Desktop Publishing

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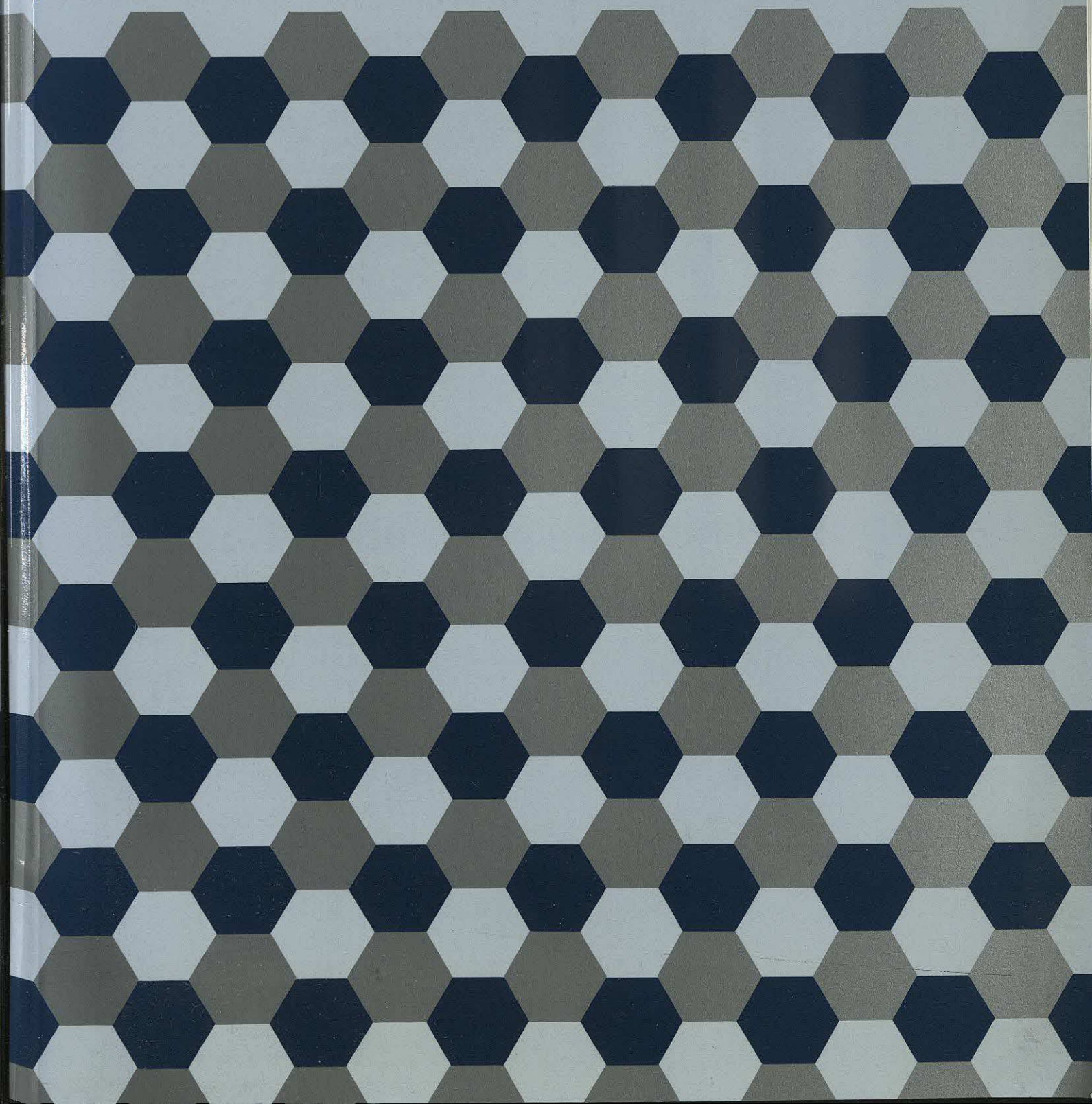

BUTLER COX
REPORT SERIES

DESKTOP PUBLISHING

September 1987

Every company is in the publishing business: billions of pages of information are published by companies each year, and the number of pages is growing rapidly despite the much-heralded paperless office. So it is no wonder that desktop publishing has mushroomed to become one of the fastest growth areas in personal computing.

But many corporate managers are cautious about desktop publishing, and rightly so. Like other advances in information systems, it is less straightforward than it appears. Often, poor implementation can result in few benefits being achieved, and sometimes in no benefits at all.

The purpose of this report is to explain how managers can gain the benefit of desktop publishing, whilst avoiding the pitfalls. Researched in the United States, Japan, the United Kingdom, and continental Europe, it discusses what you can do with desktop publishing, where and when to use it, costs and benefits, how it works, how to implement it, and what the future holds.

WHO SHOULD READ THIS REPORT

This report is aimed at business managers with responsibility for ensuring the cost-effective production of high-quality documents. Any business, in any industry sector, that is spending significant amounts on personal computing, end-user computing, electronic office systems, or printing and publishing will benefit from this report.

Although it explains enough of the technology to make it comprehensible to non-technical readers, the focus is firmly on the management of desktop publishing in business: application selection, justification, equipment selection, and organisational implications.

For the very reason that the report is principally concerned with the needs of business users, it is also of interest to equipment suppliers — explaining user motivations, equipment selection criteria, features and facilities that are sought, and purchasing responsibility.

MANAGEMENT SUMMARY

The management summary for this report has been prepared and issued separately. In eight pages of text and figures, it encapsulates the management messages of the report, setting them out clearly and unambiguously for senior executive attention.

The management summary has been published under its own cover to help allow wide circulation within each organisation subscribing to the main report.

RESEARCH METHOD

Butler Cox has been monitoring developments in information technology since 1977. This report is based on an extensive international research effort conducted by Butler Cox to ensure a comprehensive and factually up-to-date report.

In particular, we have conducted a questionnaire survey of more than 200 user organisations in Europe, representing the major industry sectors. User case histories are cited extensively in the text to support and illustrate the survey results.

In the course of investigations, our research team has conducted interviews with suppliers and users in the United States, Japan, the United Kingdom and continental Europe, specifically for this study. We have also drawn on Butler Cox's extensive research base in related fields, including office systems, graphics, end-user computing, networking, and staff organisation. Data gathered at conferences, exhibitions and seminars on desktop publishing has provided us with further input.

The project director was Roger Woolfe, Butler Cox's Director of Group Consultancy, who has in the past been responsible for market and management studies in fields including videotex, cellular radio and cable television.

The associate research director was Andrew Tribute, contributing European editor to the Seybold report on desktop publishing, and widely acknowledged as one of Europe's leading authorities on the subject.

Dr Simon Forge of Butler Cox's Paris office, a specialist in office automation, distributed systems, and telecommunications, was responsible for technical research. Neil Farmer, an authority on office systems from Butler Cox's London office, was responsible for conducting the user research programme.

BUTLER COX

Butler Cox is the independent management consultancy specialising in information technology. Its Public Report Series, which addresses topics of importance to a variety of business managers, has reached readers in more than 30 countries. Summaries of our most recent reports are printed inside the back cover.

Butler Cox also offers individual client consultancy to both users and suppliers of information systems. The company's team of specialists in office systems and networking, for instance, is amongst the foremost in Europe.

The Butler Cox Foundation is a continuing research programme for directors of MIS functions in major organisations. With more than 250 members, mostly in Europe and the Far East, the Foundation is the largest research group of its kind in the world.

A list of Butler Cox office addresses appears on the back cover.

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THE BUTLER COX REPORT SERIES

DESKTOP PUBLISHING

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Chapter 1

DESKTOP PUBLISHING IN CONTEXT

It is not hard to see why desktop publishing is gaining wide attention. The great improvement in document appearance is clear for all to see, and it promises to reduce costs as well. But from the corporate manager's standpoint, what is not immediately obvious is how desktop publishing fits in both with more traditional corporate publishing and with personal computing and electronic office systems.

In this chapter we lay the foundation for more detailed analysis in the chapters that follow. We begin by making the case for management attention, by explaining why desktop publishing is important, and why it is not about to go away. We go on to identify its characteristics, and to place it in context with corporate publishing and computer-based office systems.

DESKTOP PUBLISHING — A MANAGEMENT ISSUE

Desktop publishing is a hot topic. It is already one of the fastest growth areas in personal computing. Not surprisingly, though, many managers are unclear about how best to exploit it effectively.

THE OPPORTUNITIES OF DESKTOP PUBLISHING

Desktop publishing is the production of near-typeset quality text and pictures by computers on the desktop. It lets you use a business personal computer to lay out pages of words and pictures, and it harnesses a laser printer to produce the results. Figure 1.1 overleaf illustrates the sort of work that can be produced with desktop publishing.

