

— Communications requirements. Microcomputer users will demand instant access to the data they require for local processing. This may well require a large volume of data (and perhaps an application program as well) to be downloaded in a very short time. Managers and professionals will be using their business microcomputers as job aids to improve their effectiveness. They will not be prepared to wait for hours (or even minutes) to get hold of the data they require to complete the job in hand.

A major problem facing management services managers will be how to justify investment in the above areas. The timescale and cost of restructuring mainstream systems to permit business microcomputers to extract information from them are often huge. Most managers believe there will be a future demand and that, when it materialises, users will not be prepared to tolerate the lead times involved, so there is a need to take action now. The dilemma is that today there is little demand or cost justification for such a step.

SOFTWARE INTERFACES BETWEEN BUSINESS MICROCOMPUTERS AND MAINSTREAM SYSTEMS

Some organisations are beginning to tackle these issues. ICI in the United Kingdom (whose experiences form one of the case histories in the appendix) has developed software that provides a user-friendly interface between the user's personal computing facilities and the data stored on the mainstream data processing systems. We provide below a brief description of this software, which is called Conductor, as an example of the type of facilities that increasingly will be required. By the time this report has been published, ICI plans to be marketing the Conductor software as a commercial product.

ICI's Conductor system

In November 1983, ICI adopted the IBM PC as its managerial workstation. Since then several hundred PCs have been bought, and several thousand will be installed worldwide in the next two years or so. The Corporate Management Services department was given the responsibility of configuring a standard system, and of recommending and supporting hardware and software that would best meet ICI's needs. During the first few months of 1984 the department developed a menu interface system, Conductor, which links together all the standard applications chosen so far. Three main considerations prompted the creation of Conductor:

— The need to make the proprietary packages selected more 'user friendly'. Many of ICI's workforce have no previous computing experience, and the aim is to reduce to a minimum the time spent on training.

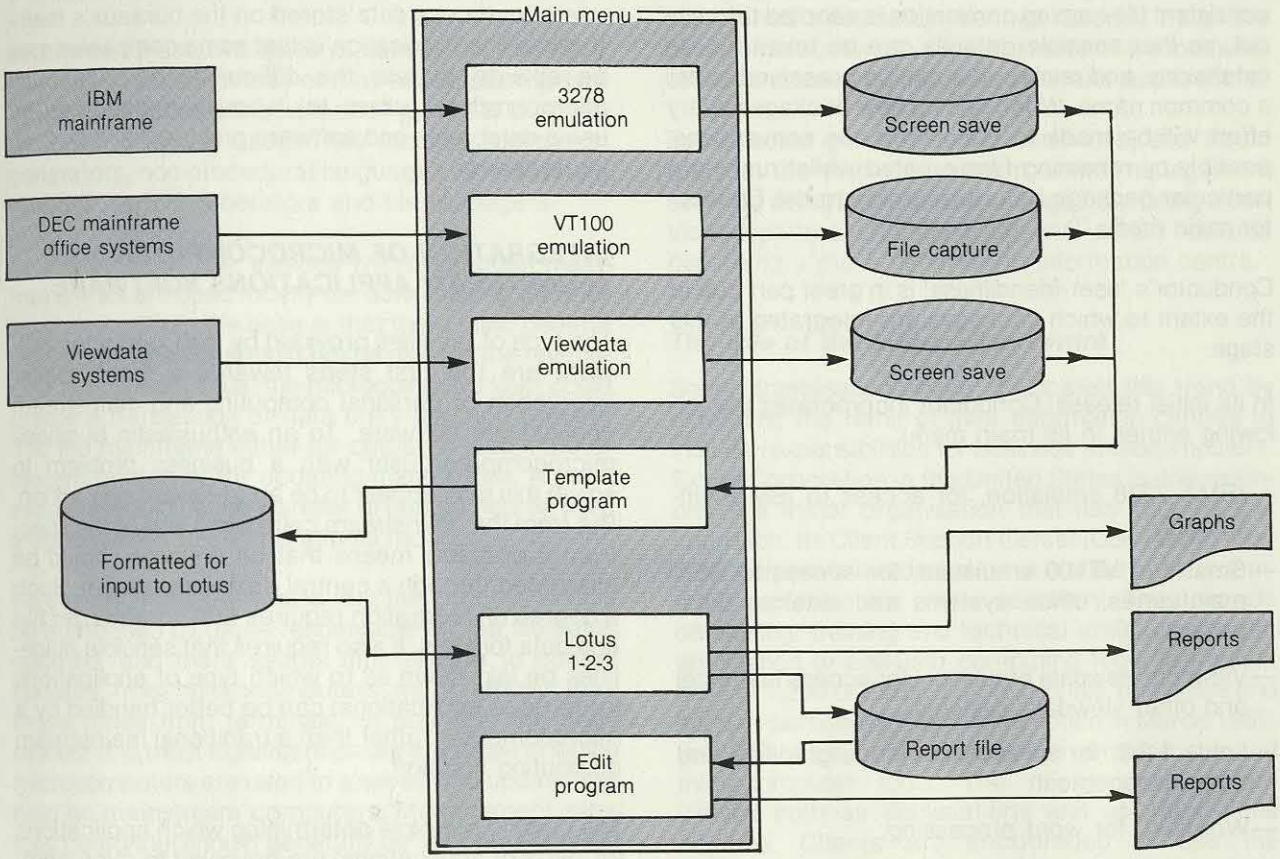
— The need to pass data freely between mainframes and microcomputers. A main factor in the choice of the IBM PC was its ability to incorporate IBM 3278, DEC VT100 and viewdata terminal emulation, together with word processing, spreadsheet and business graphics packages.

— The drive towards making the IBM PC a true 'workstation' — that is, an easy-to-use, multi-access terminal, where the user is unaware of the individual packages being used.

ICI's Conductor software enables popular software packages for the IBM PC to be accessed from a common menu system in a consistent, user-friendly style. The aim is to allow user data to be passed freely between the packages supported by Conductor. Particular emphasis is placed on communication facilities that can link mainframe data with decision support software running in the PC.

Conductor typically will be used to access data on a mainframe computer by using a terminal emulation file-transfer package, then manipulate this data in a spreadsheet, and finally plot a graph and incorporate the results in a printed report produced on a word processor. The main components of the system are shown schematically in Figure 4.1.

Figure 4.1 Components of ICI's Conductor system



Conductor will run under PC-DOS 2.0 on an IBM PC-XT or on a standard PC with twin 360k floppy discs. On the latter configuration ICI recommends that at least 512k of RAM be installed in the PC and that software such as the AST SuperDrive program is available so that Conductor can partition part of the PC memory as a RAM 'disc'. In this mode all of the menu software can be installed on the RAM disc, thereby enabling one of the disc drives to be used to load a software package (usually Lotus 1-2-3), and allowing extremely rapid access to Conductor's facilities. The other disc will typically contain a data disc.

An essential feature of the PC-DOS 2.0 operating system of particular value on an IBM PC-XT is the ability to organise data files into separate sub-directories. Conductor provides facilities to move between sub-directories in a way such that data stored or read by the selected package always resides in the designated data directory. A simple 'sign-on' procedure is available which immediately routes all user data to a specified sub-directory.

Keyboard macro facilities are fully integrated into the Conductor system. A 'core' set of useful macros specific to a particular package is loaded whenever the package is selected from the menu. In addition the current data disc or directory is scanned for a file containing user macros. In this way each user can build up a personal library of macros for every package available from Conductor.

Another component of Conductor is the Template program which marks out and formats data so that it can be read into Lotus 1-2-3. The program is easy to use, makes good use of the IBM PC's cursor control and other special keys, and includes several pages of online help. Data from a wide variety of sources may be processed through Template. In the ICI computing environment this data typically originates on one of the mainframe systems accessed via IBM 3270, DEC VT100 or viewdata terminal emulation. Once created, a template may be saved and reused at a later date with similar data.

Conductor is written in IBM PC Advanced Basic which is supplied standard with every PC and is, in ICI's view, particularly suitable for simple user programming. Each section in the main Conductor program concerned with accessing a particular package is well defined, and it is a relatively simple programming task to add any proprietary software package which runs under PC-DOS version 2.0 (or above) as a new item to the Conductor main menu.

Conductor's menus operate in a manner similar to that found in the Lotus 1-2-3 package. In addition, a consistent file-naming convention is adopted throughout, so that sensible defaults can be taken for file extensions, and related files can be preserved under a common name. When adding new packages every effort will be made to maintain these conventions, possibly by renaming files created whilst running a particular package before returning to the Conductor main menu.

Conductor's 'user-friendliness' is in great part due to the extent to which packages are integrated at this stage.

In its initial release, Conductor incorporates the following entries in its main menu:

—IRMA 3278 emulation, for access to IBM mainframes.

—Smarterm VT100 emulation, for access to DEC mainframes, office systems and external databases.

—Viewcom viewdata emulation, for access to Prestel and other viewdata systems.

—Lotus 1-2-3, for spreadsheet work, graphics and data management.

—Wordstar, for word processing.

—Template, for extracting and preparing data ready for use by Lotus 1-2-3.

—Sign-on facility, for easy access to the PC-DOS sub-directories.

—Maintenance facilities, for changing sub-directories, saving macros, etc.

Other commercial products

There are several commercially available software products designed specifically to allow business microcomputers to access and retrieve data stored on mainframes. The first such packages were announced in 1982 by MSA (Management Science America), a well-established software package supplier. Together with its subsidiary, Peachtree Software, MSA has produced Peachlink, which runs on an IBM PC. It allows IBM PC users to extract data from any of MSA's online mainframe applications. By the middle of 1984, Peachlink had been sold to more than 350 IBM user sites.

Other mainframe software suppliers quickly followed MSA's lead. For example, Mathematica Products Group now provides RAMLINK, which enables an IBM PC user to download data from a RAMIS II system running on a mainframe. The data can be formatted automatically for use by the most popular microcomputer packages, such as VisiCalc and Lotus 1-2-3.

Traditional service bureaux also are providing software facilities that allow business microcomputer users to access data stored on the bureaux's mainframes. The implication is that some companies may be able to bypass the difficulties of connecting microcomputer users to in-house mainframes by using databases and software provided by timesharing bureaux.

INTEGRATION OF MICROCOMPUTER AND MAINSTREAM APPLICATIONS SOFTWARE

The type of facilities provided by the Conductor software are the first steps towards a much closer integration of personal computing and mainstream applications software. To an enthusiastic business microcomputer user with a business problem to solve, this may appear to be an irrelevant distraction. But from the mainstream computing end of the spectrum it probably means that all systems should be integrated through a central database system. Such a degree of integration requires firm control over file and data formats. It also requires that sensible guidelines be laid down as to which type of applications (or parts of applications) can be better handled by a microcomputer rather than a traditional mainstream computing solution.

The guiding principle determining which applications (or parts of applications) are devolved to microcomputer users should be that of 'personal' computing. The consequences of the user's efforts should be restricted to that user and possibly to the subordinates for whom he or she is responsible. The 'personal' computing aspects of a system should be just that — supporting an individual in carrying out his or her job, and not impacting anyone else. Thus, an application that satisfies any of the following conditions should be reserved for mainstream processing, controlled by the management services department:

—The application is to be used routinely by anyone other than its originator and his immediate work group.

—The application could change existing data that will subsequently be used by someone other than the originator and his work group.

The applications that are appropriate for personal computing fall into the categories we listed on page 11. Note that we described these applications as job 'aids', or tools. Tools that are not usually appropriate for personal computing in large organisations include:

—Compilers or interpreters for procedural languages.

—Mainstream applications packages, such as payroll and bill of materials.

—Any access method permitting updating of data that is not 'owned' by the originator.

In between these two types of categories there are a variety of tools that may or may not be appropriate for personal computing, depending on the purpose for which they are used. They include application generators, non-procedural languages with updating facilities, report generators and file managers.

At present, the few existing microcomputer-mainframe links are used mostly for downloading data for local processing. We believe that there is no general reason why the link should not be used in the reverse direction as well. Thus, the microcomputer user could create a transaction or data entry file, and transfer it to the mainframe either for output to disc, tape or system printer, or for updating master files. A good example would be the transfer of budget figures from a spreadsheet to an operational monitoring system.

An essential requirement is that this process should be authorised by those responsible for the file being updated, and there seems little reason to control updates from microcomputers more strictly than those made from terminals. In practice, the commonest and most significant cases are those in which microcomputers are used to analyse and update files held on mainstream computers. Management services personnel should generally be in control of such processes, especially if normal security systems are to be bypassed.

IMPACT ON END-USER COMPUTING STRATEGY

Many organisations already have well established in-house timesharing services (or information centres, to use IBM's terminology) based on their own mainframes. They see these services satisfying many of the personal computing needs of their business users. As the case histories in the appendix show, the growth of business microcomputers has not, as yet, had an impact on the demand for in-house timesharing. Indeed, some organisations told us that in-house timesharing activities were still the fastest growing part of their computing workload, even though large numbers of business microcomputers were being installed as well.

Most of the business microcomputers installed so far have been installed as stand-alone devices. In other words, they are being used for a purpose which differs from those of terminals linked to in-house timesharing services. Our view is that there will be a gradual evolution, or merging, of these two types of end-user computing. Existing timesharing users will replace their conventional terminals with microcomputers that can also emulate the terminals. And existing microcomputer users will begin to use them additionaliy as terminal emulators to access the timesharing services. Thus, those organisations with established information centres already have the basic infrastructure to allow business microcomputer users to access mainstream files and applications.

Some would go even further than this, and would say that the whole orientation of the management services department should change from being a service department in the traditional sense towards becoming a more generalised information centre.

The role of the information centre

Some organisations have anticipated this trend by extending the remit of their information centres to include responsibilities for business microcomputers. Exxon Corporation in the United States is one example of a major organisation that has adopted this approach. Its Client Support Center (CSC) in the New York corporate headquarters is staffed by four computer professionals and a secretary. They provide consulting, training and technical assistance in the application of end-user computing tools to a client base of 1,200 of Exxon's professionals, managers and support personnel. From its inception in March 1982, the CSC has supported a mixture of mainframe and microcomputer tools. The microcomputers are viewed both as workstations and as stand-alone devices. Clients are encouraged to use the microcomputer either alone for small problems, or as a terminal connected to the mainframe for larger, more complex problems. The software selected (for analysis, modelling, database query, report writing, graphics and communications) provides similar functions both on the mainframe and the microcomputer.

Exxon's experience has confirmed that the people who staff a client support centre must be top performers who have excellent interpersonal skills. Furthermore their technical skills and knowledge of business techniques should complement one another. The original CSC team comprised an expert in database management systems, a second expert in database applications, a financial analysis and modelling expert, and the team coordinator, who specialised in distributed processing and microcomputers. All of them also had extensive business consulting experience.

One of the biggest problems encountered by Exxon's CSC when it was first established was the lack of understanding by other computing professionals about its role and impact on the computing organisation. They perceived it as an 'upstart' that was competing with traditional systems development staff. Moreover, it quickly became the initial point of contact between the computing department and the majority of its clients. No one in the department had foreseen the possibility of a conflict. The situation was

particularly troublesome to the computer department's functional coordinators — senior staff whose role is to ensure that computing in general is responsive to business needs. This difficulty was resolved by taking three actions:

—An end-user computing education programme for the computer department was initiated.

—The CSC coordinator schedules regular meetings with computing managers and functional coordinators to keep everyone up to date.

—Guidelines were established on when and how either the CSC or the rest of the computing application development function should deal with clients.

IMPACT ON THE APPLICATIONS DEVELOPMENT BACKLOG

There is some evidence to support the view that the growth of business microcomputers is, in part, a response to the applications backlog suffered by most organisations. Does this mean that the widespread use of business microcomputers will solve the development backlog problem once and for all?

Regrettably the answer has to be an emphatic "no". Indeed, the situation will probably become worse because of business microcomputers. We have already demonstrated that business microcomputers have had virtually no impact so far on the 'formal' backlog, which is made up of:

—Requests for changes and enhancements to existing systems (otherwise known as 'maintenance'). This typically accounts for 50 per cent (or more) of the development workload.

—Requests for new applications and systems that interface with the current systems.

—Requests for new applications and systems.

Microcomputers can have no effect on the true maintenance workload because it requires modification to existing programs. They are also of limited value at present in developing new systems to interface with current systems or system enhancements, because of the problems of interfacing a microcomputer with the larger computers. (If data processing staff were more aware of the potential of microcomputers, however, they might in many instances be able to produce simple file interfaces on the mainframe enabling the bulk of development to be carried out on microcomputers, perhaps by the end user.) Of the third category, only the smaller applications can be implemented effectively on a microcomputer. The inescapable conclusion is that microcomputers at present are having very little effect on the formal development backlog.