Organisations from every sector in many countries are already taking advantage of desktop publishing. Sampson/Tyrrell is a small consultancy based in London that offers expertise in design and marketing. Since adopting it in 1985, the company now uses desktop publishing to produce a range of printed communications, including proposals, estimates, reports, and an in-house newsletter. "Desktop publishing produces documents that look better and cost less than they would using alternative means," says one of the directors, Dave Allen.

At Perkin Elmer, a totally different kind of business, the response to desktop publishing is much the same. Perkin Elmer is a US-based supplier of electronic equipment and semiconductors with annual revenues exceeding $1 billion. Its Data Services and Support Administration (DSSA) group based in Wilton, Connecticut, provides a central service for the production of customer proposals, company reports, and product manuals. Newly introduced, desktop publishing already plays a key role. Today's individual computer stations will soon be expanded and networked together to obtain further benefits from group working, according to DSSA manager, Bernard Klaus.

Many other pioneering users relate similar experiences. The benefits of desktop publishing that are most commonly claimed are improved document appearance, faster document turn-around, and reduced cost. Cost displacement alone can be a compelling factor. The majority of the respondents in our survey expected a payback from desktop publishing in 24 months or less, as we describe later on. That expectation aligns closely with the result of other surveys. Some fortunate users, admittedly in special circumstances, have claimed paybacks in a matter of weeks — sometimes only days.

Yet organisations adopt desktop publishing in the first place mainly because of improved document appearance, rather than cost displacement. The reasons for this are not hard to find. Most importantly, the flood of paper that is a hallmark of business today is placing a heavier emphasis than ever before on quality of appearance. Every company is in the publishing business. Each year, billions of pages of information are published by companies, and the number of pages is growing rapidly despite the much-heralded paperless office (see Figure 1.2 overleaf). Increasingly, documents have to stand out if they are going to be read. There is growing competition for readers' limited attention span — their 'mindshare'.

Moreover, desktop publishing is, superficially at least, quick and easy to acquire. The equipment is relatively inexpensive. Desktop publishing software packages cost only a few hundred dollars each. Admittedly, because the programs are highly complex, they need top-of-the-range business computers to run on, which may mean enhancing existing equipment or buying new. A laser printer is essential too, at a price that starts from several thousand dollars. Nonetheless, the equipment with which to get started costs less than $10,000, and many businesses will find they have some of it inhouse already. At first sight, staff time and training appear relatively inexpensive as well.

Against this background, it is little wonder that desktop publishing has caused an explosion of interest since its arrival in 1985. For users, the benefits seem clear and compelling, and costs seem only modest. For suppliers, there is the opportunity

Figure 1.1: What desktop publishing can do

These sample pages (supplied by Corel Systems Corporation of Ottawa) indicate what can be done with desktop publishing.

COREL Desktop Published Newsletter Volume 2

PC XTRA

COREL DELIVERS PAGE MAKEUP ON PC !

It's here — a PC-based page layout system that lets you create publication quality documents quickly, easily and at an affordable price. The promise of desktop publishing is now a reality.

At COREL, we offer a full range of integrated workstations allowing you to make anything, from standard office documents to large run publications, look great!

Our business is providing turnkey solutions for organizations wanting to join the world of desktop publishing without leaving the world of IBM PC compatibility. To that end, we have assembled the best available hardware and software from a variety of manufacturers around the world, (including our own special enhancements), to present you with the most powerful and cost-effective systems available. At COREL we are constantly investigating technical advances in each component, to ensure that the systems we offer are the best value available in both price and performance.

Our business is providing turnkey solutions

Sample high-resolution illustration possible with powerful PC-based software

The Best of Both Worlds

Desktop publishing systems with IBM compatibility are available at last.

Now the hard facts from your spreadsheet, database and word-processing packages, combined with the computer-generated and hand-drawn graphics can be presented in publication quality print communications.

Say goodbye to glue, scissors and trash cans full of wasted typesetting. Our COREL systems give you the creative freedom to cut and paste on a computer screen as many times as it takes to get it perfect. Avoid the frustration, cost overruns, delays and lack of control typically associated with using outside creative services. Our desktop publishing systems give you peace of mind by letting you generate the entire publication right in the security and convenience of your own office.

Replace ho-hum looking reports and correspondence with documents which demand attention.

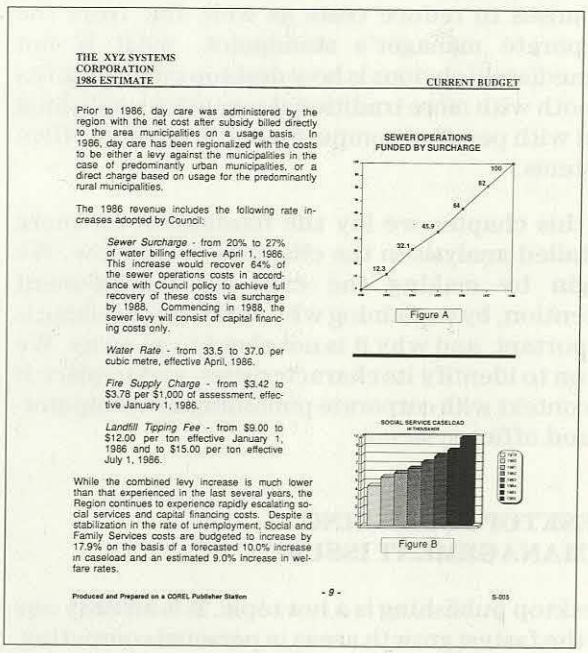
All this on IBM-compatible PC systems. Can't believe it? Give us a call and let us prove it.

In Ottawa: (613) 728-8200
In Toronto: (416) 928-3110

Original Document Designed, Typeset & Produced on a COREL Publisher Station

IBM is a trademark of International Business Machines

Corel Systems Corporation
November 1986
S-001



THE XYZ SYSTEMS CORPORATION
1986 ESTIMATE

CURRENT BUDGET

Prior to 1986, day care was administered by the region with the net cost after subsidy billed directly to the area municipalities on a usage basis. In 1986, day care has been regionalized with the costs to be either a levy against the municipalities in the case of predominantly urban municipalities, or a direct charge based on usage for the predominantly rural municipalities.

The 1986 revenue includes the following rate increases adopted by Council:

Sewer Surcharge - from 20% to 27% of water billing effective April 1, 1986. This increase would recover 64% of the sewer operations costs in accordance with Council policy to achieve full recovery of these costs via surcharge by 1988. Commencing in 1988, the sewer levy will consist of capital financing costs only.

Water Rate - from 33.5 to 37.0 per cubic metre, effective April, 1986.

Fire Supply Charge - from $3.42 to $3.78 per $1,000 of assessment, effective January 1, 1986.

Landfill Tipping Fee - from $9.00 to $12.00 per ton effective January 1, 1986 and to $15.00 per ton effective July 1, 1986.

While the combined levy increase is much lower than that experienced in the last several years, the Region continues to experience rapidly escalating social services and capital financing costs. Despite a stabilization in the rate of unemployment, Social and Family Services costs are budgeted to increase by 17.9% on the basis of a forecasted 10.0% increase in caseload and an estimated 9.0% increase in welfare rates.

SEWER OPERATIONS FUNDED BY SURCHARGE

100
82
64
45.9
32.1
12.3

Figure A

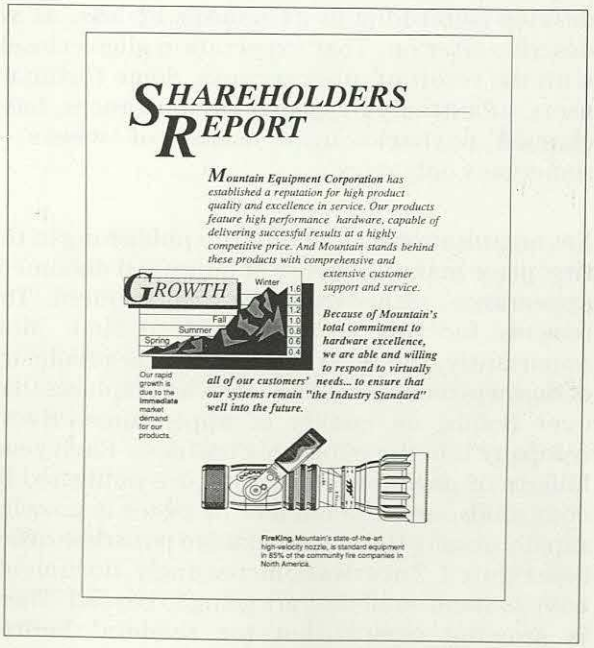
SOCIAL SERVICE CASELOAD

Figure B

Produced and Prepared on a COREL Publisher Station

- 9 -

S-005



SHAREHOLDERS REPORT

Mountain Equipment Corporation has established a reputation for high product quality and excellence in service. Our products feature high performance hardware, capable of delivering successful results at a highly competitive price. And Mountain stands behind these products with comprehensive and extensive customer support and service.

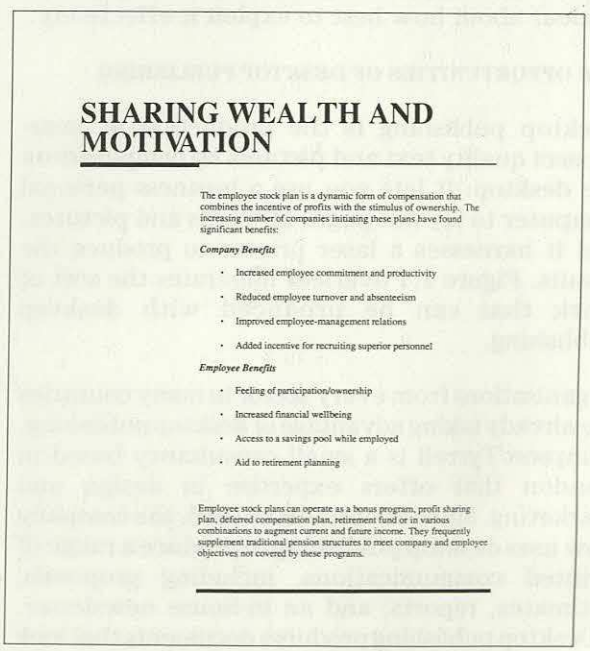
GROWTH

Winter 1.6
1.4
Fall 1.2
1.0
Summer 0.8
Spring 0.6
0.4

Our rapid growth is due to the immediate market demand for our products.

Because of Mountain's total commitment to hardware excellence, we are able and willing to respond to virtually all of our customers' needs... to ensure that our systems remain "the Industry Standard" well into the future.

FireKing, Mountain's state-of-the-art high-velocity nozzle, is standard equipment in 85% of the community fire companies in North America.



SHARING WEALTH AND MOTIVATION

The employee stock plan is a dynamic form of compensation that combines the incentive of profits with the stimulus of ownership. The increasing number of companies initiating these plans have found significant benefits:

Company Benefits

- Increased employee commitment and productivity
- Reduced employee turnover and absenteeism
- Improved employee-management relations
- Added incentive for recruiting superior personnel

Employee Benefits

- Feeling of participation/ownership
- Increased financial wellbeing
- Access to a savings pool while employed
- Aid to retirement planning

Employee stock plans can operate as a bonus program, profit sharing plan, deferred compensation plan, retirement fund or in various combinations to augment current and future income. They frequently supplement traditional pension structures to meet company and employee objectives not covered by these programs.

first to exploit and then to augment the huge base of millions of personal computers already in place in business. Desktop publishing could be the application that finally makes personal computers in business respectable. Projections for the value of the US market alone are in the $2-4-billion range by 1990, according to pundits. That many of the conferences and exhibitions have been sellouts is hardly a surprise.

But early corporate success has not been without its problems. Managers are right to be cautious about desktop publishing. Like other advances in information systems, it is less straightforward than it appears.

COMPLICATIONS OF DESKTOP PUBLISHING

Introducing desktop publishing into the corporate environment leads to complications. One concerns management. Although the management responsibilities can be enumerated fairly readily, it is not clear who has the skills to be responsible for desktop publishing in the corporate environment. Another complication concerns standards. Desktop publishing is a powerful work tool, for which standards are needed if output consistency is to be preserved. Integration is a clear trend, but one which raises complications concerning networking, office systems, and mainframe connections.

It is because of complications like these that managers require guidance before plunging into desktop publishing. Answers to a number of questions are needed. They are both organisational and technical. Organisational questions include the following:

- What applications are suitable, and how do you select them?
- Who will use desktop publishing, and what skills are needed?
- How should corporations plan for staffing and training?
- Who will manage desktop publishing in the corporate environment?
- What will be the role of MIS?
- Will desktop publishing make conventional typing and word processing obsolete, and if so, how quickly?
- What will it all cost?

Technical questions include the following:

- What standards are needed and how should they be controlled?
- What are the ground rules for selecting equipment and software?

Figure 1.2: So much for the paperless office

Every company is in the publishing business, and paper consumption continues to rise inexorably. In 1986:

- Computers spewed out more than 1,200 pages of print for every man, woman and child in the United States.
- American corporations produced more than 2 trillion pages of information.
- The documentation for the Boeing 747 weighed more than the plane itself.

- How should desktop publishing be integrated into the electronic office systems environment, and networked with departmental and corporate-wide computing facilities?
- What strategies will suppliers adopt, and what impact will this have on corporate planning?

Most important of all, *how can user managers gain the benefits of desktop publishing, whilst avoiding the pitfalls?*

It is the purpose of this report to answer these questions.

CORPORATE ELECTRONIC PUBLISHING

Publishing is the dissemination of information in printed form. Virtually every business is concerned, one way or another, with publishing. To date, much corporate publishing has been typed or word-processed. Typesetting has been reserved for high-quality documents, such as brochures and manuals, which have demanded a more professional appearance.

Until recently, the publishing of typeset-quality material has been the preserve of specialists using techniques hardly altered over centuries. Since the 1960s, however, electronics has been making inroads into the traditional industry. In business, this new activity is called corporate electronic publishing. (This term is something of a misnomer. It means the publishing of printed business documents by electronic equipment. 'Electronic publishing', by contrast, is used widely to mean publishing that is paperless or nearly paperless.) Desktop publishing is one form of corporate electronic publishing. In this section we look first at the characteristics of desktop publishing, then at how it fits into the spectrum of corporate electronic publishing activities. Desktop publishing is immature, however, as we go on to explain. In the future, its influence on corporate electronic publishing will both broaden and diffuse.

CHARACTERISTICS OF DESKTOP PUBLISHING

We have already defined desktop publishing as the production of near-typeset-quality text and pictures by computers on the desktop. Strictly speaking, the term desktop publishing is something of a misnomer (just as corporate electronic publishing is) because it misuses the word 'publishing'. 'Desktop printing' is hardly more accurate, and 'desktop production of page masters for duplication' is unappealing. Rightly or wrongly, however, the term desktop publishing is here to stay.

The distinguishing characteristics of desktop publishing are summarised in Figure 1.3. Desktop publishing is designed for the production of compound documents (documents containing both text and illustrations) of medium typographic quality — much better than word processing, but not as good as top professional standards. Because it lacks some of the features available in professional typography, it works best on documents that are neither very complex nor very long. Desktop publishing staff need not be dedicated in the sense that a professional typographer is. Desktop publishing is just another tool that runs on a business personal computer.

Figure 1.3: Summary of desktop publishing's characteristics

Characteristics of use

- Compound documents of text and graphics.
- Documents of low volume and complexity.
- Medium quality typography.
- Monochrome (and some colour).
- Operators having little or no background in professional publishing.
- Operators often occupied less than fully.
- Individual or group working.

Characteristics of equipment

- Business personal computer having WIMPS interface.
- Publishing software for assembling pages of text and graphics.
- Laser printer with page description language (PDL).
- Equipment costing not more than $10,000.

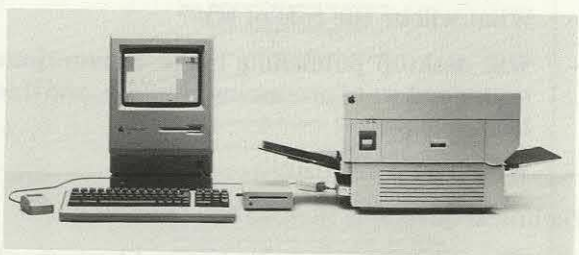
In terms of equipment, desktop publishing again has certain distinguishing characteristics. It needs a business personal computer to run special page-assembly software, known as desktop publishing software. You can use the software as a means of creating text and graphics as well as assembling them together, but more commonly the software works with 'imported' text and graphics that has been created separately. Not every business personal computer will do. It has to be at the top end in terms of power and memory size: desktop publishing software is complex and demanding. Moreover, the personal computer has to be able to display graphics as well as text. And it has to be equipped with a special kind of user interface.

In desktop publishing, the operator continually makes use of functions selected from a wide choice. An extended keyboard and conventional display screen are hardly a practical proposition for this. Instead, the operator can call up lists of functions (known as menus) for display in screen windows that overlay the current screen contents (see Figure 1.4). Each function is labelled either by name or with a symbol (such as a magnifying glass) called an icon. To select from the menu, the operator first points to the label or icon, most commonly by steering the screen cursor into position with a hand-held device called a mouse, then confirms the choice by clicking a mouse-top switch. The term that is commonly used to describe this kind of user interface, and which we will use throughout the remainder of this report, is WIMPS, an acronym for windows, icons, menus and pointers.

Besides the personal computer, desktop publishing software, and user interface, one further item of equipment needs to be added: a printer that can produce text in a range of typefaces and sizes, line art for graphics and illustrations, and even halftones to reproduce photographs. Desktop laser printers that can do this (see Figure 1.4 again) are now available at an affordable price. Compact and quiet, though rather slow, they can produce a level of quality far higher than a conventional office printer (for instance using a daisy wheel), though not nearly as good as a professional typesetting machine (see Figure 1.5).