The formal backlog comprises specific requests that have been made to the applications development department. But this is usually only the tip of the iceberg. The hidden backlog, consisting of needs that are perceived by users but have not yet been submitted as requests, may be even larger. It typically comprises non-critical items that are required by an individual or by small groups — tasks that are important, but only to a few people. It is precisely for this type of task that business microcomputers are being used. They therefore have the potential to make a significant impact on the hidden backlog.

But there is a sting in the tail. The stand-alone 'personal' applications initially developed for business microcomputers are likely to evolve into integrated microcomputer-mainframe systems. Microcomputer users will demand to be linked into the mainframes, so they can access corporate data. These demands will generate high-priority development items that are added to the formal backlog. Thus, in tackling the hidden backlog, business microcomputers are likely to generate more high-priority items to be added to the formal backlog.

CHAPTER 5

ROLE OF THE MICROCOMPUTER MANAGER

Most of the organisations we talked to had established some form of microcomputing support team, typically consisting of three or four people. The detailed responsibilities of the team, and the way in which they carry out their duties, depend to a considerable extent on corporate style (centralised or decentralised; autocratic or autonomous, etc.). Thus, there is no 'ideal model' for the manager of such a team. Nevertheless, our research identified certain common themes concerning the role of the microcomputer manager, in terms of both successful and less successful approaches. We discuss these under a series of headings, each of which will be more or less relevant to a particular organisation, depending on its corporate culture, and the stage it has reached in the evolution of business microcomputers.

BEST PRACTICES DISTILLED FROM OUR RESEARCH

If a formal microcomputing support team has not yet been established, we recommend strongly that such a team be set up at the earliest opportunity. The discussion below can be seen as a distillation of the 'best practices' from others' experiences, which can be used as appropriate in setting the terms of reference for the team and its manager.

Act as a catalyst

To be successful, the initiative for business microcomputing has to come from the business users themselves. The very few unsuccessful business microcomputer installations we heard about were invariably cases where the users had had a machine foisted on them. In an organisation where there is little or no demand for business microcomputers, the microcomputer manager must beware of being too thrusting. Instead, he must strive to create the environment where users will, of their own accord, want to use microcomputers. This is probably best achieved by a general awareness or educational programme.

In many respects, the role should be one of 'pump priming' where the aim is to get the business users up to speed (in computing terms) as soon as possible.

Anticipate users' needs for support

The microcomputer manager and his team should be ready to respond to users' needs, but should not preempt them by trying to solve the users' problems for them. This means finding a delicate balance between providing too little help and providing too much. Some organisations have successfully solved this problem by specifying a maximum amount of support that will be provided at any one time. Imperial Brewing & Leisure (see the case history on page 45) has specified a maximum of four weeks' support. In addition, only one project per division is allowed at any one time. The Exxon customer support centre mentioned in the previous chapter limits direct support to a maximum of four hours at any one sitting.

Once again, the emphasis needs to be on providing just enough support to enable the users to get on with their own personal computing. The danger of doing too much is that the user does not learn and the microcomputer support team has to grow into a large, second applications maintenance team.

Be responsive

Nevertheless, when the users do request help or advice, the microcomputer manager must be ready to respond. A help-desk or a hot-line telephone number is probably the best way of achieving this. The team members staffing such a facility must not only be technically very good. They must also be able to deal with business managers at all levels in the organisation. And they must be thoroughly familiar with the relevant hardware and software products.

Do not dictate

The microcomputer manager should be ready and able to offer advice and guidance when it is sought by the users, but he should avoid, wherever possible, telling the users what to do. At times, this may well mean standing back and allowing users to make mistakes. Above all, avoid paternalism. The aim is to build a rapport with the users so that they will naturally want to seek the microcomputer manager's advice, and will respect his views.

Recommend and endorse hardware and software products

In some organisations, the microcomputer manager will be able to insist that a standard product is purchased. In others he will only be able to recommend a preferred product (or products). In either case, the products endorsed must have been chosen on the basis of first-hand knowledge. And they must have been chosen on their ability to meet business needs, rather than on their technical characteristics.

The endorsed products will also need to be re-evaluated at regular intervals. The business microcomputing marketplace is evolving rapidly. Two years ago Apples and VisiCalc were the norms. Today, in 1984, the norm is the IBM PC and Lotus 1-2-3. But 1-2-3 has now been superseded by Symphony. And will the IBM PC still be the norm in two years' time? Many people believe that Symphony and Apple's Macintosh will be a very powerful combination.

Negotiate group deals with suppliers

Most Foundation members will be purchasing substantial numbers of business microcomputers in the next year or so. The microcomputer manager should aim to act as the organisation's purchasing agent for these devices, and he should shop around for the best possible deal for the supply and maintenance of microcomputers. Substantial discounts for bulk purchases can be negotiated, but price is not the only consideration. Microcomputer suppliers and dealers provide varying levels of service and support. The microcomputer manager should aim to build an ongoing relationship with a reputable supplier that is 'right' for his organisation.

Some organisations have negotiated group-wide maintenance deals with their suppliers. Others have calculated that it is more cost-effective to hold stocks of spare machines which can be shipped in at short notice to replace a machine that has broken down. The faulty machine is then repaired on a time and materials basis. In practice, personal computing equipment has been found to be very reliable. Any faults usually come to light within the first few weeks.

In addition, the microcomputer manager should not feel constrained to purchase products direct from the manufacturer. Many organisations, particularly in the United Kingdom, have found they get an excellent service from authorised dealers. Indeed, many say they get a better service from dealers than they do from the manufacturer.

Generate awareness

As part of his initial 'pump-priming' duties, the microcomputer manager will need to generate awareness throughout the organisation about the potential benefits of microcomputing. This can be done by running in-house 'capability' courses, as do Beecham's in the United Kingdom (see the case history on page 37). These are short (90-minute) courses designed to introduce potential business microcomputer users to the concepts of computing, showing them examples of what the machines can do and telling them how they can get started.

As the use of business microcomputing throughout the organisation begins to mature, capability days can be held to demonstrate the facilities and features of new hardware and software products.

Make it easy for users to take their first steps

Many of the people acquiring a business microcomputer in the next year or so will not previously have used any form of computing equipment. The microcomputer manager should make it as easy as possible for these people to take their first steps in business microcomputing. Once the awareness campaigns and general education programme have generated the need, the users should then be able to install and begin to use their first equipment with the minimum delay. Many organisations hold stocks of 'starter' packages (usually a basic personal computer with a spreadsheet package) that can be installed 'off-the-shelf' by the microcomputer team.

An initial training package will also need to be devised. The norm seems to be about two days for spreadsheet packages.

Allay the fears of data processing staff

Usually, the microcomputer manager and his team are not an integral part of the existing data processing staff, and this can lead to potential conflicts. Many data processing staff (particularly system development staff) are suspicious about the impact that business microcomputers might have on their careers. These fears need to be recognised, and steps taken to allay them.

In particular, there is, in large organisations, a pressing need to educate system developers about the potential uses of business microcomputers. Not only do these staff need a better understanding of why and how business microcomputers are being used. They also need to be able to assess how business microcomputers can effectively be included as elements of more conventional systems.

Encourage informal contact between users

However good the microcomputer manager and his staff are at their jobs, they will not be the source of all wisdom concerning business microcomputing within their organisation. As the user population grows and matures, they will inevitably produce a fund of tools and techniques that could be valuable to other users. The microcomputer manager should provide

a mechanism to enable users to share ideas and information, so that hard-won experiences in one area can be applied in other parts of the organisation.

Some microcomputer managers had tried to set up program-sharing schemes (usually through a newsletter) but had abandoned the idea. Their experience had indicated no demand for this type of service. We are not surprised at this. Business microcomputers are used for personal computing and, almost by definition, an application developed by an individual for his own use will not be suitable for another user.

In our view, informal contact between users should focus on the areas of tools and techniques — 'tricks of the trade' learnt by one user which can be passed on to others. A newsletter is an excellent medium for this type of information.

Again, we encountered organisations in which a microcomputer newsletter had been tried and abandoned. But we were also shown some excellent newsletters packed full with interesting and useful information. The BP case history reports on what we regard as an excellent model for a newsletter.

Provide applications development expertise

Most business microcomputer users are quite happy (indeed, they prefer) to develop their own spreadsheet-based applications. However, there will be application requirements that cannot be met by spreadsheet packages, and the microcomputer team should have available appropriate tools and techniques with which it can provide applications development expertise. There are different views about the most appropriate development tools. Some organisations standardise on Basic. Others prefer to use higher-level application generators such as dBASE II or Delta. Our view is that the facilities provided by these higher-level tools are very comprehensive, and that they should be used wherever practical.

Be prepared for change

Microcomputer managers must be ready and able to cope with the changing requirements of their 'clients'. Users will run out of capacity, and will want to upgrade their machines. The microcomputer team must provide a modular and expandable approach so that, for example, a basic system with 256k of memory and twin floppy disc drives can be easily changed for one with more memory and a Winchester disc drive.

Market the microcomputer team's services

The microcomputer team will be aiming its services, potentially, at every manager and professional in the organisation. These people need to be informed of what the team's services are, and how they should set about using them. This means that the microcomputer manager needs to undertake some form of marketing, albeit of a fairly low-key type. This type of activity is particularly important in organisations where users are not compelled to use the services of the microcomputer team. Here, the aim will be to position the microcomputer team as the most obvious group to turn to for advice and guidance about business microcomputing. Thus, the microcomputer manager has to demonstrate that his team can provide the best service at a competitive price.

Some organisations have produced a brochure describing the services offered by the microcomputer team. Others use a newsletter as the medium. Sometimes the brochure positions business microcomputing as a part of the wider area of end-user computing. For example, the Midland Bank in the United Kingdom has produced a 12-page glossy brochure "Personal Computing in the Midland Bank". This document describes (in non-technical terms) the personal computing facilities available via the bank's information centre, or via Microguide, the bank's centre of advice, guidance and expertise for microcomputers. To quote from the document: "This brochure has been produced in response to many requests within the bank for information about the personal computing services available to meet specific individual needs or to supplement the existing facilities provided by the better-known main systems."

PLACE IN THE CORPORATE STRUCTURE

The role of microcomputer manager is a new one and, as we have shown above, the responsibilities are not only technical. Experience in the United States has shown that employers often do not know what skills they require when they set about appointing a microcomputer manager. In practice, microcomputer managers have come from a wide variety of functions, including purchasing, sales, consulting, data processing, engineering and business school graduates. In Europe, the trend seems to be to appoint a seasoned computing professional who is seeking a new challenge.

At present, most microcomputer managers report to the management services director or the data processing manager, but have little direct contact with the rest of the management services organisation.

An increasing trend in the United States and, we believe, soon also in Europe, is for the team to be established as the 'corporate micro store'. (BP's experience of following this approach is reported in the appendix.) Furthermore, corporate management appears to be pulling such stores deliberately into the mainstream of their organisations. According to

research carried out in the United States, an in-house micro store is more likely to be established in organisations with at least several of the following characteristics:

—The company operates in a high-technology business.

—The annual revenues are more than $250 million.

—The development budget is at least 15 per cent of the product budget.

—The company has at least five fairly autonomous divisions.

—Most of the major divisions are located in just one city (or within easy reach of each other).

—The company employs a large number of professional staff.

—The company has a senior executive responsible for planning and corporate development.

The research has further shown that the person running the micro store is increasingly likely to be reporting to the chief executive, rather than the management services department.

PROFESSIONAL GROUPS FOR MICROCOMPUTER MANAGERS

Another recent development (again in the United States) is the formation of professional associations for microcomputer managers. The Microcomputer Managers Association (MMA) in Boston was formed by an independent vendor who was selling microcomputer products to large organisations. He noticed the trend towards the appointment of corporate microcomputer managers, and set about determining the degree of interest in forming a professional group. He was surprised at the response, and his Association now has nearly 100 members who meet monthly to discuss management issues — care and training of executives, data security issues, and how to keep control are typical topics. This group is similar to, but independent of, other microcomputer management groups in New York and Los Angeles.

The founder of the MMA group now devotes himself full-time to running the group. He arranges meetings and seminars, and is planning an electronic bulletin board for his members. This would probably be used to extend discussions of current concern to microcomputer managers — integration, standards, security, training, and the relationship with the established management services function.

We did not hear of any equivalent group in Europe. This may be due in part to cultural differences between Europe and America. On the other hand, it might reflect the different states of corporate microcomputing on each side of the Atlantic. American microcomputing managers appear to be much more concerned with sorting out the problems caused by an uncoordinated approach to microcomputers in the past few years. European managers are much more concerned with preventing the problems happening.

CHAPTER 6

FUTURE DEVELOPMENTS

Business microcomputing is evolving rapidly, and the number of machines installed in larger organisations is set to grow very quickly. Various estimates have suggested that, in the United States alone, there will be eight to ten million personal computers on office desks by 1990.

Xerox Corporation has made an attempt to quantify the growth of end-user computing by measuring the installed computer power (in terms of mips — millions of instructions per second) used for operational computing and end-user computing in one of its major business subsidiaries. In 1970, end-user computing accounted for a negligible amount of the 3.5 mips then installed; by 1980 it had grown to nearly 40 per cent of the 70 mips installed. Furthermore, the study predicts that by 1990 end-user computing will account for some 75 per cent of the total installed computing power, which is expected to be somewhere between 1,350 and 2,700 mips. The end-user computing component is expected to grow by a factor of between 40 and 80 during the decade.

THE MICROCOMPUTER BECOMES UBIQUITOUS BY 1990

We believe that the use of business microcomputers will steadily increase and that by 1990 perhaps 90 per cent of managers and professional workers will use them on a regular basis, with an average ratio of machines to workers of 1:2.

During this period the machines will become more powerful. Today, most new microcomputers purchased are 16-bit machines. By 1986, 8-bit business microcomputers will no longer be marketed and 32-bit machines will begin to be demanded by users. By 1990, these 32-bit machines typically may have several megabytes of memory and the power of an IBM 4341.

Managers and professionals will want to 'own' their own personal computers. But they will also want to use them in a 'terminal' mode to access corporate information centres or query the corporate data files. We have already described (in Chapter 4) the profound impact we believe that this trend will have on the management services department.

In Chapter 4, we also mentioned the emergence of software products that will allow business microcomputers to link to mainframes for downloading data for local processing by a microcomputer package. We expect more of these products to become available, making it easier to integrate microcomputer and mainframe applications. Moreover, software products are already being announced that are designed to run partly on the mainframe and partly on a microcomputer. This type of product will be particularly attractive to mainframe vendors, as it provides them with the opportunity of locking-in their customer base to their own proprietary business microcomputer.

But the traffic between microcomputers and mainframes will not be one-way. At present, management services staff are alarmed at the thought of microcomputer users updating central files. We agree that this is unlikely to happen in a direct way, yet we can foresee the emergence of software products and techniques that will enable this to happen where it makes sense to do so. Thus, we foresee an increasing role for business microcomputers as intelligent data capture devices, for example for the raw data for a transaction file, which would then be transferred to the mainframe and processed in the normal way.

How will the suppliers (hardware and software) react to this wider market for their products? Who will be the market leaders? Will IBM continue to dominate the market? What type of products will they be supplying? We now attempt to answer these questions by first examining the likely future development in software (operating systems and general-purpose utility software). We then examine the future relationship between business microcomputers and office automation, because we believe that this is really what the microcomputer revolution is all about — office automation for managers and professionals. And finally, we offer our predictions on the most likely product and supplier trends.

OPERATING SYSTEMS

The success to date of business microcomputing has depended at least as much on software as on hard-

ware capabilities. It was VisiCalc, and latterly Lotus 1-2-3, that enabled business microcomputers to gain general acceptance. Underlying this user-oriented software has been the small number of operating systems that have facilitated the development of the enormously successful business packages. Operating systems will continue to play an important role in the development of business microcomputers, and fierce controversy rages over which will be the de facto standard of the future. Today PC-DOS (or MS-DOS) reigns supreme. But will Unix become the future standard?

There are three main families of contenders: CP/M, PC-DOS (or MS-DOS), and Unix. Within each of these there are now a wide variety of products. In addition there is an enigmatic outsider, Pick and the so-called integrated operating systems. We first briefly review the main contenders and then give our views for the future.

Digital Research's CP/M

CP/M was originally developed in the early 1970s by Gary Kildall and John Tarode. By the end of the 1970s Kildall and Tarode had established Digital Research and, today, CP/M has evolved into a family of products, the best-known of which are:

—CP/M 80 which is the generic name for the whole range of 8-bit operating systems. CP/M 2.2 is the most common version; CP/M Plus has enhanced features, such as fast file access with disc caching.

—Personal CP/M is the version of CP/M supplied on ROM for use in home computers.

—CP/M 86 is a straight re-write of the original 8-bit system for use on 8086 machines.

—MP/M is the multi-user version of CP/M.

—CP/M-86K is the version used on Motorola's 68000 chip. It was produced originally to compete with Unix.

Concurrent CP/M is the most recent member of the family. It has since been renamed Concurrent DOS (and is sometimes called Concurrent PC-DOS). It is a single-user system which allows up to four tasks to be run simultaneously, controlled via windows. It has a local network extension called DR/Net which has been implemented on several local area networks. In addition, it has many other facilities not yet available on rival products. In particular, Release 3.1 provides emulation of Microsoft's PC-DOS, so that the huge range of software written for the IBM PC (running under PC-DOS) can now be used with Concurrent CP/M.

IBM's salesmen in the United States have grown tired of waiting for a concurrent version of PC-DOS, and have begun to recommend Concurrent CP/M to some of their customers.

But the most reliable indicator of the significance of a new operating system is the reaction of leading software suppliers, and these too are signing up to write applications for Concurrent CP/M. Examples include MicroPro (of Wordstar and SuperCalc fame), Ashton Tate (supplier of dBASE II) and Peachtree.

With an installed base of at least one million, CP/M has carved out a unique niche in the microcomputer marketplace.

Microsoft's MS-DOS

MS-DOS's history is inextricably linked with the success of the IBM PC. In essence, MS-DOS is a fairly straightforward 16-bit operating system that had the good fortune to be chosen by IBM for its PC.

The initial version of MS-DOS (Release 1.25) bore a remarkable resemblance to CP/M. It has since been replaced by Release 2, which has many enhanced facilities, including the tree-like directories usually associated with Unix.

MS-DOS was originally written by Seattle Computer Services and was acquired by Microsoft and developed to meet IBM's requirement. The IBM version is called PC-DOS and, though it is similar to MS-DOS, there are some significant differences between the two products. The most important is that some functions, such as cursor addressing, are controlled by software incorporated into ROM on the IBM version (PC-DOS). These functions are different to the calls used in MS-DOS, so PC-DOS software will run only on an IBM PC, or a very close lookalike. (This is one of the problems that Digital Research has sought to address with its Concurrent CP/M product.)

Microsoft does not yet have a multi-tasking version of MS-DOS, although it is known to be working on this enhancement. It is also due to introduce window-type features before the end of 1984, which will enable several tasks to be displayed simultaneously on the screen, although only one of them will be active at a given time.

The huge success of the IBM PC has assured MS-DOS's future in the short and medium term. But its long-term success may well depend on IBM's continuing patronage. It is possible, for example, that IBM may develop PC-DOS independently of MS-DOS.

Unix

By the end of 1985, there will probably be about half a million users of Unix worldwide. Unix was developed originally in the late 1960s by Ken Thompson of Bell Labs (part of AT&T).

By 1973, Unix had become sufficiently well-established within Bell Labs to warrant a re-write — this time in Unix's own 'C' programming language. C's portability has been largely responsible for the ability of Unix to run on a wide range of different machines.

The growing popularity of Unix is due equally to a subtle marketing tactic employed by AT&T. The telecommunications regulatory environment in the United States in the 1970s effectively prohibited AT&T from marketing Unix. AT&T therefore decided to provide Unix at virtually no charge to many American universities, where it was used both by computing science students and as the environment in which most other students learnt the basics of business computing. That generation of students is now reaching junior and middle management positions. Given a choice, they would prefer to use Unix.

Unix has now developed to become an interactive, multi-user operating system offering a sophisticated set of features. In order to do this, it is divided essentially into three layers:

- —The kernel, which interfaces directly with the computer hardware. This part of Unix handles tasks such as file input and output, and provides the multi-tasking features. It needs to be separately implemented for each new machine.
- —The shell, which is 'wrapped round' the kernel. It is designed to be largely hardware independent, but can be modified by each supplier to meet specific requirements. The shell is used typically to define processing 'lists' to Unix, and can contain logic statements to control the processing.
- —Utilities, of which there are a bewildering number. Most of them are programming aids, and it is this aspect of Unix that makes the system popular with programmers.

In some respects, Unix is a retrograde step because it provides programmers with opportunities to immerse themselves in technical detail rather than encouraging them to write useful applications using high-level tools.

Until recently there has been no standard version of Unix, but literally dozens of slightly incompatible variations. The first attempt at a standard was Unix System III which emerged from Bell Labs in 1981. AT&T has since modified this and its new standard is Unix System V.

So far, Unix has had very little impact on business microcomputing. Yet there are many people who argue strongly that Unix will become the de facto standard for business microcomputers. Much of the speculation centres around the future role of AT&T in the information technology marketplace. The belief is that if AT&T is a serious contender in the business microcomputing marketplace, it will use Unix as its spearhead.

IBM and Unix

But has IBM already pre-empted any move by AT&T? In January 1984, IBM announced a Unix-like operating system, PC/IX, for its PC. The system was demonstrated at the Uniforum event held in Washington DC. This was the largest gathering of Unix users and product suppliers ever held, and was expected to be a showcase for AT&T and its products. Yet, by the end of the third day of Uniforum, Unix experts were predicting that PC/IX will grow to become the de facto standard for all multi-tasking desktop personal computers below $25,000.

IBM's PC/IX is based on Unix System III (Bell Labs' first 'standard' version of Unix), and is now available in the United States for a once-off licence fee of $900. Assuming that it begins to sell in reasonable volumes, there will inevitably follow a serious flow of Unix business applications software aimed at the ever-expanding IBM PC market. But AT&T's push of Unix System V could well see an alternative set of applications software for that company's products.

For a decade or more, Unix has been regarded by business users as an academic curiosity. The product developments outlined above mean that in 1984 Unix-based business applications are beginning to be created in reasonable quantities for the first time. We believe that these developments will combine to make Unix a force in the business microcomputing market. Foundation members would be ill-advised to ignore Unix.

Pick

The Pick operating system is seen by many as the only serious rival to Unix. It was designed by Richard Pick when he attempted to create a truly user-friendly environment for the vast majority of users, who would not want to know anything about the technicalities of the machines they were using. By the middle of 1984, there was a worldwide user base of about 14,000.

Pick is built around a relational database and an English-like query language that can be utilised by relatively naive computer users to make queries against the database. Pick also extends the concept of virtual storage to include the whole of the available disc storage.

The most widespread implementation so far of Pick has been on the Microdata range of hardware (as the Reality operating system), although there are an increasing number of versions available for 68000-

based microcomputers. There is also a version for the IBM PC, and other implementations are imminent.

Pick is typically used by systems houses who develop application software packages for vertical markets. They find that Pick's facilities provide them with an ideal development environment. They also find that the built-in relational database and high-level enquiry facilities mean that they do not have to write many of the reporting and enquiry programs that would normally be required.

Pick is ideally suited to business applications and 'data' processing, whereas Unix is suited to scientific, technical and 'number-crunching' applications (though Unix System V attempts to bridge this gap).

However, Pick has been targeted at software developers and not at user organisations, and so it has yet to emerge as a contender in the general business microcomputer marketplace.

A major new release of Pick is scheduled for later in 1984. This should provide improvements in the relatively weak area of data communications, and should also include a C compiler.

This will allow certain releases of Unix to be run as a sub-task of Pick.

Integrated operating systems

There is one final class of microcomputer operating system that is just beginning to emerge as a serious contender in the business microcomputing marketplace. These are the so-called integrated operating systems, represented by Apple's Lisa and Macintosh (called MacOS).

Such systems are designed to remove the distinction between utility programs and the operating systems needed to support them. Typical features include multi-tasking, mice, windows and, eventually, multi-users. Pro rata, they require more hardware than other operating systems and they can be slow to use. And, as yet, there is not a very large application software base. Nevertheless, many people believe that this type of operating system will come to dominate the business microcomputing marketplace in the medium-term future where ease of use is all-important.

Future developments in microcomputer operating systems

In the medium term (three to five years), we foresee a four-cornered battle for supremacy between Digital Research's CP/M family of operating systems, Microsoft's MS-DOS/PC-DOS, Unix (but with two versions striving for supremacy) and the integrated systems such as Apple's Macintosh. Each will have its advocates, advantages and disadvantages compared with the others, but no clear market leader will emerge during this timescale. On the other hand Microsoft, despite its present patronage by IBM, could cease to be a serious contender in the marketplace.

The ultimate winner, in our view, will be very different from any of the present products. We believe that future operating system development will be shaped by the following forces:

—User requirements.

—Actions of independent software suppliers.

—The emergence of generic processors.

Each of these is discussed below.

User requirements

The most significant user requirements that are at present poorly satisfied by the four main contenders are windowing and microcomputer-mainframe interworking.

Among the four, Digital Research's Concurrent CP/M leads the way in windowing techniques, but falls short of the facilities offered by the 'integrated' software of the Apple Lisa and Macintosh.

There has so far been very little development in interworking. However, as Unix is already available to support timesharing on several mainframes and minicomputers it could have a head start in this respect. It is also likely that IBM's PC/IX will be followed by compatible versions for 4300s, 308Xs and their successors. IBM has now shifted much of its new software development into Unix's programming language, C, and, according to a former senior executive, IBM staff are now talking about Unix revolutionising the entire product range from 8088-based microcomputers to the largest mainframes.

Actions of independent software suppliers

The most reliable indicator of the future success of an operating system is the extent to which it is adopted by the leading independent software suppliers such as MicroPro, Lotus, Ashton Tate, and Peachtree. These are all companies that invest very large sums in developing products for business microcomputers. They therefore have to assess very carefully which operating systems their products will be designed to run with, and which to develop first in order to recoup their development funds most rapidly. For example, Ashton Tate's new product "Framework" was initially available only on the IBM PC under PC-DOS with versions for MS-DOS and CP/M-86 to follow later.

Emergence of generic processors

In the longer term, the confusion about rival microcomputer operating systems could be removed by the emergence of 'generic' processors, able to provide a 'virtual environment', which would allow users to switch rapidly between different operating systems.

Developments underway at Digital Research indicate the way in which this might happen. This company is currently including Unix in its product development plans. It has recently announced a deal with AT&T that is designed to produce a working version of Unix for the top of AT&T's personal computer ranges. Digital Research has also been commissioned by Motorola to implement Concurrent CP/M on Motorola's new VME/10 processor (based on the 68000 family), but running under Unix System V . This version of Concurrent CP/M will also be written in C. It is also working for Intel to make Unix System V available on the iAPX 286 processor.

In addition, Digital Research is pioneering new compiler technologies, based on the C programming language, which make it very much simpler and faster to develop a compiler for a new processor. The first product to be created with the new compiler technique is Fortran-77 for Intel's 8086/8088 series of processors. Thus Digital Research's products have the potential to provide CP/M, MS-DOS, Unix and a range of compilers all running simultaneously on the same hardware — a generic processor.

The potential impact of such a development is substantial. Users would no longer be locked into a particular model of microcomputer to run a particular applications package. Digital Research is beginning to open up the way for truly portable applications software by allowing PC-DOS software to run under concurrent CP/M without modification. The trend is leading towards CP/M, CP/M-86 and Concurrent CP/M applications programs, together with applications developed under Unix, intermingling under a unified umbrella operating system.

GENERAL-PURPOSE SOFTWARE

Most business microcomputer users are more interested in the application software than in the operating system or even the make of microcomputer. It is no exaggeration to say that the existence of spreadsheet packages has been as important in the development of microcomputing as have the machines themselves. There have been some staggering successes: VisiCalc has sold more than 650,000 copies worldwide; Lotus Development Corporation grew in one year from zero to a $53 million turnover company on the strength of Lotus 1-2-3. But the lifecycle of this type of product is very short, and the race is now on to find the market leader for the next generation of integrated applications-oriented software.

By the time this report is published, several major new integrated products will have been launched in the United Kingdom, and a few months later in other West European countries:

— Lotus' Symphony, a fully integrated package with which the same data can be freely switched between the database processing part of the system and the spreadsheet and the word processing module. Initially, Symphony will be available only for the IBM PC and certain IBM-compatible products. Later in the year, an upgraded version is expected for the Apple Macintosh.

— Ashton Tate's Framework. This product, from the suppliers of dBASE II, is designed initially for the IBM PC, but versions for MS-DOS and CP/M-86 will be available in the United Kingdom by the end of September 1984. Versions for the DEC Professional, Apple Macintosh and Unix machines are being considered also. Framework is written partly in C, so Unix versions would seem to be likely. As well as integration features similar to those of Symphony, the package also includes a form of 'ideas processing', which provides the ability to identify relationships between ideas within a document.

— Peachtree Software's Decision Manager for the IBM PC. This product can have up to 20 windows or projects defined, with up to ten displayed on the screen at any one time.

In the United Kingdom, these products will cost between about £400 and £500 ($500 – $650).

To date, all of the most successful applications-oriented software has come from independent software suppliers, not from the hardware suppliers. In particular, IBM has positively encouraged the independent software suppliers to produce products for the IBM PC. But there is evidence to suggest that IBM's attitude may now be changing. In the middle of 1984, IBM announced a range of software products (initially for the American market) including word processing, file management, financial analysis, report writing and graphics. The products are priced very competitively at no more than $150 each. The indications are that IBM intends to take a larger slice of the everyday microcomputer software market for itself. The result could be a price-cutting battle between the independent software suppliers.

At the same time, IBM is also seeking closer business ties with some of the independent suppliers. An example is the recent decision by IBM to market Vector International's Everyman database system for the IBM PC.

These examples illustrate the trend towards micro-

computer hardware suppliers taking a much more active role in providing applications-oriented software.

MICROCOMPUTERS AND OFFICE AUTOMATION

We believe that the business microcomputer is set to become the cornerstone of office systems. At the present time, many organisations have separate policies for office systems and for personal computing, but the trend is firmly towards the business microcomputer becoming the building block for office systems. Most office systems installed so far have been aimed primarily at the clerical and secretarial levels of office staff, but the personal computer is the device that is being (and will be) installed in large numbers on the desks of managers and professionals.

Measured in terms of numbers installed, the business microcomputer is catching up rapidly with the more conventional forms of office systems devices. Amy Wohl, one of the best respected observers of the United States office automation scene, has calculated that there were half a million IBM PCs (and IBM lookalikes) being used as desk-top workstations at the end of 1983. With a million more due to be installed in 1984, it will not take the business microcomputer long to overtake the 2.5 million word processing workstations installed in that country. Wohl has also said that the personal computer has been accepted as the standard device for the office workstation, and that it will permanently alter the way in which office automation will work. One immediate effect is that some equipment makers are seeing their office markets dry up for specialised word processors, office automation systems and data processing terminals.

The key to the success of the business microcomputer in the office will be the functionality that it provides, not the technology that underlies it. One of the main messages of this report is that managers and professionals will not use a business microcomputer unless it provides them with a real business benefit. Over the past few years, several manufacturers have introduced new products that they claimed would revolutionise the whole area of office automation. The Xerox Star, for example, was positioned as the management/professional workstation which was intended to advance office automation beyond secretarial word processing.

The Star has not been a commercial success, partly because of its high price and partly because of its lack of functionality. It provided a range of adequate administrative support applications and a very good word processor, but it provided nothing that addressed the business needs of its intended users. The Star had concentrated on the user interface (icons, mouse, high-resolution screen, etc.) at the expense of function. In reality, the user interface is a secondary factor. All other things being equal, a system with a better user interface will be preferred. But a system that provides better functionality will almost always be preferred to one that provides only a better user interface.

This apparently obvious observation not only explains the lack of success of the Xerox Star and other products, but also explains the success of unsophisticated products such as the Apple and the IBM PC, and straightforward spreadsheet packages. Automated spreadsheets provide the functionality that many managers and professionals can use effectively. The business microcomputer just happens to be a convenient, cost-effective way of achieving this. Thus the main trend will be towards providing greater functionality in the office environment.