Figure 1.4: Personal computer and laser printer configuration

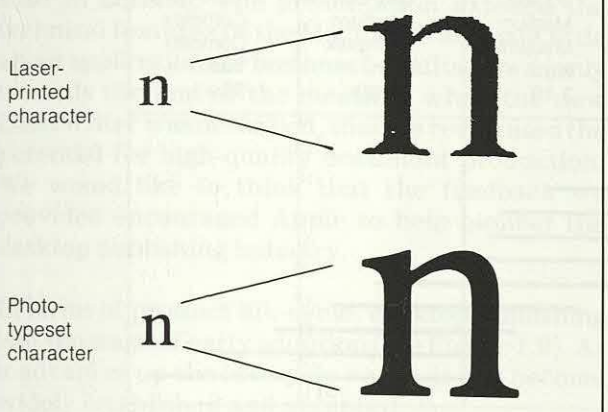
The basic configuration for desktop publishing consists of a powerful business personal computer with a graphics screen, WIMPS interface (see text), and laser printer. The picture shows an Apple Macintosh personal computer linked to a LaserWriter printer.



Acknowledgement to Apple Computer UK Limited

Figure 1.5: Print quality

With a resolution of around 300 dots per inch (dpi), laser printing quality is superior to word processing, but inferior to that of phototypesetting's 1,000 to 2,400 dpi. Magnification shows the laser-printed character's jagged edges.



Just as in the case of the business personal computer, however, not every desktop laser printer will do. Although some might disagree, we contend that only laser printers able to interpret a 'page description language' are admissable for desktop publishing. Page description languages (PDLs for short) break the direct link between the printer and personal computer. Print quality is no longer constrained by the relatively low resolution of the computer's display.

Professional typesetting machines able to interpret PDLs are now becoming available. They can be linked to personal computers running desktop publishing software through a common PDL, to produce printed output of very high quality.

DESKTOP PUBLISHING AND CORPORATE ELECTRONIC PUBLISHING

Corporate electronic publishing spans a wide spectrum. For simplicity it helps to divide the spectrum into levels of increasing complexity and equipment price, as shown in Figure 1.6. Typing and word processing are at the low end in terms of process complexity and equipment price. Professional publishing — for such things as colour brochures and house journals — is at the top end of the spectrum.

Desktop publishing is positioned between word processing on the one hand, and technical publishing on the other. Word processing has rapidly displaced conventional typing in most organisations. Early word processing stations were purpose-designed, but today the vast majority are low-cost personal computers running text-editing software. Technical publishing has its roots in computer-aided design and manufacturing (CAD/CAM) systems, now used extensively in engineering and design. Today, most engineering workstations are based on micro-chips that are a good deal more powerful and expensive than those found in business personal computers. Professional publishing systems represent a further advance still, in terms of equipment capability, and price. The computer-driven phototypesetting equipment used internally in some businesses is similar to that used by dedicated publishing organisations producing magazines and journals, where both typography (the design and planning of printed matter) and print quality have to be to the highest standard.

Figure 1.6: Desktop publishing: a form of corporate electronic publishing

Desktop publishing is positioned between word processing and technical publishing, filling the gap between 'office documents' and 'graphics arts documents'.

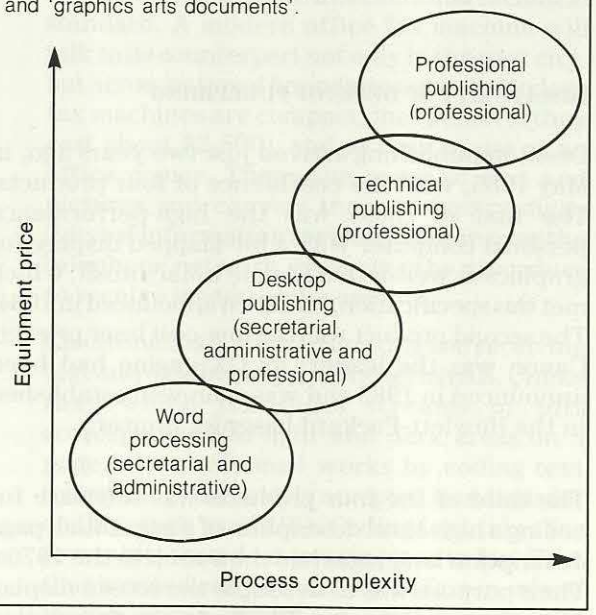


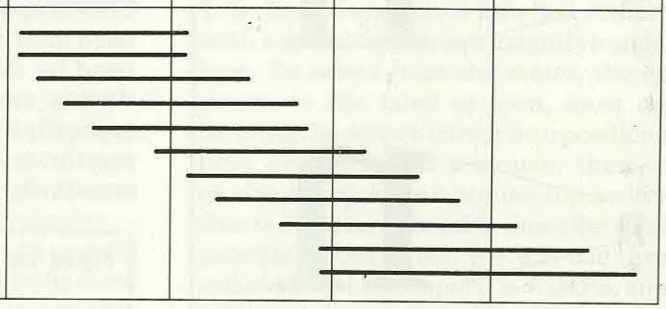
Figure 1.7 overleaf compares the features of the four forms of corporate electronic publishing. It also indicates, in very broad terms, the kind of applications appropriate to each one. With time, the ratio of price to performance of corporate electronic publishing will improve, reflecting a continuing reduction in the cost of electronics. That will lead to a rightwards shift of the ellipses in Figure 1.6, and to a growing overlap between them — a point we return to in Chapter 6 when we look at the prospects for desktop publishing.

Before going on to examine desktop publishing in the context of related information systems, it is pertinent to pause for a moment for a brief historical review.

Figure 1.7: Features and applications of corporate electronic publishing

In the context of corporate electronic publishing as a whole, desktop publishing is best suited to work of medium volume and complexity.

Features/examples		Word processing	Desktop publishing	Technical publishing	Professional publishing
Document size	(pages)	1-100	1-50	1-100	1-250
Print resolution	(dpi)	50-100	300-600	300-600	1200-2400
Text composition	S/M/C	Simple	Medium	Medium	Complex
Graphics	S/M/C	Simple	Medium	Complex	Complex
Colour	Yes/No	No	No	No	Yes
Cost/station	($000)	1-2	3-10	15-30	50+
Memos					
Letters					
Reports					
Proposals					
Policy manuals					
Technical specs					
Repair manuals					
Catalogues					
Directories					
Journals					
Sales brochures					



IMMATURITY OF DESKTOP PUBLISHING

Desktop publishing arrived just two years ago, in May 1985, with the confluence of four products. The first of these was the high-performance personal computer with a bit-mapped display for graphics as well as text. Apple's Macintosh, which met this specification, had been announced in 1984. The second product was the low-cost laser printer. Canon was the leader: its CX engine had been announced in 1983 and was soon well established in the Hewlett-Packard LaserJet printer.

The third of the four products was software for coding a high-level description of a page. Such page description languages had their roots in the 1970s. Their purpose was to decouple the screen display from the printed page. The first page description language able successfully to create and scale typefaces from mathematical primitives at high speed was Adobe's PostScript, which was announced as a commercial product for Apple's LaserWriter printer early in 1985.

The last of the four products was the publishing software itself, to assemble pages of text and graphics. Aldus Corporation of Seattle, Washington announced its PageMaker product in May 1985. A user could now buy a Macintosh, and a LaserWriter and PageMaker software (both with PostScript), for less than $10,000, and begin publishing from the desktop. Figure 1.8 shows the historical milestones both leading up to and following the birth of desktop publishing.

Since 1985, desktop publishing has exhibited all the hallmarks of an industry at an early stage in its maturity and growing at a hectic pace: press hyperbole, crowded conferences and exhibitions, suppliers struggling for an early position in the market. In fact, there are many parallels with word processing, which saw a similar period of explosive growth in the mid-1970s.

Word processing replaced typing because it was more cost-effective. Desktop publishing, on the other hand, appeals because it produces print that is more attractive than word processing. It is part of a trend towards more style and professionalism in communications. It makes it possible to put back into the printed page some of the quality that has been removed over the years, particularly by

Figure 1.8: Historical milestones

Desktop publishing was born in May 1985.