Earlier in this chapter we reviewed the likely future developments in general-purpose applications-oriented software, where the emphasis will be on greater integration. But integration will only be of real value if it provides genuine additional functionality. It remains to be seen if the emerging range of software products will do this, or whether they will satisfy no one except an imaginary user.

The vision of the integrated 'office of the future' remains just that — a vision. But, in the meantime, business microcomputers will be installed to provide particular solutions to particular problems. At some future date, organisations will realise that these apparently fragmented developments have created a new working environment. The key to success is to ensure that the individual solutions adhere to an overall architectural vision, so that the end result is coherent and not fragmented.

Our research has shown that, at present, most business microcomputers are being used as stand-alone devices. The next stage, we believe, is for the managers and professionals using these devices to realise that they can be used to provide an electronic window on the entire business world. The busy manager will then want to use the same device for doing his financial calculations, for sending and receiving electronic mail, for putting together reports and for retrieving information both from the corporate databases and from external sources — stock prices or commodity prices, for example. Thus, as well as the need to link business microcomputers to the corporate mainstream systems, there will also be a need to interlink business microcomputers at the local level, across the organisation, and between organisations.

An example of the emerging trend is that more and more business microcomputer users are prepared to do their own word processing. Some estimates sug-

gest that, by the late 1980s, nearly two-thirds of managers and professionals will be doing their own word processing. This trend has not gone unnoticed by IBM, which is making its Displaywriter word processing software available on the IBM PC. We believe that moves such as this will lead to the business microcomputer replacing much of the need for specialised word processing equipment. Francis Rodgers, IBM's marketing vice president, would not disagree. He has said "The personal computer is a fundamental part of our office systems strategy".

SUPPLIER AND PRODUCT TRENDS

At present, IBM is the leading force in the business microcomputer marketplace. Two years ago, Apple was in that position. Our research has confirmed that more IBM PCs will be installed in large European organisations in the next year or so than any other make of business microcomputer. But IBM's leading position will be challenged by three major contenders: the IBM-compatible vendors collectively, Apple Corporation and AT&T. Already in the United States, Apple's Macintosh is reported to be selling faster than the IBM PC. We predict that the IBM PC compatibles will also begin to sell in much larger numbers than they have done so far. For example, Compaq, a supplier of an IBM PC lookalike, sold machines worth $100m in its first full year of operation.

IBM has one major advantage over other business microcomputer suppliers, however, in the form of the independent software suppliers. As we pointed out in the previous section, applications software is the key to success in the business microcomputer marketplace, and the majority of software is aimed first at the IBM PC market.

Before any other business microcomputer supplier can hope to be successful it must ensure that the independent software suppliers are prepared to back its products. Apple has worked hard to achieve this with the Macintosh, and may well have sown the seeds for success.

IBM will, of course, take steps to defend vigorously its position in the marketplace. Mitch Kapor, president of Lotus Development Corporation, has predicted that IBM will make three strategic moves:

—It will make future IBM PC parts proprietary.

—It will manufacture more of the machines itself. (At present only the IBM badge is manufactured by IBM.)

—It will become a major PC software developer in its own right, partly by introducing its own operating system.

Each of these trends is already evident. For example, the 3270 PC includes IBM's own native windowing software, and a custom keyboard arrangement designed to receive future generations of office software. Also, IBM is taking steps to reduce its dependence on outside suppliers for peripherals for its PC. The company's Lexington plant is being modernised to build a line of new printers, and there is speculation that the Boulder, Colorado plant is being enhanced to produce the hard and soft disc drives that have been in such short supply. We have already highlighted IBM's moves to become a major force in the applications software market.

The 3270 PC is likely to be the first in a range of specialised versions of the IBM PC. Each IBM division will be expected to absorb the PC into its own specialities and sell the integrated result direct to its own target accounts. Thus the 3270 PC was developed by the Kingston, New York group, and the XT 370 is the Endicott, New York group's version of the PC. These are likely to be followed by PC-based products from the banking terminals, cash register, small business and System 36 and 38 groups. Also, we would not be surprised to see a personal (relational) database PC from the Winchester or Hursley groups in the United Kingdom.

IBM is also now offering a portable version of its PC (code named Crackerjack). This device weighs 30 pounds, has a built-in 9-inch display, dual-sided 360 kilobytes discs and 256k RAM main memory with its Intel 8088 processor. It offers comparable graphics to Apple's Macintosh, controlled by a mouse. In the United States, Crackerjack is now being shipped in limited quantities at a price of $2,795. A comparably configured IBM PC would cost about $5,000 — a certain indication that heavy price cutting of the PC can be expected to follow shortly.

Industry analysts predict that IBM has a Mark Two version of its portable personal computer in the pipeline. This is likely to be a 15-pound device with a flat panel display. The same sources also predict that Microsoft's Unix-like Xenix operating system will be available on the portable versions of the IBM PC.

IBM's Crackerjack is priced to be competitive with Apple's Macintosh. Yet Apple has been careful to position Macintosh so that it is not competing head-on with the IBM PC. Instead, Apple is striving to provide what it terms "a viable alternative" to IBM's standard. Macintosh is not compatible with the IBM and offers its own proprietary operating system, MacOS.

The lack of IBM compatibility has, so far, greatly diminished Apple's penetration in large corporate accounts and, for this reason, many industry observers predict that Macintosh will be more successful in the home, education and small business

sectors. Nevertheless, Apple is insistent that it can widen its horizons. Steve Jobs, chairman of Apple, believes this can be achieved by adopting the Unix operating system. Yet, as we discussed earlier, IBM has also now made a Unix-like operating system (PC/IX) available on its PC. Thus, IBM and Apple could well be competing head-on in the same marketplace.

The inclusion of Unix-like operating systems on IBM's PCs could also divert attention from AT&T's efforts to become a force in the business microcomputer marketplace. The industry has been predicting for about two years that AT&T would be aiming its formidable resources at the business microcomputer market. To date, progress has been disappointingly slow. But now AT&T does appear, slowly but surely, to be getting its act together. It now owns 25 per cent of Olivetti, and is likely to make that company's personal computer products available in the United States and elsewhere. In addition, it has set up Unix Europe Limited jointly with Olivetti. It has also commissioned Convergent Technologies, the Californian office systems supplier, to develop and manufacture certain computer products specifically for AT&T Information Systems Inc.

In summary, we foresee a three-cornered battle for dominance between the major contenders in the business microcomputer marketplace:

— IBM, and the suppliers of IBM-compatible systems, who are already well established in large corporate accounts. The main thrust of these products will be to position them as intelligent terminals that can be connected to the corporate mainframes.

— Equipment inspired by the pioneering work done originally by Xerox on the Star, which has now been embodied in products such as Apple's Lisa and Macintosh. These products will be positioned as the devices that can be interconnected at a local level to provide support for a working group.

— AT&T, which will position its products on the back of the existing telecommunications infrastructure. It will also promote Unix as the de facto operating system standard.

What is at stake is the de facto standard for the 32-bit business microcomputer of the future. 32-bit devices will not begin to dominate the market until the late 1980s, but in ten years' time they will be the norm. By then, a business microcomputer is likely to be provided as standard with 10 to 20 megabytes of memory.

Finally, although in recent years there have been as many or more new entries into the business microcomputer marketplace as there have been failures, we believe this situation will not continue. The entry costs to the market are increasing rapidly and it is becoming more and more difficult to compete with the leaders. Niche markets will continue to exist, the most significant being the own-brand business microcomputers of the main minicomputer and smaller mainframe suppliers, but even these will come under pressure. Few of the independent business microcomputer manufacturers will survive the decade.

CHAPTER 7

MANAGEMENT ISSUES

In this chapter we conclude the report by summarising the main management issues to emerge from our research. We present these as a series of guidelines, for Foundation members to consider as they build on the start they have already made in managing the microcomputer in business.

1. *Recognise there are different stages of development*

Business microcomputing (or end-user computing in general) will go through several stages of development from initiation to maturity, similar to those postulated for data processing by Richard Nolan. During our research we identified three stages: Initiation, Proliferation and Enhancement. Most Foundation members are beginning to move into Stage 2 (Proliferation), although a few are about to embark on the Initiation stage.

Following these three stages a further two (Integration and Maturity) may develop. Although users move through the stages very rapidly each stage needs to be managed in a different way, and the management approach has to be flexible enough to evolve as the users progress through the stages. The key is to get the timing right, so that issues are dealt with as and when users perceive them to be a problem. Trying to force the issues will not work, because users will have no incentive to co-operate in solving what for them is a non-problem.

Stage 1: Initiation
At Stage 1, users need support from a microcomputer expertise centre (an in-house micro store, for example), which can provide them with advice and hands-on experience. It should also provide them with a quick and easy way of acquiring the machines and the software.

Stage 2: Proliferation
Stage 2 is a period of user experimentation and learning, and is not the time to be enforcing rigid controls. Most Foundation members seem to have at least implicitly recognised this in the way they have implemented their business microcomputer policies. Some, however, are trying to apply disciplines inherited from their mainframe standards and procedures. Our advice is to let users 'do their own thing', but in a controlled environment. This means finding the right balance between too little control and too much control. It may also mean standing by and letting the users make mistakes.

One Foundation member used the term 'soft control' to describe the delicate balance that needs to be achieved. It is a term that captures the essence of the management approach that is necessary at Stage 2.

Stage 3: Enhancement
Users will begin to require access to data stored in corporate and other systems. They will also realise the limitations of their first-generation hardware and software. Organisations need to anticipate these needs and provide for them with appropriate hardware and software policies. They need also to provide a simple initial mechanism to allow users to get at the limited subsets of corporate data they require at this stage.

Stage 4: Integration
The next stage will be integration. We believe that no organisation, even in the United States, has yet reached this stage, when users will need help in the management of data networking. The integration stage will be the time to focus users' attention on data management issues.

Stage 5: Maturity
Only at the final maturity stage will users be ready to face issues such as cost-justification.

2. *Educate system development staff*

Management services directors and their team of microcomputer specialists are well aware of what is happening with business microcomputers in their organisations. But the rank and file staff in the systems development departments are in danger of being left behind. There are two problems that need to be addressed. First, the staff are suspicious of the whole concept of business microcomputing, seeing it as a potential threat to their own professional expertise and their careers. Second, they are reluctant to expose their lack of knowledge by attending general

education programmes run for business managers. The solution to these problems is to implement a bespoke training programme for system development staff. We believe that this is an urgent need that should be met at the earliest opportunity. Unless and until system development staff have a thorough understanding of when it is sensible to use business microcomputers, there will be no chance of integrating microcomputers into an organisation's overall information processing strategy.

3. Plan for microcomputers to be the bridge between office systems and data processing

Business microcomputers are an essential element of office automation for managers and professionals. They also have the potential to become an integral part of data processing strategies. They are therefore the key to linking an organisation's data processing and office automation strategies. This subject will be further developed in Foundation Report No. 44 — Office Systems: Applications and Organisation Impact (due to be published in November 1984).

4. Determine and anticipate the need for microcomputer-mainframe links

Most management services departments are assuming that there will be a need to link business microcomputers to the corporate mainframes. At present, however, there is little explicit user pressure for such links and, where there is pressure, users are often steered to in-house timesharing systems as a substitute. We believe that there will be a need for such links, but that it may not necessarily be as widespread or as imminent as many people currently believe. Users will demand these links only when there is a real business need for them to do so. But when the need is perceived they will not tolerate a delay; they will want to be connected immediately.

User demands for this type of link will have significant implications for data management and data administration. Corporate data collected for one purpose will inevitably be found to be lacking when it is subjected to close scrutiny by business microcomputer users. There is also a real danger for many organisations that users will use corporate data without fully understanding its structure and degree of incompleteness. In many organisations, user requirements can be met from summary files specially created for the purpose — live detailed data is not needed. For some users this will be insufficient, however, and here the shortcoming of present data will be overcome only by considerable development effort and substantial increases in computing power.

User demands for access to corporate systems will also have a significant impact on networking requirements, as will demands to interlink business microcomputers.

5. Do not try to enforce redundant standards

Business microcomputing is driven by business users and their need to solve business problems. The underlying technology, or even the suppliers name, is of very little interest to such users. They are interested primarily in the functionality provided by a particular hardware and software combination. From the users' point of view, business microcomputing is a 'fashion' business. In 1982, the fashion was VisiCalc; in 1983 and 1984 it was Lotus 1-2-3; in 1985 it will be different again.

The same will apply also to hardware. At present, the IBM PC appears to be the safest option because it satisfies the present needs of users and it is easy for system professionals to come to terms with. But brand loyalty will not be the same as it has been with mainframes. Yesterday's Apple users are clamouring now to 'upgrade' to an IBM PC. In the future, the same users will clamour to upgrade again to a totally different machine if they perceive it as providing greater business benefits.

Management services departments should therefore not assume that today's policies will endure for long. It will be impossible to enforce a business microcomputer policy that does not embrace the latest developments on the market. An extreme example illustrates this point. Exxon's New York-based Customer Support Center (CSC) which we have mentioned in Chapter 4 was supporting a widely used spreadsheet package, and planned to migrate users to an advanced version of the package by 1984. As a consequence, it paid very little attention to Lotus 1-2-3. But a senior manager from one of the user departments happened to see a Lotus 1-2-3 demonstration in a New York department store. The store kindly provided him with a demonstration diskette, which he brought back to the office and distributed to other departments. The CSC became aware of this when two of the user managers demanded that all future spreadsheet training be based on Lotus 1-2-3. In the past, the CSC had handled the promotional activities of conventional suppliers, but it had not anticipated a problem from a department store. The final result was that Exxon adopted Lotus 1-2-3 as its standard product.

6. Beware of the backlash from dissatisfied users

To date, business microcomputer users have been quite happy to accept the advice provided by the microcomputer expertise team. Indeed they have welcomed it. But, as users gain more experience and confidence, they will begin to question the advice being offered. Already, they know more about using microcomputers than do the systems development staff. Relationships between users and the management services department will become severely

strained if the corporate policy prohibits them from acquiring what they regard as today's technology. User dissatisfaction could also surface when users find that the data extracted from the corporate files does not meet their particular needs.

7. *Look out for alternatives to IBM's de facto standard*

Today, the IBM PC is the de facto standard for business microcomputers. But there are alternatives that could grow very quickly to challenge IBM's dominance. Apple's Macintosh is now gaining market share in the United States at the expense of the IBM PC. AT&T and Unix-based products could emerge as powerful competitors to IBM in the not too distant future. The independent software suppliers will play a crucial role in determining who the market leaders will be. But most influential of all will be the users, who will demand to have the microcomputer that they believe best meets their business needs.

The business microcomputer market is unlike any computer market that has gone before it. In particular, it has totally different characteristics to the mainframe computer market. It is much more like a mass consumer market. As hardware and software features are enhanced, the only reasons users will have for retaining their 'old model' is their personal investment in learning how to use the machine and their investment in data and software. Machines are becoming increasingly easy to use and data and software increasingly portable. As a result, users will think no more of trading in a functionally obsolete business microcomputer than they do today of trading in a two-year-old car.

8. *Beware of legal pitfalls and operational security problems*

Steps must be taken to ensure that users do not unwittingly fall foul of the law. Two specific issues need to be addressed. The first concerns the proper handling of copyrighted programs. These programs are not sold to the organisation; they are licensed for use on just one computer, unless additional fees have been paid. Suppliers of copyrighted programs are taking a hard line about copyright infringements, particularly by corporate business microcomputer users. All users must be aware of their obligations in this area.

The second issue concerns data protection legislation. Procedures must be implemented to ensure that business microcomputer users are also aware of their legal obligations in this area.

There is also the more general area of security. A floppy disc can contain a lot of confidential and sensitive company data, and is a lot easier to transport than conventional media. Also, if the user becomes dependent on his floppy disc data, archiving and backup may become essential operations.

Conclusion

This report set out to address the management issues associated with introducing substantial numbers of business microcomputers into large organisations. The pace of change in this fast-moving area of information technology is sometimes bewildering. New hardware and software products are announced every week, and old favourites are made obsolete overnight. If anything, the pace of change will increase in the foreseeable future.

In Foundation Report No. 30 — End-User Computing (published in July 1982) we predicted that end-user computing would be the next major era of computing development. That era is now well underway, the two main thrusts being business microcomputing and in-house timesharing. We believe that the issues explored in this report provide the framework within which business microcomputers can continue to be introduced in a coherent and imaginative way.

Business microcomputers have already provided substantial benefits to their early users. As they spread throughout the organisation, the benefits will multiply. In addition, provided that it continues to take a positive and constructive attitude towards their use, the management services department has the opportunity to substantially increase its influence and standing in the eyes of the rest of the organisation.

APPENDIX

CASE HISTORIES

SUMMMARY OF THE CASE HISTORY EXPERIENCES

The case histories reported in this appendix have been chosen to represent the range of different approaches being adopted by Foundation members. Most of the other organisations we spoke to, or whose plans we reviewed, have adopted a policy for business microcomputers which is similar to at least one of those reported above. In fact, there was a remarkable degree of uniformity in the experiences related to us, the only significant differences being between different countries — and even these were differences in timing rather than fundamental differences in approach.

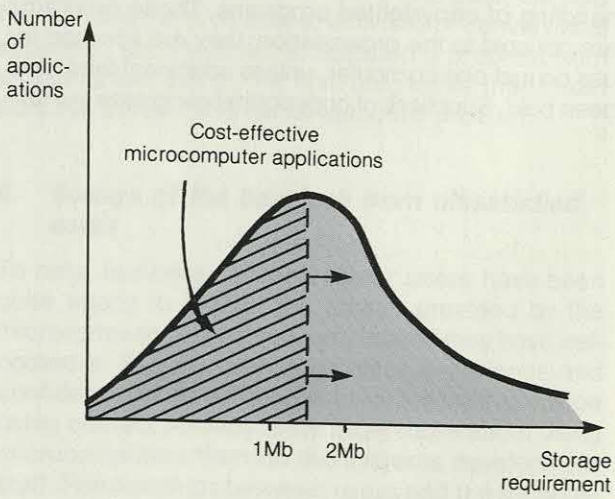
In France, for example, Foundation members have been slower to adopt the IBM PC as the de facto standard for business microcomputers. The reason for this is that the main software packages (including the PC-DOS user interfaces) have only recently become available in the French language. Business microcomputers are used for personal computing by ordinary office staff, not by computer professionals. Office staff will not be prepared to work with computer systems that require them to use English (or, more accurately, American). The importance of different-language versions of microcomputer software was also emphasised by a member in Sweden. The lack of Swedish versions of popular software packages has also slowed down the introduction of IBM PCs in that country.

Another national difference concerns the degree of satisfaction with microcomputer dealers. In the United Kingdom the majority of companies purchase their business microcomputers from a dealer, rather than direct from the manufacturer. From the comments we received, many organisations in the United Kingdom have found they get a better service from a dealer than they do from the supplier. In France, by contrast, there was universal condemnation of the lack of support provided by dealers. The experience had been that dealers were only interested in selling boxes; users were left to unpack the various elements of a system and had to connect them together themselves. Dealers in France also did not provide any software or applications support.

Some of the companies we spoke with provided additional insights not explicity mentioned in the case histories. One Dutch company told us about the analysis it had carried out of its total applications portfolio. The applications storage requirements had been plotted against the number of applications with that requirement, and had produced a left-skewed distribution, as shown in Figure A.1. The peak of the distribution occurs at between one and two magabytes of storage. Every application to the left of this line is now a candidate for a cost-effective microcomputer application. However, technological developments are pushing the dividing line rapidly to the right.

The overall picture to emerge from the case histories is that, in these large organisations, business microcomputers have not been allowed to proliferate in an uncontrolled way. The situation may well be different in smaller organisations, but we did not set out to investigate these because practically all Foundation members are large organisations. According to reports emanating from the United States, the situation is different on that side of the Atlantic. Much of the literature relating to experiences in the United States suggests that business microcomputers have been installed in a haphazard and uncontrolled way. A recent article in Datamation

Figure A.1 Cost-effective microcomputer applications



suggested that American companies are now having to appoint "Micro Marshals",the modern-day equivalent of the "Wild West Marshal", whose task is to 'round up' the microcomputers that have been installed and to introduce some law and order.

The experience in Europe, at least amongst large organisations, is very different. The typical evolution of business microcomputers here began with a few enthusiastic users acquiring their own machines. No more than about six to twelve machines were installed in this way before a central policy for acquiring microcomputers was formulated.

More often than not, the policy was initiated by the management services (or information systems) department. As a result, all of the management services departments we contacted are confident that they are now at least aware of the existence of most of the microcomputers that have been installed.

In some companies, the corporate style allows the policy to be mandatory and explicitly enforced. In others it can only be advisory. Nevertheless, even this latter group have been remarkably successful in 'persuading' the rest of the business to adopt the preferred microcomputer as the standard. The experience has generally been that, apart from the very few enthusiastic users who are prepared to do everything themselves, most users (and potential users) welcome the advice available from a central group of microcomputer experts.

BEECHAM GROUP

The Beecham Group manufactures and distributes pharmaceutical and consumer products (groceries, toiletries, drinks, etc.). We spoke to the Information Systems Controller (Anthony Bargioni) about the group's approach to managing the introduction of business microcomputers.

Development of the microcomputer policy

In the middle of 1983, Beecham set up a two-man microcomputer support team within the information systems department. It is led by an ex-chief programmer (for whom it has been "a refreshing challenge"), working with a new graduate-level recruit who knew a little about microcomputers. The team is part of Beecham's information centre. The style of the centre is very user-oriented because it is managed by an ex-user.

The micro team has deliberately adopted a low-key approach. Anthony Bargioni describes it as a "softly-softly velvet glove approach". Beecham's management style provides the divisional directors and managers with a lot of autonomy, and any attempt to dictate to the business about which microcomputers should be used would have been counter-productive. Instead, the team has set out to become the natural point of reference in Beecham for access to microcomputing expertise, and so gain leadership by common consent and not by authority. Its services are provided free of charge to anyone in Beecham who wishes to use them.

Prior to the formation of the micro team, Beecham had acquired a mixture of Apples, Commodores, etc. ("at least one of everything"). These machines had been bought by enthusiastic users who were determined to "do their own thing" as far as microcomputers were concerned. Nevertheless, Beecham's experience is that this type of user is the exception. Most potential users of business microcomputers now welcome the advice and guidance available from a central team of microcomputing experts.

The micro team's preferred standard machine is now the IBM PC, although user departments are not compelled to use this equipment (nor, indeed, to use the team's services). Since the team was set up, there has been no example of users independently installing their own microcomputers, and all of the machines installed have been IBM PCs. The total is now about 40 IBM PCs, 16 of which had been installed in the month before we spoke with Mr. Bargioni. He estimates that the installed base will increase to about 100 machines during the next 12 months.

All equipment and software is purchased out of the user's departmental (or divisional) budget and, in theory, users may purchase these items from any source. However, the micro team has a preferred supplier (with whom it has negotiated discounts for bulk purchases). In practice, all microcomputers are now purchased from this dealer. At the time we spoke to Beecham's staff, the micro team was in the process of negotiating a single microcomputer maintenance agreement for the whole of the Beecham Group.

As part of its 'marketing' effort, the micro team has produced a leaflet advertising the 90-minute IBM PC capability course it runs. (A copy of the leaflet is reproduced in Figure A.2.) This leaflet is distributed widely throughout the Beecham Group, and there has been a rush to enroll on the course. Ten such courses were held during the period March to June 1984.

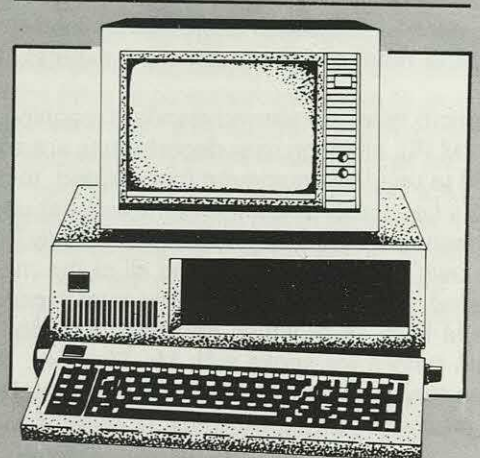
Microcomputer users and applications

Most of the microcomputers are being used by middle managers and professionals (particularly accountants), and almost all of the applications are based on spreadsheet packages. There is a small amount of word processing, however, typically by accountants who have produced some figures via a spreadsheet package and then "want to put some text around the figures". A limited number of applications

Figure A.2 Beecham's in-house personal computing promotional leaflet

Beecham U.K. Computer Services

PERSONAL COMPUTING



and the IBM PC

Events: March - June 1984

PERSONAL COMPUTING AND THE IBM PC

Personal Computers are here to make our lives easier. They can take the hard work out of those vital but time-consuming business activities such as planning and budgetting leaving you free to concentrate on the more creative tasks essential to the growth of the business.

Our presentation introduces you to personal computing using the IBM PC and demonstrates LOTUS 123, a program which replaces paper, pencil and calculator to help solve large number-orientated problems. This easy-to-use package turns numbers into reports instantly and at the touch of a key, will produce quality graphs and a lot more . . . . . .

In addition, we will be discussing other software available for the IBM PC and its communications ability with our Beecham House main computer. You need no special skills to operate a Personal Computer. This session aims to take away the mystery surrounding microcomputers and acquaint the business professional with the latest personal computer tools.

To book a place on one of these sessions, please ring John O'Hara at Beecham House on ext. 2145 or return the attached reservation slip.

packages are also used on the microcomputers, and a few bespoke programs have been written in Basic, etc. To date, any bespoke programming has been subcontracted to an outside agency with the information services department controlling the contractor, but in the future internal expertise will be developed. Anthony Bargioni estimates that all of the microcomputers installed so far are being used regularly for an average of two or three hours per day.

The micro team is not involved in cost-justifying the microcomputer purchases or the applications for which they will be used. The responsibility for this rests firmly with the users. The information services department believes that cost is not an issue when users are considering whether to install a business microcomputer. In general, users are prepared to pay a few thousand pounds to get on to the personal computer learning curve.

None of the microcomputers installed to date has been connected to the mainframe, and very few have been interlinked via micronets or local area networks. Where such inter-connections have been made they have been for economic reasons (cost savings brought about by sharing resources), rather than for functional reasons (sharing data or files between microcomputers). Beecham believes that the latter requirement will develop only slowly.

Impact on the information services department

End users in the Beecham Group are offered two basic choices: timesharing via the mainframe service provided by the information centre; or stand-alone microcomputers. So far, there has always been a clear-cut reason for suggesting one route or the other. The information centre's timesharing service is the fastest growing part of Beecham's computing activities (the users have "already used up one mainframe"). The information services department does not believe that the increasing use of microcomputers will cause this growth to slacken.

Most of the work being processed on business microcomputers is 'new' computing work. In general the microcomputer applications have not replaced centralised data processing activities (nor have they shortened the development backlog).

Thus far, microcomputing has had very little impact on the central data processing function, but information services staff are now beginning to experiment with mainframe-microcomputer links. They foresee these links being used to extract files for local processing on a microcomputer.

The biggest impact so far of the growth in personal computing has been to increase the visibility of computing in general in the Beecham Group. Anthony Bargioni believes that the approach adopted by his department for managing the introduction of business microcomputers has helped to enhance the standing of the department within the company. The information services department is now perceived as being supportive of business needs. It is no longer perceived as promoting technical solutions for the sake of preserving (or expanding) its own technologies or areas of influence.

Future developments

At present, there is a small amount of informal contact between different microcomputer users. The micro team intends to establish a formal mechanism to allow users to swap ideas, experiences, problems, etc. via user meetings and a regular newsletter.

The information services department believes that it is unlikely that the present generation of business microcomputers will be adopted as the de facto standard for an integrated management workstation. "They do not look right on the executive desk". Beecham's view is that two or three more generations of hardware will be required before this concept becomes a reality.

One concern expressed for the future is that the impending United Kingdom data protection legislation could inhibit the uses of business microcomputers.

Beecham believes that the biggest management issue in the planning of future systems architectures is how to develop a clear view as to where it is more appropriate to use a local personal computer as opposed to a mainframe with its vast source of data. Today's PC technology does not yet offer a complete alternative, but it will within two years. Beecham is confident that its base of compatible technology and knowledgeable personal computing users will enable it to exploit to the full the ultimate solution when it does become available.

BP INTERNATIONAL

We spoke to Chris Kent, who is manager of the Microcomputer and Terminal Support Branch of Information Systems Services (ISS). ISS was established in January 1983 as a supporting service within BP International. It is available to provide information and related services to the group head office departments (corporate planning, etc.), to the ten international business streams (oil, exploration, chemicals, etc.) and to the other supporting services (accounts, engineering, etc.). The rest of the BP Group may choose to use outside contractors or provide the services themselves if they so wish. ISS must therefore compete in the marketplace to obtain its business. Its normal territory is the group headquarters which are based in Moorgate, central London, and in Harlow, Essex.

Chris Kent's group advertises itself within BP as "the Microshop". It has been established to serve the microcomputer and word processing needs of BP's Moorgate and Harlow offices, though it will accept business also from other parts of BP. Other parts of the worldwide BP Group also have their own teams of microcomputer experts.

From the beginning of 1984, Microshop also assumed responsibility for the supply and support of computer terminals. The rationale for this move was to bring the responsibility within ISS under one branch for the supply and support of all terminal equipment, whether microcomputer, word processing, dumb terminal, printer or plotter.

Reasons for establishing Microshop

The Microshop concept was adopted because ISS management recognised the potential danger of BP's many autonomous units installing whatever microcomputers took their fancy. In particular, ISS was concerned about the very great difficulty of connecting every conceivable make and type of microcomputer into the corporate networks. ISS is not in a position to dictate to its clients, however. Information systems users are free to choose whether to use ISS services, or build and run their own system, or use the services of an outside contractor.

ISS therefore decided to establish a microcomputing advice centre (the Microshop) which would recommend and promote a small set of options. The aim is to provide a comprehensive service, both to people who know exactly what they want and to members of staff who know nothing about microcomputers. In particular, Microshop aims to provide the latter group with an easy way of taking their first steps in microcomputing. Chris Kent has coined the term "soft control" to describe the way in which Microshop has set about directing BP's overall microcomputer effort.

Development of Microshop

Microshop opened for business at the end of June 1983. In addition to Chris Kent, there were nine other staff. Two of these were experienced word processing support consultants whose roles were transferred to Microshop. Others were recruited specifically to work in this new enterprise. The new recruits are typically young graduates with two or three years commercial experience. One has mainframe programming and systems experience; one transferred from a technical area within BP where he had experience of providing technical data processing support (he is also a home computer enthusiast); another specialises in communications between microcomputers and other systems. Chris Kent predominantly has a general data processing background. He had previously been a business systems analyst.

Potential microcomputers users are under no compulsion to use Microshop's services. Chris Kent therefore has to provide a service that is at least as good as his "competitors". He has identified the competition as being the "local microcomputer dealer" and "door-to-door salesmen". Microshop therefore aims to provide all of the facilities (and more) found in a high quality microcomputer store, plus bigger discounts. The aim is to channel all business for the recommended products via Microshop. Chris Kent estimates that nearly all business microcomputers in BP's head office departments are now bought from Microshop.

Products endorsed by Microshop

An early task for Microshop was to identify the products it was going to endorse. As far as business microcomputers were concerned, it was clear that the requirement would be for 16-bit machines with at least 256k memory, twin double-density floppy disc drives, and with room for expansion (more memory, hard discs, etc.). The Microshop staff evaluated the microcomputer products of all of the suppliers whose mainframe or minicomputer equipment was already installed in BP (predominantly IBM, Univac, and DEC). The original list of microcomputers endorsed by Microshop was:

— DEC Rainbow.

— DEC Professional.

— IBM PC (and XT).

— Wang Professional.

— Hewlett-Packard HP 120.

— Hewlett-Packard HP 9816.

In addition, the DECmate II and the IBM Displaywriter were endorsed as the preferred dedicated word processing machines.

The endorsed machines were selected for their potential networking capability, rather than the availability of suitable software. The original list of software products supplied and supported by Microshop was:

— Database systems: Condor and dBASE II.

— Spreadsheet packages: VisiCalc, Multiplan and Lotus 1-2-3.

— Word processing packages: Wordstar, Select and Spellbinder.

By March 1984, the list of endorsed hardware and software products had evolved, with some of the original products being removed and new ones added.

Figures A.3 and A.4 respectively list Microshop's hardware and software product lines as they stood in March 1984. (This information was published in the March 1984 edition of the monthly Microshop Bulletin.) Microshop makes it clear that it can supply other software packages, but does not directly support them. The microcomputer user community is encouraged to contact the Microshop staff if they have experience of a package that compares favourably with an endorsed product. New products will be added to the list if they are of a high standard and there is sufficent demand for them.