Before	1974	Xerox Alto and laser printer
	1978	Xerox 9700 high-speed laser printer
	1980	Xerox Star and Ethernet local area network
	1983	Canon CX engine and Hewlett-Packard LaserJet
	1983	Apple Macintosh 128k
	1985	Adobe PostScript for Apple LaserWriter
Birth	1985	Aldus PageMaker for Macintosh
After	1986	Macintosh Plus, LaserWriter Plus
	1986	Ventura for IBM PC
	1987	PageMaker for IBM PC
	1987	IBM adopts PostScript

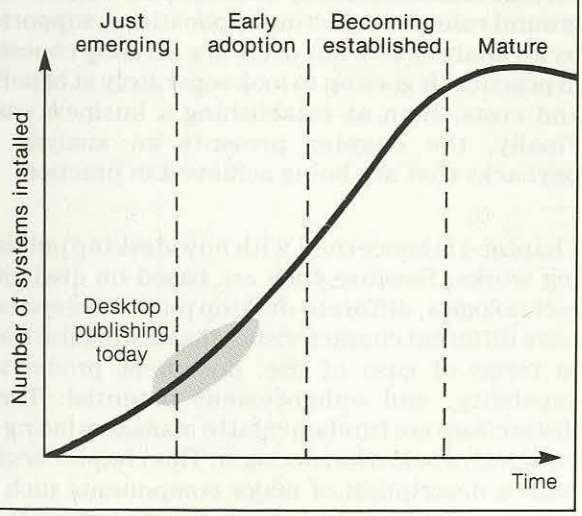
computers during the course of the past two decades.

The rapid growth of desktop publishing based on the Macintosh was probably not foreseen by Apple. In April 1985, Apple's UK Managing Director, David Hancock, gave a private presentation to Butler Cox staff in London. The presentation extolled the technical features of the Macintosh and said little about applications or business benefits. It was only towards the end of the meeting, when the new LaserWriter was described, that we recognised the potential for high-quality document production. We would like to think that the feedback we provided encouraged Apple to help pioneer the desktop publishing industry.

In terms of product life-cycle, desktop publishing is at the stage of early adoption (see Figure 1.9). As it advances up the life-cycle curve, it will become widely established and accepted.

Figure 1.9: Immaturity of desktop publishing

The product life-cycle curve illustrated below, showing desktop publishing at the stage of early adoption, is typical of most sectors.



DESKTOP PUBLISHING AND RELATED INFORMATION SYSTEMS

Desktop publishing fits into a spectrum of corporate electronic publishing, as we have already explained. It also relates closely to other electronic information systems designed to handle text and graphics in the office environment. We will review briefly what these related office systems are, because desktop publishing will be strongly influenced by them as it matures.

The scope of electronic office systems is a wide one. It covers the creation, distribution, storage, and retrieval of information not only in the form of text, but as data, images (graphics and illustrations), and voice as well. In the past, the focus of development has been on particular areas of this very broad field. Examples include the following:

- Business graphics, for presenting data in the form of charts, histograms, and graphs, rather than (and also as well as) in tabular form. Because they are an effective means of communicating, graphics are widely used in business today. Their adoption has come about as a consequence of the spread of business personal computers and the availability of easy-to-use and affordable graphics-generating software.
- Facsimile (fax), for transmitting documents over the telephone network. Fax transceivers have proliferated, particularly during the past two years. The reason is the common acceptance of a single international technical standard. A modern office fax machine will talk to its counterpart not only in the next city, but across national boundaries as well. Modern fax machines are compact, inexpensive (they cost about $2,500), and as easy to use as an office copier. They take pages of text and pictures and convert them to binary digits (bits) of information for transmission over the telephone network, reversing the procedure to receive incoming documents.
- Electronic mail, for transmitting and receiving text and data between users' terminals. Unlike fax, which transmits streams of bits corresponding to light and dark areas on a page, electronic mail works by coding text (using one of the widely accepted standards for coding, such as ASCII). Coding text takes far fewer bits than does imaging it as in fax. Text that is coded can be transmitted faster, stored in less space, and processed semantically rather than merely as a meaningless string of signals. Electronic mail introduces a store-and-forward point (mailbox) between senders and recipients, so that messages can be deposited and retrieved at convenient times. Electronic mail is used widely within businesses, and its use is beginning to grow between businesses through public services such as British Telecom Gold.
- Document image processing (dip), for storing and retrieving office documents in image form. The pages of documents are scanned and converted to a digital bit stream in much the same way as in a fax transceiver. An A4 page of text takes about a quarter of a million bits to image at a resolution level of 100 dots per inch

(easily sufficient to render small type readable), and allowing for the removal of redundant bits (corresponding, for instance, to areas of white). Electronic files of very large capacity are needed to store multiple-page documents, but technology has come to the rescue with large-capacity magnetic disc stores (up to a billion bits per disc, sufficient for 4,000 pages) and optical disc stores (tens of billions of bits, for more than 40,000 pages).

Office systems of the sort outlined above are developing in a piecemeal fashion, to provide answers to specific problems. At the same time, the major computer suppliers have been working hard to sell their own integrated office system products. IBM is the best illustration of this: it supplies one of the largest product ranges to the largest number of users. IBM's office system products are built around a set of architectures. DCA, Document Content Architecture, defines the layout and content of a document. DIA, Document Interchange Architecture, provides a framework for sending and receiving information between devices. SNADS, Systems Network Architecture Distribution Service, provides a centralised office information distribution service over wide-area networks.

These architectures are brought together in two major integrated office system products. The first is DISOSS, which is IBM's Distributed Office Support System. DISOSS is IBM's large-scale office system hub. It enables every user to be linked into a common network, either directly or via an intermediate node. PROFS, IBM's Professional Office System is for smaller-scale operations. It provides document interchange, personal filing, and retrieval on a range of IBM workstation and computer products. These office products are comprehensive but complex. In line with IBM's traditional philosophy, they are conceptually mainframe-centred.

Whilst the leading computer suppliers have been developing their integrated office systems, the ubiquitous personal computer has been proliferating throughout business and industry. It provides users with a growing range of functions such as spreadsheet analysis, word processing, diary management, and a range of decision support features such as financial modelling and statistical analysis packages. There is now little doubt that networked personal computers will form the basis upon which integrated office systems of the future will be built. The personal computer is also the basis of desktop publishing. In later chapters of this report, we examine the implications of this impending convergence around the personal computer.

SCOPE OF THIS REPORT

In this chapter our focus has been on what desktop publishing is and where it fits in the organisation. We began by defining and characterising desktop publishing, then placed it in the context first of corporate electronic publishing and then of related information systems. The chapters that follow are designed to answer the questions we posed earlier on page 3.

Chapter 2 is concerned with what desktop publishing can and cannot do and the skills that it demands. To appreciate desktop publishing's capabilities and limitations demands an understanding of what you can do with it and how a typical system can be made to work. In this chapter we explain how to edit and compose text, the creation of graphics and images, how to assemble compound documents, and how to design pages and documents that are attractive and easy to read.

Chapter 3 looks at choosing applications and assessing benefits. Publishing from the desktop is rarely the right choice for every corporate document. It is best suited to documents that have certain characteristics. This chapter begins with ground rules for selecting applications, supported by an analysis of what users are actually choosing in practice. It goes on to look separately at benefits and costs, then at establishing a business case. Finally, the chapter presents an analysis of paybacks that are being achieved in practice.

Chapter 4 is concerned with how desktop publishing works. Because they are based on dissimilar technologies, different desktop publishing systems have different characteristics that distinguish them in terms of ease of use, document production capability, and enhancement potential. These distinctions are fundamental to managers facing an equipment selection decision. This chapter begins with a description of major components such as screens, printers, and scanners, explaining their characteristics and how they work. This is followed by a close look at leading systems, including the Apple Macintosh and IBM PC. The characteristics of publishing software are also examined and compared.

Chapter 5 looks at planning and implementing successful desktop publishing. Based on practical experience gathered in pioneering installations, it uses guidelines and checklists to explain how to survey existing documents and workflow, assess requirements, set standards, select equipment, and choose and train staff. It examines desktop publishing management and the role of MIS. Case

histories are used to illustrate how success can be achieved in practice, and what pitfalls and obstacles to avoid.

Chapter 6 is about the direction of desktop publishing. With supplier announcements appearing almost daily, it is no wonder that some business managers are reluctant to invest. Will desktop publishing make conventional word processing obsolete, and if so, when? Will it become a part of office systems? What strategies will suppliers adopt? This chapter helps to remove some of the uncertainty by identifying major trends in technology and supplier strategy and predicting how quickly developments will occur. Most importantly, it draws out the implications and key issues for managers.

The report is completed by three appendices. Appendix 1 contains tabulated product profiles to help ease the task of equipment comparison. Appendix 2 is a glossary of terms used in typography and desktop publishing. Appendix 3 brings our survey findings, analysed and commented upon throughout the report, together in one place.

Chapter 2

WORKING WITH A DESKTOP PUBLISHING SYSTEM

To appreciate desktop publishing's capabilities and limitations demands an understanding of what you can do with it and how a typical system can be made to work. In this chapter we begin by describing the principles of assembling (making up) a page from text and graphics. We go on to discuss graphics creation, and in particular the creation of artistic graphics using a recently announced software package called Illustrator. Finally we present guidelines on document design.