The most popular hardware products are (in descending order of popularity): DECmate IIs, IBM PCs (and XTs), Wang PCs, DEC Rainbow (and Professional), Hewlett-Packard PCs. (For the time being, Microshop is not prepared to endorse any IBM PC compatible machines.)

The most popular software product is Lotus 1-2-3, which is "supplied with virtually every microcomputer".

Responsibilities of Microshop

Microshop sets out to act like a microcomputer dealer within BP. It has a demonstration room where potential customers may try out the various machines and software facilities. Stocks of the endorsed products are held, so they can be sold (or rented) 'off-the-shelf' to customers.

Figure A.3 BP Microshop's list of endorsed hardware products

Product	*Product description**
General purpose microcomputers	
DEC Rainbow	The base model micro which runs CP/M and MSDOS operating systems. Can expand to 256kB of internal memory. Twin 400kB disc drives.
DEC Rainbow Plus	The Rainbow with a 10MB Winchester disc and potential expansion of memory to 892kB.
DEC Professional 350	The PDP-11/23 shrunken into a Rainbow sized box. Runs its own operating system which is based on RSX.
IBM PC	The original! Comes with twin 360kB floppy disc drives and PCDOS operating system which is very similar to MSDOS. Can easily expand to 544kB memory.
IBM XT	IBM PC with one of the floppy drives replaced with a 10MB Winchester drive but slightly more expandable in terms of memory and options. Can expand to 640kB of memory.
Wang Professional computer	Similar features to the IBM but has an excellent wp package and is comparable with a dedicated wp machine.
HP 150	The new MSDOS micro from HP. Physically one of the smallest but most powerful in the Microshop range. Touch sensitive screen.
Dedicated word processors	
DECMate II word processor	A dedicated word processor which offers an option to allow use of computer application packages such as Multiplan and Condor.
IBM Displaywriter	More powerful and more expensive than DECMate.
Wang Professional computer	See under "General purpose" above.
Terminals	
Pericom 7800 DEC (various) IBM (various) Univac UTS 4000 range	Most of the microcomputers and word processors listed above can also act as a terminal to larger systems if a communications line is available. For those situations where a terminal is preferred, or it has facilities not available on the micro, we offer guidance and support for these terminals.
Peripherals	
Various	The most common peripheral requested is a printer and we normally recommend that the printer and computer are from the same supplier. An exception to this is the letter quality printer which we recommend for the IBM PC which is the Qume II daisy-wheel printer.

*This information was published in the March 1984 edition of Microshop Bulletin.

Figure A.4 BP Microshop's list of endorsed software products

Product	*Product description**
Word processing	
WPS-8	The DECMate word processing software.
Wang WP	The Wang Professional computer wp software.
Red	A very simple screen based editor which comes free with the DEC Rainbow.
Select	Red's big brother with more facilities although still very easy to use. Also has a spelling checker function included in the price.
Wordstar	Almost an industry standard wp package which is very powerful but not particularly easy to learn. It is part of a family of programs which include spelling checkers and mailmerge utilities.
Spreadsheet	
Multiplan	An excellent spreadsheet but no graphics function. Runs on IBM, Wang and Rainbow. Also available for DECMate CP/M.
Lotus 1-2-3	Spreadsheet and graphics combined into a first-rate general purpose package running on IBM, Wang, Rainbow and HP 150.
Database	
Condor	A powerful but easy to use program which runs on almost all our personal computers and even on the DECMate if fitted with CP/M option. See separate article in this Bulletin.
Graphics	
Lotus 1-2-3	See above. Graphics limited to pie charts, bar charts, etc. Supports HP colour plotter, dot-matrix printers as well as colour monitor if available.
HP Graphics 150	Excellent and versatile program for new HP 150. Supports HP colour plotter.
Communications	
Vterm	VT-100 emulator and file transfer program for the IBM PC and XT computers.
Poly-XFR	As Vterm but for DEC Rainbow under CP/M.
LINK-150	Comms for HP-150 but does not include VT-100 emulation.

*This information was published in the March 1984 edition of Microshop Bulletin.

By the end of 1983, Microshop had supplied nearly 200 machines, although just over half of these were DECmate IIs which will be used for dedicated word processing. (Chris Kent says there was "a pent-up demand" for word processing in BP, which was unleashed by the establishment of Microshop.) In the same period more than 500 people had visited Microshop. In his end-of-year review Chris Kent said "the success stories of 1983, as far as the UK is concerned, are the IBM PC and Lotus 1-2-3".

In the first four months of 1984, a further 100 machines were supplied, with the majority still being dedicated word processing systems. In the ensuing twelve months, Chris Kent anticipates that Microshop will supply a further 700 machines, with the emphasis switching to personal computers. In particular, he believes that, once the IBM 3270 PC is available in the United Kingdom, it will be installed as a replacement for conventional 3270 terminals. In addition, he anticipates that a lot of IBM PC XTs will also be installed.

Most of the business microcomputers are being bought by junior managers and professionals. Chris Kent does not find this surprising because personal computers are being positioned as tools (job aids) for these types of office worker. Nevertheless, his experience is that all levels of seniority are just as interested in using microcomputers.

Microshop staff are not involved with ongoing user support or applications development. They will demonstrate the application development tools that are available, and will recommend a particular software product. But the final choice is up to the 'customer', and it is then the users' responsibility to build and run their own applications. At the time we spoke to Chris Kent, Microshop staff were recommending Lotus 1-2-3 as the first choice for spreadsheet applications (with Multiplan as the second choice). For word processing, the preferred products were Wordstar and Select, although Chris Kent believes that IBM's recently announced Displaywriter II could well become the first choice.

Instead of providing ongoing support for microcomputer users, Microshop prefers to recommend the training that should be undertaken. Training needs might be met by the product tutorial (VisiCalc and Lotus 1-2-3, for example), by external courses or via the ISS training branch, which makes extensive use of video-based self-instruction material.

Once a 'customer' has decided to purchase a machine, the Microshop staff will configure and install the equipment. There is also a well-publicised Microshop 'hot-line' (with an easily remembered extension number) that users can call for advice and guidance. Microshop maintains a supply of standby units that can be shipped out at very short notice to replace faulty units. Users are charged an annual fee for this 'fast response' service, the aim of which is to replace faulty equipment (at least in London) within one to two hours.

Microshop has not needed actively to solicit business and, if the anticipated growth occurs, it will not need to do so for at least the next year or so. Nevertheless, it does aim to make itself highly visible throughout the BP Group, so that potential users will automatically consider using the services it provides. Staff are encouraged to walk into the Microshop to browse, but are advised to make an appointment if they want a specific demonstration. In addition, Microshop runs a series of open days and seminars which focus on specific aspects of its services.

The Microshop Bulletin

The most important vehicle for marketing Microshop's services to the BP Group is the Microshop Bulletin. This newsletter is published at approximately monthly intervals, and is edited by Chris Kent and one of his staff. It is distributed to about 1,000 BP staff members, mainly in London and Harlow, but some copies are sent to BP Germany and the Gulf countries. An electronic version is also available for users of BPFILE, BP's in-house electronic mail system.

The Microshop Bulletin contains news and views, feature articles, notices about forthcoming events, and product reviews. The Microshop 'hotline' telephone number appears on every page. Material published in the 'news and views' section has included:

- Announcement of a new version of DECmate with a CP/M option, together with a list of its main features and possible uses.
- A reminder to users to return their software registration cards to the software company. If they have not registered, they will not receive notice of any enhancements or free upgrades.
- A warning to users not to copy software, pointing out that Lotus Development Corporation is taking legal action for several million dollars against a major American company for allegedly making a dozen illegal copies of Lotus 1-2-3.
- Notification of the availability (on floppy disc) of a one-cell spreadsheet which triggers the use of the £ (pound) sign with the American version of Lotus 1-2-3. Many users had not found an obvious way of achieving this, and this facility was developed by one of BP's users.
- Notification of the existence of a public file available to BP's Unix users. This file contains advice from a user who has been experimenting with using his IBM PC as a terminal to BP's Unix system.
- Advice from the ISS training branch about the training available within BP for microcomputer users.

Feature articles have discussed topics such as:

- Security and back-up on microcomputers.
- Communications and microcomputers.
- Spreadsheets explained.
- Microcomputer database packages and their uses.
- A review of the state-of-the-art of portable personal computers.

The article dealing with security and back-up introduced microcomputer users to the dangers of ignoring these issues. It exhorted users to "think back-up". Users were warned of the possible sources of contamination for a floppy disc (backshelf of a car, under a coffee mug, sticky fingers, tobacco smoke and ash, bending them to see how floppy they really are, exposure to electromagnetic fields, etc.).

One of the potential electromagnetic hazards identified was BP's internal mail transport system. This prompted a series of tests in which magnetic tapes spent three weeks moving continually around the system. They emerged unscathed, as did the floppy discs that were subsequently tested in the same way.

The biggest problem noted with floppy discs occurred when they were put into an envelope, and a ballpoint pen was used to write the address on the envelope. Pressure of this nature could easily corrupt floppy discs.

In the spreadsheet article, users were provided with a list of questions they should ask when purchasing this type of product:

—What sort of on-screen help is available?

—What is the documentation like?

—What types of reports can be produced? (Is it possible to merge text with the contents of a spreadsheet model?)

—Can information be exchanged between spreadsheets?

—Are there any graphics capabilities?

In the review of Microshop's product line (see Figures A.3 and A.4) published in March 1984, users were provided with a checklist of points to consider when looking for a software package. This checklist is reproduced in Figure A.5. Users are urged to make sure they see the software running and to ask as many questions as possible. If possible, the person who will use the system should attend the demonstration, and should bring some samples of the data to be processed.

Forthcoming events advertised in the Microshop Bulletin have included:

—A portable computer open day, where staff were invited to come and see for themselves some of the products discussed in the feature article. The open day was also designed to allow Microshop staff to gauge how much demand there might be for portable computers.

—Office systems demonstrations.

—Announcement of the forthcoming launch of the HP 150 personal computer at BP.

—Demonstrations of the IBM PC version of the Focus database management system.

—Demonstration of the Votan V5000 voice processing system.

Future developments

The Microshop role in BP will evolve to meet the changing and growing requirements of BP's microcomputing user community. Chris Kent sees the use of 16-bit microcomputers as being at the 'proliferation' stage of their evolution, and believes that the rate of growth will begin to slacken by about the middle of 1985 (16-bit microcomputers will then enter the 'maturity' stage of their evolution). In his view, the next major cycle in the use of business microcomputers will be concerned with interlinking microcomputers via local area networks or mainframes. He expects this type of development to begin its proliferation stage in BP during the first half of 1985.

Figure A.5 BP's checklist of points to consider when choosing a package

Function:
Does it do the job, as you have defined it, perhaps with the aid of the salesman in defining the nature of your requirement?

Use of features:
Most keyboards have function keys, often labelled "insert", "help" etc. Does the software use these keys?

Use of help:
If you type in "help", what does it do? A good program will even show you how to use the help facility.

Easy to use:
There is usually a trade-off between ease and speed of use. A very easy-to-use system, perhaps menu driven, might turn out to be too slow for a user after a few days of experience. A good program will let you bypass the menus with commands, or invoke commands to bring up menus.

Training:
Does the software include a computer-based training course or at least a training manual?

Is there any other sort of training course available? Users of even the simplest system can benefit from a few hours of concentrated training, perhaps a few hours away from your desk and those everyday distractions. Remember that ISS can offer training facilities, often in-house, on most of our products.

Documentation:
Documentation is a good sign of the quality of a program. If you can't get something up and running within the first chapter or so, the program may be too complex to use. Good software is often so easy to use that the manual is more of a last resort, to be used for reference rather than every few seconds, but when you need it, it has to be good. A reference document should have contents as well as alphabetic index.

Is the documentation well produced physically? Do the pages fit the binder? Are they clear to read and properly typeset or just a bundle of photocopies?

Compatibility:
If you already have a machine, does the software run under your operating system? Is the data compatible with other programs in use? For example, using the Condor database package, one can send output to a text file rather than the printer or the screen. Can the word-processing program handle this text-file? Ask to see this done.

Upgrade path:
As programs evolve, the manufacturer will bring out new versions of the software and perhaps the manuals. Will you have to pay the full price for the upgrades? Are new versions fully compatible with older versions, ie. will they read old files correctly?

Chris Kent also foresees a declining need for dedicated word processing systems as more word processing functions and software are included within the PC environment. With networking, electronic mail and other text handling services will become more important to the general end user of information services. There will still be a need for dedicated word processing, however, to produce high-quality external correspondence, for example. But even this need will diminish as inter-company electronic mail becomes established.

BROOKE BOND OXO

End-user computing in Brooke Bond Oxo is controlled by the User Support Group (part of the Management Service Division). A major responsibility of the group is to provide a service similar in concept to that of a conventional information centre. Mainframe-based end-user computing is well established in Brooke Bond Oxo and, because of this, the company does not anticipate much demand for stand-alone business microcomputers.

The five staff in the business systems department of the user support group implement (or develop) end-user systems in one of two ways:

—By using end-user computing tools.

—By developing bespoke systems for end users.

The end-user computing tools are made available via a VM/CMS timesharing service operating on the company's mainframes. Standard mainframe software packages such as ADRS, SAS, Graphpac, and I.C.U. are used, together with Lotus 1-2-3 running on IBM PCs. APL is used to design bespoke end-user systems, both for the mainframe and for the IBM PCs. Some specialist end users have developed their own PC-based systems in APL, but these are purely stand-alone applications that are supported technically by the business systems department. The bespoke systems developed for end users are referred to as "tactical systems development".

The user support group is physically and organisationally separate from the I/S Development (Mainframe) Group, and reports direct to the management services controller.

The tactical use of APL by the user support group has proved very successful, particularly in the following areas:

—Developing bespoke low-cost systems that quickly can provide a pay-back.

—Prototyping potential mainframe applications.

Some of the systems developed in APL by the business systems department have not been transferred to the conventional data processing environment because of the need to respond quickly and economically to the users' frequently changing information requirements. APL has proved itself particularly useful in this respect.

Development of the microcomputer policy

Early in 1983, the user support group evaluated four different business microcomputers before deciding to standardise on the IBM PC. The main selection criteria was that the microcomputer should be capable of supporting APL and be able to communicate with Brooke Bond Oxo's IBM mainframes. At the time we spoke with Tony Hanrahan, manager of the user support group, six IBM PCs had been installed in the company's head office. One of these is lent to potential microcomputer users by the user support group. An additional six IBM PCs have been installed in Brooke Bond Oxo's factories, one each at the six main sites.

Anyone in Brooke Bond Oxo who believes he has a need for a stand-alone microcomputer must write formally to Tony Hanrahan. The prospective user must enclose a capital expenditure request form signed by a main board director (for purchases in excess of £5,000), together with a written justification signed by his divisional director. All hardware and software (including business microcomputers) is purchased centrally on the management services budget. Costs are not recharged to the user departments. However, all divisional directors and controllers in Brooke Bond Oxo receive a monthly statement showing how much of the total management services budget has been spent on their behalf.

Mainframe spreadsheet package acquired

Tony Hanrahan stated that, in Brooke Bond Oxo, the current "prime mover" for acquiring a personal computer is the need for spreadsheet analyses. Lotus 1-2-3 was quickly recognised as an exceptional product that provides first-time computer users with an excellent application which could be easily learnt and applied in their business environments. However, the company's sales, marketing and financial planners, who were the main users of the product, quickly outgrew the facilities provided by 1-2-3, and this has led the company to identify the need for a mainframe-based spreadsheet system.

As a result, Brooke Bond Oxo has acquired a mainframe spreadsheet package (Dataport, developed by APL Plus), which will be made available via the in-house timesharing service. This product has interfaces to most of the well-known end-user packages (SAS, Lotus 1-2-3, VisiCalc, etc.) and it is worth noting that the business justification for spending £15,000 on this package was written by users, not by the User Support Group.

Dataport has also been interfaced successfully with several mainframe information systems, thus providing users with the means of generating their own ad hoc enquiries.

Low growth of PCs predicted

Looking twelve months ahead, Tony Hanrahan anticipates that the number of IBM PCs installed in Brooke Bond Oxo's head office will have grown steadily to about 12. He believes that this relatively low number, and low growth rate, will be due to:

- —Spreadsheet processing power being provided via the mainframes. The infrastructure to allow this to happen (networks, terminals and user support) is already in place. Adding spreadsheet facilities to the mainframe will remove much of the need for stand-alone microcomputers.
- —A high percentage of Brooke Bond Oxo's current information needs are being addressed by large online information systems developed in the late 1970s and early 1980s. As a direct result of these developments there is already a high penetration of computer terminals in most of the major operational areas of the company.
- —Most potential users of business microcomputers already have easy access to a 3270-type workstation.