It should be clear from this chapter that desktop publishing software makes it easy to lay out pages electronically. Graphic creation programs are equally easy to use. Desktop publishing broadens an individual's choice, so from the manager's standpoint it is both an opportunity and a threat.

MAKING UP A PAGE

Desktop publishing enables you electronically to cut and paste text and graphics together onto the pages of a document.

CREATING TEXT AND GRAPHICS

Although desktop publishing software packages enable you to create and edit both text and graphics, their facilities for doing so are not yet particularly good. The common practice today is for text and graphics to be created as separate activities in advance. The text and graphic files are then brought together for page makeup by the desktop publishing software package.

To create text, the likelihood is that you will use a word processing package running on a personal computer. Popular packages for IBM PCs and lookalikes are WordStar, Multimate, Wordperfect and Microsoft's Word; for the Apple Macintosh they include MacWrite, WriteNow and Microsoft's Word 3. Word processing packages such as these differ in detail, but all share editorial features of the sort set out in Figure 2.1.

Figure 2.2 shows a block of text that is monospaced: the width of each character is the same, as with an ordinary typewriter. The lines are not justified: there is no hard right margin, so the line lengths are unequal, giving a 'ragged' appearance.

To create the graphics, again it is most likely that you will use a separate software package. Compared with text editing, which is a mature

Figure 2.1: Word processing editing features

Editing features that are commonplace enable operators to:

— Insert and delete letters and words.

— Select words, paragraphs, blocks, pages for moving, copying, deleting, replacing.

— Search for and replace a word or phrase — for example, to correct 'Pagemaker and desk top publishing' to 'PageMaker and desktop publishing'.

— Check spelling, through an online dictionary.

— Select alternative words, through an online thesaurus.

— Hyphenate and justify, to adjust line lengths.

— Group together multiple characters or words that are in common use in a document, for example, meta tolylenediamine, onto a single keystroke (a macro statement).

— Merge sections of text from different, already created files.

— Outline the document structure by assisting with the sorting of notes and headings.

Figure 2.2 Word-processed text

Text that is word-processed is sometimes still monospaced and is usually single-column.

```
It is not hard to see why desktop publishing is gaining wide
attention.  The great improvement in document appearance is clear
for all to see, and it promises to reduce costs as well.  But
from the corporate manager's standpoint what is not immediately
obvious is how desktop publishing fits in both with more traditional
corporate publishing and with personal computing and electronic
office systems.

In this chapter we lay the foundation for more detailed analysis
in the chapters that follow.  We begin by making the case for
management attention, by explaining why desktop publishing is
important and why it is not about to go away.  We go on to identify
its characteristics, and to place it in context with corporate
publishing and computer-based office systems.
```

technology, graphics creation is less well established. You can create graphics in one of several ways. Painting, drawing, and charting (charting is also known as data-driven graphics) are the most common. But there are other forms as well. One is clip art, which comes in the form of libraries of pre-prepared art work ready to read straight from an electronic file. Another is image scanning, which enables originals in any form to be scanned, edited, and input. Yet another is by using Illustrator, the first of a breed of illustrating packages, otherwise known as artistic graphic packages.

We discuss these forms of graphics creation later in this chapter after first discussing how to lay out a page by placing the pre-prepared text and graphics onto it.

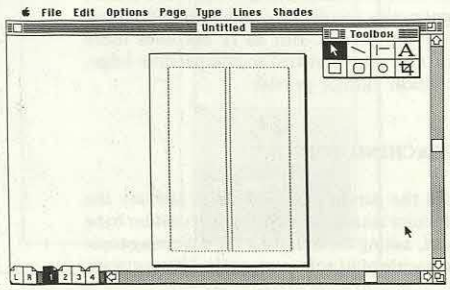
LAYING OUT A PAGE

There is already a good choice of desktop publishing software packages for laying out pages, and the number of packages is growing. Their features and mode of operation vary, but their basic principles of working do not differ much. In this section we use PageMaker, the original and still the most widely used desktop publishing software package, to illustrate the principles. PageMaker faithfully emulates the procedure adopted by conventional pasteup artists.

The first step is to specify the layout of your publication — its features such as margins and columns that will remain the same throughout the document — on PageMaker's electronic drawing board. Figure 2.3 shows the page layout surrounded by a large blank working area called the paste board. Also shown are PageMaker's menu bar, tool box, and master page icons. Clicking the cursor on a menu label pulls down a window displaying menu items. Similarly, clicking on an icon brings the corresponding function into play. PageMaker will store standard page layouts for you, but you can set them up in any way you want by using a combination of menu functions to call for columns and margins, and by using the keyboard to adjust spacing.

Figure 2.3: Page layout

PageMaker's drawing board displays grid lines of the page layout, together with menu bar, tool box, and master page icons.



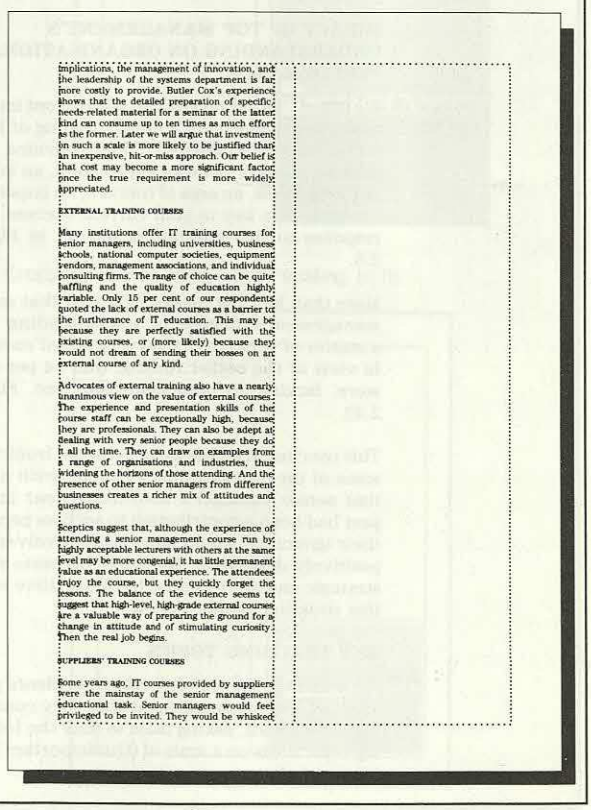
The tool box is the direct electronic equivalent of the conventional graphic designer's box of tools for selecting text and graphics, making lines and shapes and trimming ('cropping') graphics. The master page icons are for the left- and right-hand pages of a two-page spread.

Once you are satisfied with the page layout, you can begin to set text from the text file into the columns. You do this by flowing the text in, starting from where you point to in the column. Figure 2.4 shows the left column filled with flowed-in text that has started from the top of the column. Achieving this is straightforward: you use the pointer tool to select 'Place' from the file menu, click against the file name of the text you want, click 'Place', position the pointer in the column and click again.

PageMaker has justified the text shown in Figure 2.4 to both left and right column margins as it flowed in (the line length of the word-processed text was longer than the column width). Visual

Figure 2.4: Flowing-in column text

PageMaker has flowed text into the left column from top to bottom.



implications, the management of innovation, and the leadership of the systems department is far more costly to provide. Butler Cox's experience shows that the detailed preparation of specific needs-related material for a seminar of the latter kind can consume up to ten times as much effort as the former. Later we will argue that investment on such a scale is more likely to be justified than an inexpensive, hit-or-miss approach. Our belief is that cost may become a more significant factor once the true requirement is more widely appreciated.

EXTERNAL TRAINING COURSES

Many institutions offer IT training courses for senior managers, including universities, business schools, national computer societies, equipment vendors, management associations, and individual consulting firms. The range of choice can be quite baffling and the quality of education highly variable. Only 15 per cent of our respondents quoted the lack of external courses as a barrier to the furtherance of IT education. This may be because they are perfectly satisfied with the existing courses, or (more likely) because they would not dream of sending their bosses on an external course of any kind.

Advocates of external training also have a nearly unanimous view on the value of external courses. The experience and presentation skills of the course staff can be exceptionally high, because they are professionals. They can also be adept at dealing with very senior people because they do it all the time. They can draw on examples from a range of organisations and industries, thus widening the horizons of those attending. And the presence of other senior managers from different businesses creates a richer mix of attitudes and questions.

Sceptics suggest that, although the experience of attending a senior management course run by highly acceptable lecturers with others at the same level may be more congenial, it has little permanent value as an educational experience. The attendees enjoy the course, but they quickly forget the lessons. The balance of the evidence seems to suggest that high-level, high-grade external courses are a valuable way of preparing the ground for a change in attitude and of stimulating curiosity. Then the real job begins.

SUPPLIERS' TRAINING COURSES

Some years ago, IT courses provided by suppliers were the mainstay of the senior management educational task. Senior managers would feel privileged to be invited. They would be whisked

inspection, however, reveals some slack lines. To tidy these up, you can break and hyphenate words (some programs will do this automatically). Alternatively, you may be able to adjust the spacing between some pairs of letters by kerning them, as shown in Figure 2.5.

Flowing text into the next column is essentially a continuation of the same procedure. A problem that can arise is that of widows and orphans — ugly short lines left at the foot or the top of a column (see Figure 2.6). Eliminating them entails 'column fitting', again by manual intervention. It may be

Figure 2.5: Hyphenation and kerning

Excessive space between words and letters in a line of text look ugly. If spaces occur on successive lines they form 'rivers' that look uglier still. Interword spaces can be reduced by breaking and hyphenating words. Interletter spaces can be improved by kerning — reducing the gap that occurs when certain characters appear in pairs.

Many other, more expensive, systems are used for corporate electronic publishing. At the top end are sophisticated professional typesetting systems, costing $50,000 and upwards. Between them and desktop publishing there is a middle ground of systems for office and technical publishing, costing typically in the range $15,000 to $30,000 per workstation. Compared with desktop publishing systems, their workstations are more powerful and they run, more often than not, under the Unix operating system. Because many have their roots in engineering workstations for CAD, their emphasis is on graphics rather than text handling. They are more adept at networking, too.

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Inevitably, however, the distinction between technical publishing systems and desktop publishing is blurring. The former are gaining improved text

Figure 2.6: Column fitting

Widows and orphans can be eliminated in several ways through column fitting: by hyphenating, by adjusting space around a heading, and by taking up white space.

IMPACT OF TOP MANAGEMENT'S UNDERSTANDING ON ORGANISATIONAL PERFORMANCE

We asked: "What do you feel the current impact of senior management's understanding of IT to be on your organisation?", and provided five possible answers – a major impediment, an inhibition on success, an area of concern, an important strength, or a key to your current success. The response to this question is set out in Figure 2.5.

More than half the replies indicated that senior management's degree of understanding was a matter of concern or that it impeded success. In view of the earlier finding, that 84 per cent were lacking in understanding (see Figure 2.4).

This conclusion comes as no surprise. Ironically, some of the organisations we spoke with noted that senior manager's *noninvolvement* in the past had been a contribution to success because their ignorance would have made involvement positively dangerous. But as IT becomes more strategic and more central to competitive edge, this situation cannot persist.

KEY TEACHING TOPICS

We asked the survey respondents to identify the areas of senior management that they consider to be important, asking them to rank the following topic areas on a scale of 0 (unimportant) to 4 (important).

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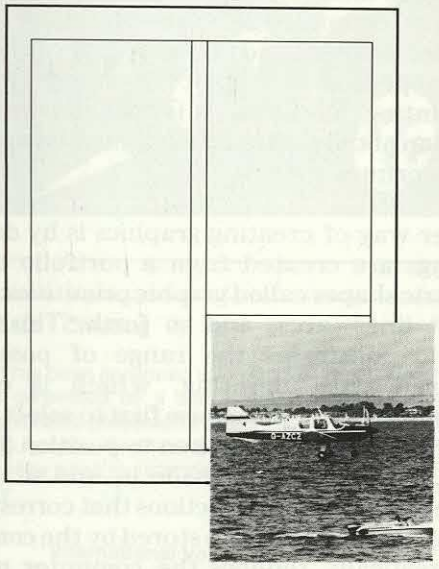
possible to make space by hyphenation and kerning. Alternatively, it may be necessary to adjust the vertical spacing between paragraphs, or even the spacing between lines of type (called leading) as shown in Figure 2.6, though this is not very satisfactory because it leads to an inconsistent appearance between adjacent columns.

You place a graphic in much the same way as text, choosing 'Place' from the file menu, clicking against the name of the graphic you want in the list of documents, clicking 'Place' from the file menu, positioning the pointer and clicking again. The graphic flows in at the size it was first created, overriding column and margin guides (see Figure 2.7). One way of fitting the graphic into the column is by scaling it down. This is accomplished by picking up the graphic at one of eight pre-positioned 'handles' on the border surrounding it (the handles are shown as small dots in Figure 2.7), then using the mouse to drag the graphic closer towards its anchor position on the opposite side (or opposite corner). Graphics can be expanded in the same way, by dragging handles away from rather than towards the anchor position. It may help to crop as well as scale, as shown in Figure 2.7. To do this you select the cropping tool from the tool box, position it over the graphic and then click.

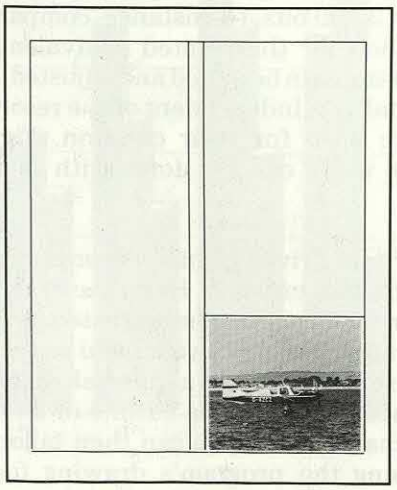
Figure 2.7: Scaling and cropping

The graphics can be fitted into the space by scaling, but a better approach is by both scaling and cropping:

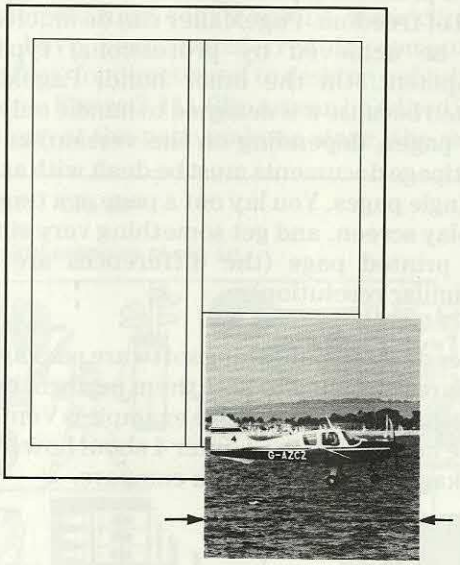
1. As originally created, the graphic is too large to fit the frame.



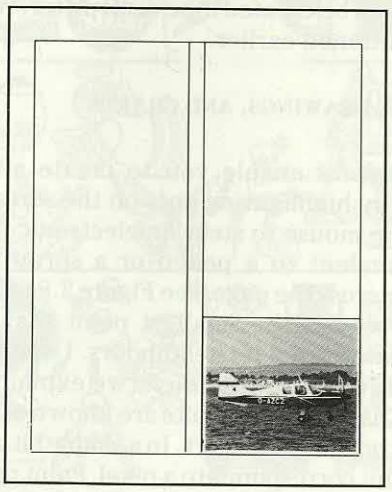
2. Fitting by scaling means an excessive size reduction.



3. An alternative is first to crop away unwanted detail.



4. Cropping can be followed by scaling to fit.



There are many other things that you can do with PageMaker. A graphic may be placed between columns, for instance, and the text edited around it (some programs feature 'text-repellent graphics' to do this automatically). You can select text that you want to correct or replace, or add in new text such as a headline. To do this, PageMaker offers you a range of typefaces and sizes. You can use other tools to create boxes, circles and ovals, and then fill them with patterns, solid white or solid black. Lines can be drawn in a range of thicknesses and weights, solid or broken. You can change the size in which the current page is displayed, making it either larger or smaller than normal. And PageMaker includes a range of other features to help design and lay out pages and manage the files that are used and created.

PageMaker allows you to move text about on a page with almost complete freedom of position, typeface and size. Graphics can be handled in a similar way. Word processing packages offer nothing like this kind of freedom. PageMaker can do much of what can be achieved by professional typesetting equipment. On the other hand, PageMaker is limited because it is designed to handle only one (or two pages, depending on the version) at a time. Multipage documents must be dealt with as a series of single pages. You lay out a page at a time on the display screen, and get something very similar on the printed page (the differences are due to dissimilar resolution).

Other desktop publishing software packages have features designed to help them perform better on multipage documents. One example is Ventura. We have more to say in Chapter 4 about how software packages such as Ventura compare.

CREATING GRAPHICS

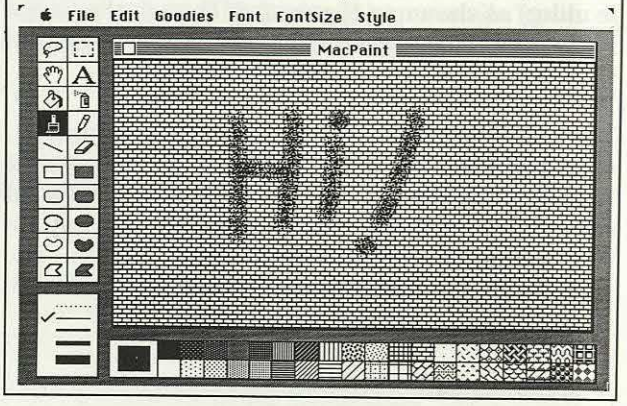
Graphics can be created in several different ways, as we mentioned earlier.