Tony Hanrahan therefore believes that the IBM 3270 PC will provide Brooke Bond Oxo with an excellent opportunity of introducing a multifunctional terminal which will not only provide direct access to corporate databases, but will also provide personal computing facilities with the extracted data. The economic growth of personal computing in Brooke Bond Oxo will therefore more likely be addressed via this route.

Use of microcomputers in factories

Although we have specifically excluded factory use of microcomputers from the scope of this report, it is instructive to review briefly Brooke Bond Oxo's strategy in this area. The business emphasis of the company is in the marketing, sales, distribution and finance areas, and computing systems have concentrated on providing support to these functions. The production processes are essentially straightforward and, hitherto, there had been very little demand for computing services by the production side of the business.

The Management Services Division has decided to provide an IBM PC to each of the six main factory sites and, although several stand-alone systems have been designed by the business systems department, the majority of the systems currently in operation were designed by the users themselves. Guidelines for the system development procedures, and advice on documentation and backup, were provided by the user support group.

The Management Services Division believes that production management quickly will confirm the potential benefits of using computing in their own environments. As a consequence, they will develop their ideas beyond the capacity and scope of stand-alone systems and, eventually, will require direct access to the corporate databases.

The provision of PCs in this way is seen as a tactical move that will allow the user to develop his ideas at his own pace, and in so doing will permit the Management Services Division to extend computing power throughout the company in a controlled fashion.

Impact on the business

No IBM PC has yet been connected to the mainframe, though Tony Hanrahan anticipates such a link in the very near future. Microcomputers will then be able to download extracts from the corporate databases and process them locally. Initial concern expressed by the data processing staff about users accessing and using corporate data was overcome by formally recognising the controls and procedures required to address data security, ownership and integrity. Tony Hanrahan told us that the capacity of users to learn and effectively apply end-user computing tools in their business environments came as a revelation to many of the data processing traditionalists.

The Management Services Division sees business microcomputers as a tactical weapon that can be used to complement the established mainframe environment, not only for prototyping new systems but also in the development of systems that initially could not justify the cost of mainframe developments. Personal computers (and end-user computing in general) will make computing much more visible for end users. Tony Hanrahan believes that, as a result, users will be able to relate more readily to the money that Brooke Bond Oxo spends on computing. The overall effect will be to enhance the status of the management services division throughout the company.

IMPERIAL BREWING & LEISURE

The Management Services Department of Imperial Brewing & Leisure Limited is responsible for the computing activities in each of the group's operating divisions. The principal business activities are in brewing, distributing and retailing beers and other alcoholic drinks. Each division has its own business systems manager, who reports to divisional management. The business systems managers are appointed with the assistance of the head of management services and, usually, they have a management services background. Their role is to act as the interface between

the divisions and the management services department.

A company-wide policy for microcomputers was formulated in the first quarter of 1982. The policy was fully endorsed and actively supported by the main board. The main elements of the policy were:

—A four-man micro systems team, which reports to the head of management services and provides support for all microcomputer users throughout the company.

—A rigidly enforced hardware policy. Originally the standard hardware was that of Apple and Superbrains. More recently, Apple has been replaced by the IBM PC.

—Project support provided by the micro systems team is limited to a maximum of four weeks per project.

—The micro systems team undertakes only one project at a time for any particular division.

—No charges were made for support provided by the micro systems team.

—The applications have to be stand-alone personal computing (for example, departmental budgets, spreadsheet forecasting, personal filing systems, etc.).

Development of the policy

By the end of 1981, the various divisions in the company had acquired a total of about six Tandy II microcomputers, which were being used for very specific applications (maintaining ledgers in finance functions, for example). Technical staff in the management services department saw the need for an overall policy which would control the impending proliferation of microcomputers throughout the business. At the initiative of the head of management services, the micro systems team had been established in November 1981. At that time, microcomputers were seen as a natural extension of the company's existing policy of implementing decentralised computing on minicomputers, and the person appointed to head the team had previously been responsible for evaluating and selecting the decentralised computing equipment. (Prior to that, he had been a programming manager within the management services department.)

Early in 1982, the head of the micro systems team prepared a paper with the aim of setting out clearly the team's objectives, methods of working, areas of contact with the operating companies, and the types of system to be developed. This paper became Imperial Brewing & Leisure's microcomputer policy.

By May 1984, 150 microcomputers had been installed. Fifteen of the microcomputers were being used in the management services department for support and development work. From now on, most microcomputers being installed will be either IBM PCs or Texas Instruments PCs (with the emphasis on the former).

The IBM PC was chosen as one of the standard machines because the management services department believes that the widest choice of software will be available for this particular business microcomputer.

The Texas Instruments PC was chosen because the company's distributed computing is based on Texas Instruments minicomputers (more than 50 have been installed). The TI PCs can link to the minicomputers, but this has not yet been implemented.

Microcomputer applications and users

Typical microcomputer users in Imperial Brewing & Leisure are depot managers and people in staff functions. Their main use of the microcomputers is in collecting statistics and presenting accumulations, analyses, etc. Examples include analyses of mileage claims or expenses by region. As Figure A.6 shows, a wide variety of software packages are being used to implement these applications. By implication, the figure also shows that many of the microcomputers are running more than one type of software.

Figure A.6 Use of microcomputer software in Imperial Brewing and Leisure

Software package or utility	*Number of micros using the software*
VisiCalc	48
dBASE II	41
Application packages	33
Basic	32
Lotus 1-2-3	24
VisiPlot	10
PFS	7
Wordstar	5
VisiFile	4
SuperCalc	3
Multiplan	1
InfoMaster	1

When the use of the microcomputers is analysed by type of application, more than 20 different types have been identified. The most frequently mentioned are:

—Statistics and trends (mentioned 39 times).

—Company/business unit administration (mentioned 24 times).

—DCF calculations, ledgers and analysis (mentioned 22 times).

—Record keeping and analysis (mentioned 16 times).

—Personnel records (mentioned 10 times).

—Data capture (mentioned nine times).

—Word processing (mentioned five times).

For spreadsheet applications, users receive about two days support from the micro systems team. They are then encouraged to set up their own applications using VisiCalc, Lotus 1-2-3, etc., although the micro systems team will sometimes develop this type of application. In general, all other development work is carried out by the team, normally using dBASE II, although a small number of users have been trained to use this package themselves. Very few users program their own applications in Basic. Those who have tried to do so have learnt that programming is not as easy as they thought it would be, and have preferred to use development tools such as dBASE II.

The conventional route for acquiring a microcomputer (or adding a new application to an existing one) is for the division's business systems manager to prepare a list of possible applications. One of these applications will be implemented by the micro systems team as it carries out its 'round robin' development cycle. In practice, some of the business systems managers are now beginning to implement applications themselves on behalf of their divisions. This move is welcomed by the management services department, who see all responsibilities for business microcomputers ultimately being devolved to the divisions.

The typical starting point is for a user to be provided with what the micro systems team describes as a "pure personal" system. Such a system comprises stand-alone basic hardware (Apple or IBM PC), dot matrix printer and twin floppy disc drives, together with VisiCalc (or VisiPlot or VisiFile), Lotus 1-2-3, or something similar, and the appropriate package tutorial. The essential characteristic here is that the users do everything themselves. The micro systems team provides the minimum of initial support. After that, the team is not particularly concerned with what the system is used for. About 40 per cent of the microcomputers are being used solely for this type of stand-alone personal computing.

Experience has shown that users reach the limit of what they can do with spreadsheets (with a basic Apple/VisiCalc system) within about six to 12 months. They then want their application to be enhanced or expanded. Typically, this leads to the micro systems team either selecting an application package to meet the users' growing needs or (more likely) developing a bespoke application using dBASE II. About 40 per cent of the microcomputers are now being used for a mixture of "pure personal" applications, application packages and/or bespoke systems.

An increasing trend identified by the micro systems team is for users who have had an Apple with VisiCalc for as little as 12 months to demand to "trade-up" to an IBM PC. Users perceive the IBM PC as being "today's technology" and therefore as the means of overcoming the constraints of basic spreadsheet applications.

Experience with using dBASE II

The micro systems team manager describes dBASE II as the highest level of "filing system application generator". He says that in addition to good file handling facilities, it also provides a high-level structured programming language that produces reliable code. The micro systems team has developed a set of standard dBASE II building blocks for file handling, updating, etc., and this enables the outline of a new application to be working very quickly (typically in a few days). The facilities provided by the language make it very easy to incorporate a high degree of changes during the development phase. Users are therefore able to work with the microcomputer expert during the development phase to clarify their requirements. In other words, dBASE II is used to set up a quick prototype, which is then modified to produce a fully working system — all within the space of four weeks. As a result, the maintenance workload for dBASE II applications is very low. The micro systems team spends only about 10 per cent of its time on maintenance.

The company's experiences of dBASE II lead it to describe the product as a "high-productivity tool", because:

—Program listings are usually short (two or three pages), which makes it easy to work on a program developed by someone else.

—Problems can often be sorted out over the telephone. The team keeps duplicate program listings in its offices. If a user reports a problem, the required change can usually be specified over the telephone, and the user can be instructed to make the change.

—dBASE II provides true applications portability between different makes of microcomputer. For example, it is very easy to move a dBASE II application from an Apple to an IBM PC.

Responsibilities of micro systems team

The primary purpose of the micro systems team is to provide a controlled environment in which business users can make the most effective use of microcomputers. This is achieved through the rigidly enforced hardware policy (any exception has to be sanctioned

individually by the head of management services) and by providing the minimum of support necessary to enable users to take full responsibility for their own personal computing hardware and applications. The team's role is seen very much as 'pump-priming', with the objective of introducing business users to microcomputers in a controlled but non-dictatorial manner. The team manager endeavours to make his group as visible as possible throughout the business, but does not actively market or sell his services. There is enough demand without promoting the team's services.

The micro systems team does not involve itself with cost-justifying either the machines or the applications. The responsibility for this rests firmly with the users' managers. If the user department believes it can justify the machine and the application, the team will install it — provided it fits within the overall policy. The hardware and software are purchased centrally by the management services department (volume discounts have been negotiated), but the cost of these items is recharged to the user departments or to the local business systems manager's budget.

The decision to limit support to a maximum of 20 days was taken early in 1982. At that time a standard microcomputer configuration (including software) cost about £3,000. Twenty days support would have been recharged at £2,000. It was felt that the total of £5,000 was high enough to enable something useful to be done, but low enough for the business units not to worry too much about the cost.

The manager of the micro systems team believes that one of the keys to the success of his department has been the policy of not charging for support provided by the team members. He feels that high charges for support would deter users from making use of the team's services, and would encourage them to try to do more for themselves. The consequence would be uncoordinated implementation of microcomputer applications throughout the business.

The team allocates as much of its time as possible to developing new applications. In practice, this amounts to about 60 per cent. The team manager summarises the development approach in the following way:

— Use the highest level application generator that will do the job, even if it does not produce the most elegant result. The higher the level of generator that is used the less is the need for documentation.

— Avoid programming in Basic whenever possible.

— Make the maximum use of standard, duplicated system structures (dBASE II standard modules, for example).

As mentioned above, the team also spends about 10 per cent of its time on application maintenance activities. A further 10 per cent of the time is taken up with providing advice and guidance, mostly over the telephone, but also by running in-house training sessions. The team tried, unsuccessfully, to establish a company-wide microcomputer users' newsletter. The aim was to appraise users of the applications that had been developed elsewhere in the company, and so avoid the need to 're-invent the wheel'.

The team manager believes that this initiative failed because, in reality, there is little scope for replicating personal computing applications in different business areas. By its very nature, personal computing is bespoke, that is, tailored to meet an individual's needs. There was no need for a newsletter because the business systems managers should be able to identify the applications that could be re-used within their particular business area. Any scope for re-using applications in a different business area would be recognised by the micro systems team.

Finally, the team spends about 10 per cent of its time in evaluating software products and other facilities.

Evaluating and selecting microcomputer application packages

Before building a bespoke application for a user, the micro systems team will, as a matter of course, try to find an application package that meets the need. In practice, the team often fails to find a suitable package. Packages are excellent for standard applications such as sales ledgers. But, almost by definition, personal computing is concerned with doing something which is non-standard.

Nevertheless, some microcomputer packages are used successfully (the preparation of export documentation, for example). The micro systems team manager offers the following advice for selecting and evaluating microcomputer application packages:

— Identify potential packages from the published directories of available software.

— Contact the supplier to request a copy of the basic literature describing the package. If the supplier has not responded within three days, remove them from the list of potential suppliers.

— Talk to the supplier, rather than to other users. Ask for a demonstration of the package.

— Avoid software where the supplier claims he has a skeleton system that "just needs a bit of customising".

— Look for packages which have an installed base of at least 10.

— Look for suppliers who are well established (which

means they have been in business for at least 18 months).

—Do not spend more than £2,000.

The micro systems team is aware that the microcomputer applications package supply industry is still in its formative years and is evolving rapidly. It will be two or three years before reputable market leaders appear. Nevertheless, the team has been delighted with the reliability of the software it has purchased. The difficulty has been that promised enhancements or additions to a package may not appear because the supplier has gone out of business.

Another problem with application packages is caused by package salesmen making direct contact with users. This problem is tackled by creating an environment where users will naturally want to consult the micro systems team and/or their business systems manager before purchasing an applications package.

Impact on the business

Nearly all of the microcomputers installed so far are used regularly — ranging from about two or three hours per day to about two hours per week. However, the micro systems manager is doubtful if the machines and applications installed to date can be justified in terms of reduced direct costs. The majority of the applications are concerned with some form of performance monitoring. Hopefully, the results of these applications will therefore lead to better business performance.

In general, the microcomputers are used at present as a tool to help business people do what they would have needed to do anyway. The 'benefit' provided by microcomputers is that the tasks can now be done more frequently, more accurately and more completely than before. Thus, microcomputers are not yet being used to break new ground in business terms. All age ranges are using business microcomputers, but younger people are more prepared to make creative and innovative use of them.

Nevertheless, the management services department believes that microcomputers have the potential for making a huge impact on the business. In particular, business microcomputers allow professional systems staff to gain access to areas of the business where, hitherto, there has been no computing.

One change in attitude that the micro systems team manager has noticed in the past 2½ years is that no-one any longer questions the amount of money that needs to be spent on installing a microcomputer and its associated software.

Impact on the management services department

The major benefit to date of Imperial Brewing & Leisure's widespread use of microcomputers has been for the management services department itself. Hands-on experience with microcomputers has made users far more 'computer literate', and the head of management services says that life has been made a lot easier because users now understand better many of the problems faced by management services staff. As a consequence, management services staff are now perceived as being much more supportive of the business needs.

Nevertheless, apart from establishing the four-person micro systems team, the introduction of microcomputers has not had a significant impact on the responsibilities or workload of the management services department:

—The mainstream computing development backlog has not been reduced, because virtually all of the microcomputer applications are new computing work which would not have been implemented on the mainframes or minicomputers.

—So far, all of the microcomputers have been used for stand-alone applications not linked to the company's mainframes or minicomputers. However, the management services department anticipates that such links will be required by about the end of 1984, so that users can extract files for local processing on their microcomputers.

—At present, there is no business need for microcomputers to share files and data. Thus, there is not yet a functional requirement for microcomputers to be interconnected via some form of local networking scheme or via the corporate data network. (Several networked clusters of microcomputers have been installed — but for the cost-benefits of sharing resources, such as hard discs, rather than for file and data sharing.)

Future developments

The management services department estimates that the total 'market' for business microcomputers within the company is about 250, and that this limit will be approached by about the end of 1985. In addition to this growth, many of the earlier systems installed (mainly Apples) will be replaced by IBM and TI PCs. Thus, in terms of numbers of microcomputers installed, the growth will begin to slacken off. Most of the growth will in future come from new applications being added to existing machines.

Other developments foreseen during the same period include:

—An increasing demand for microcomputer users to access central data held on the corporate mainstream systems.

—An increasing need for microcomputer applications to share files and data, which will lead to an increased requirement for them to be interconnected via micronets.

—Multi-user application generators (such as a multi-user version of dBASE). These products will also lead to an increased demand for microcomputers to be interlinked.

—A need for more general awareness training in the business about the uses to which business microcomputers can be put. There is also a need for the business systems managers to be trained to appreciate better the opportunities for using microcomputers as an element of a wider systems requirement.

In the longer term, the management services department believes that business microcomputers will be the cornerstone of electronic office systems. At present, however, the company has a separate policy for word processing, electronic typewriters and so forth. In the words of the micro systems team manager: "The timescale will be longer than I thought two years ago".

He is also concerned that, in the future, business microcomputing will become more complex. Until recently, business microcomputing was very straightforward. A CP/M package would (nearly) always work with your version of CP/M. Today, the package purchaser needs to know which version of the operating system is being used, and whether it is single or multi-user (or task). The packages themselves are also becoming more complex, with several functions integrated into one product.

IMPERIAL CHEMICAL INDUSTRIES

Imperial Chemical Industries (ICI) is the United Kingdom's largest industrial company. Its principal business is in the international production and sale of chemical products. ICI is a decentralised multinational with a divisional structure. The structure is beginning to change and certain service functions, including computing, are beginning to be provided on a more corporate basis.

The use of business microcomputers is seen within ICI as an essential element of information systems for middle managers and professionals, with the introduction of microcomputers being coordinated by the Corporate Management Services Department (CMSD). ICI has standardised on the IBM PC and this policy has been endorsed at board level. All business microcomputers now installed must be IBM PCs unless specific permission is given for another model by a management services director.

We spoke with Colin Davies, ICI's Interactive Computing Manager (a job title which represents what he used to do, rather than what he does now). Mr. Davies' group provides technical support and development to the whole ICI group in the following areas:

—Application software available on the corporate interactive services.

—Integrated office technology.

—Workstations, together with local applications and their integration with the above two areas.

Other groups in CMSD are responsible for the design and implementation of all networks in ICI and for the management of all the mainframe computing centres. The department is therefore responsible for all aspects of end-user computing in the company, with the exception of end-user support whch is carried out by local "information centres".

Development of the policy

In the mid-1970s, ICI set up a working party to examine the interactive computing needs of engineers and technical staff in the company. Colin Davies, who was a chemical engineer with experience of process-control computing and computer-aided design, was the engineering representative on the working party. The group realised that the interactive computing needs of engineers and technical staff could not be considered in isolation to those of their commercial and administrative colleagues (for example, the accountants who were using external timesharing services). It was also aware that early microcomputers were beginning to be used by various parts of the business.

The working party recommended that a senior manager be appointed both to develop a corporate interactive service and to develop an ICI strategy for end-user computing. In 1979 Colin Davies was selected for the job, and today he claims to be running one of the largest timesharing bureaux in Europe. There are now several DEC machines available on this basis, and an IBM VSPC network which has 3,000 users — many of whom program in Basic.

In early 1981, in common with certain other timesharing bureaux, the interactive service began to examine the potential for business microcomputers among its users.

Several machines were evaluated, and some work was done in linking microcomputers to the timesharing mainframes. As a result of these investigations, Colin Davies led a study team drawn from divisional management services which recommended that ICI should standardise on a single business microcomputer. Towards the end of 1982 the team set about

producing the specification for ICI's "ideal" workstation. The key requirement was for a multifunction terminal with the following characteristics:

— 3270 and VT100 emulation for access to the corporate systems.

— Viewdata (videotex) access.

— Graphics facilities. (A separate study had proposed that the bulk of the graphics intelligence should reside in the workstation.)

— Local processing capability (spreadsheets, word processing etc.).

A number of machines, including the DEC Rainbow, appeared at first to be more attractive, but in the middle of 1983 the IBM PC was chosen as the standard. During the first half of 1984 about 500 IBM PCs were installed throughout ICI.

Reasons for choosing the IBM PC as a standard

The IBM PC was chosen in preference to other machines because:

— The DEC Rainbow has no expansion bus. Thus, there was no scope for third-party hardware enhancements.

— The DEC Professional used a proprietary operating system and processor. ICI's view was that standardising on the Professional would therefore be too restrictive. The same applied to the Apple Lisa; the elaborate user interface was not considered to be worth the constraints (or the price).

— More powerful hardware, such as the Motorola 68000, lacked software that could utilise its latent capability. By the time such software appeared it was felt that the equivalent Intel 80/286 processor would be available.

— The IBM PC uses standard components; it has an expansion bus, which opens the way for all types of third-party hardware enhancements; and IBM positively encourages customers and third-party suppliers to produce application software for the PC.

— The IBM PC's operating system (PC-DOS) immediately became a de facto industry standard.

However, ICI does not use standard IBM PCs. Instead, it sees the IBM PC as providing a 'standard framework' that will need to be enhanced to meet ICI's specific needs. CMSD has specified components for use within ICI, including memory boards and expansion boards from third parties. It has also designed a 'user-friendly' menu-driven front end for the IBM PC. This provides a standard interface to all of the standard software available on ICI's customised version of the IBM PC. It also includes a Lotus 1-2-3 link to the DEC and IBM mainframe systems, and to the in-house viewdata systems. (The viewdata board replaces the keyboard ROM on the PC to provide viewdata graphics character sets.)

ICI currently does not make much use of colour, because the present standards are considered unsuitable for continuous use with text and data. But the Hercules graphics board is used extensively to provide monochrome graphics.

In the future, ICI is likely to standardise on a different keyboard for its IBM PCs. CMSD believes it now has sufficient experience of using the PC to define ICI's requirements for an 'ideal' keyboard.

ICI believes that IBM has set the standard for business microcomputers, and that future products from IBM will keep to that standard. CMSD has made it clear that if IBM should attempt to develop hardware or software of a more closed, proprietary nature, shutting out third-party involvement, ICI would stay with the existing standard. At the present time, ICI would be reluctant to purchase IBM PC compatible machines because "you never get 100 per cent compatibility. The dilemma is that as soon as an improvement is made (for example, higher graphics resolution) some compatibility is lost".

All IBM PCs and third-party enhancements are purchased at a substantial discount via one dealer (Micro Business Systems — MBS). MBS carries out all of the customisation before delivering and installing fully tested systems. Colin Davies says he is "very happy" with the service provided by MBS considering the volume of business it has had to contend with over a short period of time. "Many dealers are able to provide good service to a few hundred users but very few can service thousands of machines on a national level." All maintenance of ICI's IBM PCs is also carried out by MBS.

Standard software products chosen

At present, ICI staff use about 12 software packages including VisiCalc, SuperCalc, Multiplan and Lotus 1-2-3. By the time this report is published, the standard software product for business microcomputers in ICI is likely to be Lotus' Symphony. When we spoke with Colin Davies, ICI had just commenced *beta* testing Symphony. This new product from Lotus supersedes 1-2-3 by providing all of the features available in the older product together with word processing, multi-window and other facilities. First impressions of Symphony's word processing facilities are very favourable, although he stressed that factors such as text interchange standards must be considered before the extent of its use could be defined. ICI has developed conversion aids that will allow its users to change existing applications from SuperCalc to Sym-

phony. (Lotus will provide a similar aid for Multiplan to Symphony conversion.) The intention is for all standard applications, including mainframe links, to be available via a simple menu system.

ICI has developed a software product (called Conductor) that allows mainframe applications to interface with Symphony. This software will be available from ICI as a commercial product at about the time this report is published. (A brief review of the product can be found in Chapter 4.) The software enables an IBM PC running in 3270 emulation mode to log on to one of the corporate IBM mainframe systems. (Note that ICI does not intend to purchase many 3270 PCs; it will use IBM PCs and XTs with emulation capabilities.) The user then downloads a series of 3270 screen images to his PC, and the software passes through a 'template' that selects the data for local processing. The data is then automatically formatted ready for processing by Symphony.

Similar facilities are available for extracting viewdata frames, and files residing on DEC machines, combining them with data extracted from corporate databases and outputting the results via Symphony.

Microcomputer users and uses

A wide range of staff in ICI use business microcomputers, ranging from directors to secretaries, but they are used mainly by senior and middle managers. The emphasis so far has been on using microcomputers as an extension of conventional data processing systems, particularly where there is a requirement to access several different systems. Microcomputers are seen as the route to a single terminal per desk (instead of several dumb terminals, each accessing a different system). It is expected that the intelligence in the micro will considerably simplify log-on procedures and mainframe enquiry.

Most of the stand-alone use of microcomputers involves spreadsheet-type applications — budgets, forecasts, project progress chasing, planning, etc. Once a business microcomputer has been installed, CMSD does not attempt to control the stand-alone applications that it is used for. However, Colin Davies suspects that very few new users will write their own programs in Basic. He described the use of his own IBM PC (mainly Lotus 1-2-3 and word processing) as evolving over a period of time to become an invaluable aid to his job efficiency. One interesting benefit is that he and his secretary can now bypass the need for shorthand. As he dictates, she keys straight into the IBM PC. He can see the text immediately on the screen, and can edit it in 'real time'. (This is the only 100 words per minute continuous voice input device he knows of but it is not for sale!)

The initiative for installing business microcomputers comes both from users and from CMSD staff. Colin Davies says that users' awareness of what a microcomputer can be used for is increasing all the time (as a result of the recent series of television advertisements, for example). However, CMSD staff do not actively market PCs to the business — this is the job of the local information centres and in many cases they are simply trying to cope with user demands.

All business microcomputers are purchased, and are therefore capital expenditure items. Some of ICI's divisions have obtained a blanket capital expenditure authorisation to anticipate future needs, so that new microcomputers can be installed at very short notice.

All of the machines installed so far are being used regularly. There is no example of any gathering dust on a shelf.

Future developments

ICI expects to install large numbers of IBM PCs during the next two years. Colin Davies estimates, that by the middle of 1986, the installed base will have increased to about 2,500 (compared with about 500 in mid-1984). The majority of these machines will be installed primarily to work in conjunction with ICI's various mainframe, viewdata and office systems. As prices fall further and functionality increases a ratio of one machine for every two or one of ICI's 20,000 plus office staff is likely to be achieved.

The use of business microcomputers as multifunction devices conforms very closely to the overall model envisaged four or five years ago: corporate mainframe resources (software and data) available via a network to terminals out in the business. That type of access is available today. The only significant variation from the original model is that two networks are used — an SNA network and an 'open systems' X.25 network.

So far, the microcomputer-mainframe links in ICI have not had a significant impact on the mainframe workload. But Colin Davies predicts that there will be a big impact on corporate network requirements. Downloading data and files from mainframes to microcomputers will require the networks to handle a type of traffic for which, probably, they were not designed. The requirement will be for intensive short bursts of transmission where a lot of data is transmitted in a short time.

But there is one major element of the overall scheme which is still missing. Business microcomputers will require more access to local (that is, regional or divisional) computing resources and data than to corporate resources. ICI is still considering how best to provide for these local networking requirements.

For example, Colin Davies does not believe there will be a significant need for multi-user microcomputers

or for linking microcomputers directly together via various micronets. All of ICI's main sites will have general-purpose local networks containing a range of facilities, including nodes of an integrated office system. Most micros will communicate via these networks.

ICI believes that its policy for managing the introduction of business microcomputers will allow large numbers of machines to be installed in a carefully coordinated manner. Far from being a threat to services, the business microcomputer is beginning to enhance the standing of the management services function — a sign that it is of real benefit to the business.

MOBIL OIL FRANCAISE

Mobil Oil Française is the French subsidiary of Mobil Oil, which has its headquarters in New York. Mobil's policy for microcomputers in France has been developed in line with overall corporate policies, taking into account the need to exchange information in a machine readable form.

Marcel Mizrahi, Directeur Informatique, told us that there were two main aims in formulating the policy:

—To prevent isolated pockets of microcomputers appearing in the business in an uncoordinated way.

—To prevent end users become programmers.

At the end of 1981 Mobil Oil Française specified a standard hardware and software environment for business microcomputers (Apples plus VisiCalc). This standard conformed with Mobil's international standards for exchanging financial information on floppy discs.

To acquire a microcomputer, users have to present a justification for installing the machine, which has to be endorsed by the systems consulting group. This group is able to veto the user's request and recommend that the need is best met by an alternative form of information technology. All microcomputers are purchased centrally (discounts have been negotiated), and the costs are not recharged to the user department.

When we spoke with M. Mizrahi, 40 Apples had been installed, together with a couple of IBM PCs. Typically, once a microcomputer has been installed, users find additional ways in which to use it. As a consequence, they often run out of capacity within three to six months, and memory upgrades (or even a second machine) are then required. The cost of any upgrades also has to be justified by users in the same way as the original acquisition.

Applications are developed either by users themselves (using VisiCalc) after two days initial training, or by professional systems staff, who develop applications in Basic. No other type of application generator tool is used. Mobil Oil Française has also installed 140 Wang OIS work stations, and Apple-Wang links have been constructed so that graphics and text can be mixed.

Mobil's data processing staff in France often use microcomputers for building prototypes of new mainframe applications. The main purpose of these prototypes is to help users clarify their requirements.

Mobil Oil Française is now under pressure to adopt the corporate standard for business microcomputing — the IBM PC. M. Mizrahi told us he was reluctant to do this because of the existing investment (skills as well as hardware) that Mobil Oil Française now has in Apple equipment. He believes that the Apples will suffice for a couple of years yet, but after that he can envisage the Apples being sold off to employees. Nevertheless, a few IBM PCs will be installed to provide gateways to Mobil's international IBM network.

In the medium-term future, M. Mizrahi believes that the Wang systems (including Wang personal computers) will be used for office automation in Mobil Oil Française, with IBM 3270 PCs being used for computer-related applications. In the longer term he can envisage an IBM-only environment, but adds that "the products to allow this to happen have not yet been announced".

AHOLD NV

Ahold's main business activities are in supermarketing retail chains (Albert Heijn, Etos, Alberto and Miro in the Netherlands; Bi-Lo and Giantfood Pennsylvania in the United States), road-side restaurants, camping grounds and manufacturing packaged consumer goods and related consumer goods. Organisationally, the operating companies are fairly autonomous and decentralised. Ahold does not regard itself as pioneer users of information technology, but Mr. Van Marion, General Manager Data Processing, told us about his concern that the business is making insufficient use of business microcomputers. His fear is that, unless his department takes the initiative, Ahold is in danger of being left behind as its competitors find ways of using business microcomputers for competitive advantage.

Ahold's policy for introducing business microcomputers is therefore based on installing a certain number of microcomputers in a given period. The aim is to install 35 microcomputers before the end of 1984, and the manager charged with doing this has been placed on an incentive scheme to ensure that it happens.

So far, there has been very little demand from within the company for business microcomputers because of the fast-moving nature of the food retailing business — where managers and professionals need to access mainstream data. Mr. Van Marion is determined to create the demand. To do this, the data processing department will be identifying the professional workers who can probably benefit from using a business microcomputer. Likely candidates are in the legal department, property department, personnel department, etc. All microcomputers will be purchased centrally by the data processing department, but the cost will be recharged to the user department. The data processing department will also charge for any support requested by the user. According to Mr. Van Marion, there will be "one or two people" in the support unit, which will be part of the decision support section. This section also has responsibility for office automation and in-house timesharing in Ahold.

The intention is to allow users to implement and run their own microcomputer applications with the minimum of interference from the data processing department. There will also be a fairly wide range of permissible hardware. Microcomputers will be classified in one of three ways:

— 'White': on Ahold's approved list.

— 'Grey': can be installed if a good case is made for doing so.

— 'Black': on Ahold's forbidden list.

In reality the 'white' list is likely to be confined to Texas Instruments personal computers and IBM PCs, with the preferred operating system being MS-DOS or Unix. The reasons for Texas Instruments being on the white list include the fact that several Texas Instruments minicomputers are in use at Ahold already.

In addition to installing business microcomputers for discretionary use by professionals and managers, Ahold will also be installing at least one microcomputer in each supermarket. These machines will not be used for personal computing; they will be used for standard, replicated applications developed by data processing staff for the use of the supermarket managers (primarily in support of management activities within the stores).

THE BUTLER COX FOUNDATION

Butler Cox & Partners Limited
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The Butler Cox Foundation sets out to study on behalf of subscribing members the opportunities and possible threats arising from developments in the field of information systems.

The Foundation not only provides access to an extensive and coherent programme of continuous research, it also provides an opportunity for widespread exchange of experience and views between its members.

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The research programme is planned jointly by Butler Cox and by the member organisations. Half of the research topics are selected by Butler Cox and half by preferences expressed by the membership. Each year a short list of topics is circulated for consideration by the members. Member organisations rank the topics according to their own requirements and as a result of this process, members' preferences are determined.

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