PAINTINGS, DRAWINGS, AND CHARTS

Paint programs enable you to create an image freehand by highlighting dots on the screen. You can use the mouse to steer an electronic painting tool, equivalent to a pencil or a spray can for instance, across the page (see Figure 2.8). Each dot on the screen is the smallest point that can be differentiated from its neighbours. Usually there are about 70 dots to the inch (we explain this in detail in Chapter 4). The dots are known as picture elements, or pixels for short. In a simple bit-mapped display, a bit corresponds to a pixel. Paint programs are very flexible in terms of what can be created.

Figure 2.8: Painting

The graphic shows a MacPaint screen, painted using the spray can tool against a textured background.



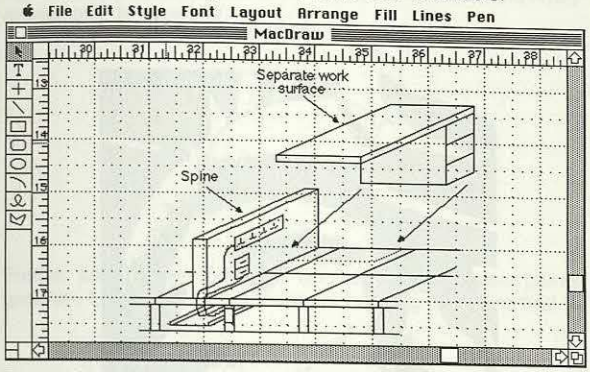
They usually provide you with tools to create geometric shapes such as rectangles and circles. But bit-mapped images, like the facsimile images that we mentioned on page 7, are profligate users of computer memory, and although they can be scaled and cropped, they cannot be edited except by overpainting. Moreover, it is hard to improve the resolution of the painted image between the screen and the printer.

Another way of creating graphics is by drawing. Drawings are created from a portfolio of basic geometric shapes called graphic primitives: points, straight lines, arcs, and so forth. This limited portfolio constrains the range of possibilities compared with painting, which is entirely freehand. You use the mouse first to select a shape from the menu list, and then to position it on the screen, adjust its size, shade it, and so on. The picture description instructions that correspond to the graphic primitives are stored by the computer. This drastically reduces the computer memory requirement, compared with painted images. A screen-sized drawing of 100 square inches takes up only about 3,000 bits, for instance, compared with half-a-million for the painted equivalent. Moreover, drawings can be edited and adjusted, and the printed quality is independent of the resolution of the device used for their creation. Figure 2.9 illustrates what can be done with a drawing program.

Charts, or data-driven graphics, represent another form of graphics creation. Here, the drawing program is driven from numbers created by another program rather than from your hand on the mouse. You can use the data from a spreadsheet program, for instance, to create the outline of a bar chart or a pie chart, which you can then tailor on the screen using the program's drawing tools (see Figure 2.10).

Figure 2.9 Drawing

This graphic has been created with MacDraw using the pen drawing instrument together with line and box tools.



Cricket Draw is a more sophisticated drawing program, offering features such as rotation, shadowing and curve smoothing. Because Cricket Draw generates PostScript PDL commands, the print quality depends only on printer resolution.

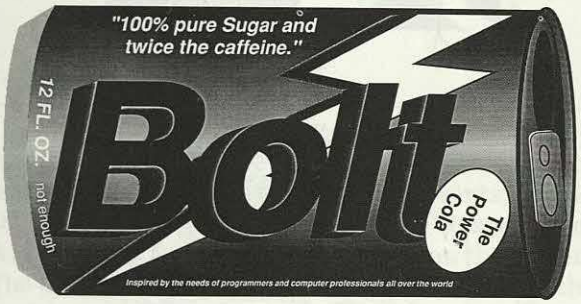
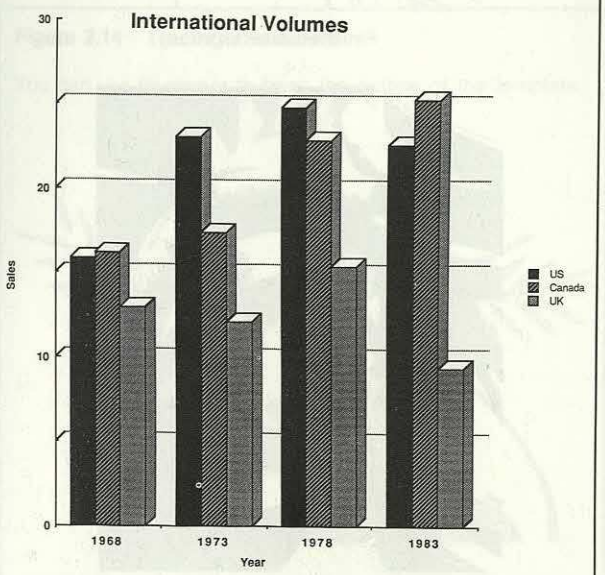


Figure 2.10: Charting

The chart has been generated using Cricket Graph working from numbers generated by a spreadsheet programme. Cricket Graph can create presentations in a variety of forms including pie charts, graphs, and histograms with a 3D effect. Editing facilities allow scaling, repositioning, overlaying, shading, and text entry.



ARTISTIC GRAPHICS

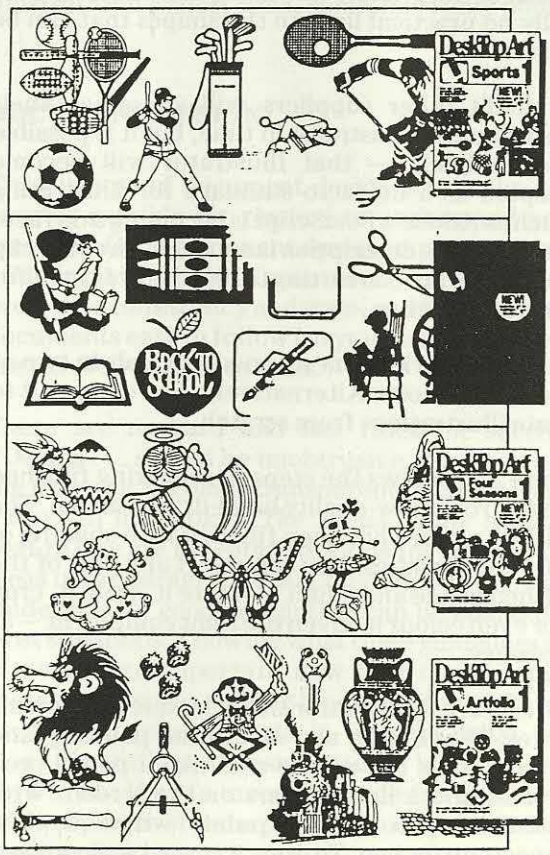
Artistic graphics are distinguished by their use of complex curves and shapes to produce accurate renderings of objects. Painting is limited in several ways, as we have seen: by the resolution of the screen, high storage requirements, and lack of editing facilities. What is more, the mouse is hardly an ideal painting tool. Steering it accurately is almost impossible, even for the steadiest hand. Drawing is limited too, by the restricted portfolio of geometric shapes.

Clip art (sometimes called canned images) is one way of filling the gap. It is art that is prepared in library form that subscribers can reproduce and transfer into their own publications. Sheets of hard copy clip art are used extensively where symbols and pictures are constantly reused, as in architects' offices for building components, engineering drawing offices for springs and fasteners, and in town planning for such things as trees and vehicles.

To complement hard copy versions, some clip art libraries have been transferred to computer-readable files, for direct input to desktop publishing systems (see Figure 2.11). Clip art can be edited into publications at the page makeup stage, the same

Figure 2.11 Clip art

Some typical examples of clip art.



way as painted graphics can. But for industry sectors that are not well served by clip art libraries, finding a suitable picture is seldom easy.

An alternative to pre-prepared clip art is the scanned image. Scanners work like fax machines, converting the light and dark areas of an original into a bit stream that can be displayed, stored, and printed like a painted graphic. Image scanners work at much the same resolution as desktop laser printers, about 300 dots per inch, which is a good deal better than screen-painted graphics. They can cope with originals in the form of line art or photographs. But scanned images share the disadvantages of painted graphics and clip art: they cannot be edited and their resolution is limited.

Fortunately, there is an alternative. Illustrator is the name of the first of a new breed of software packages for creating artistic graphics.

ADOBE ILLUSTRATOR

Illustrator is a product of Adobe Systems Inc, the company behind PostScript, one of several page description languages of the sort that we mentioned in Chapter 1 and describe in more detail in Chapter 4. Announced in early 1987, Illustrator is a tool for creating artistic graphics and illustrations of much finer detail than are possible with a paint program. Like drawings, the illustrations are coded from graphic primitives so that they can be computer-edited, and reproduced to a resolution limited only by that of the printer. But unlike drawings, there is really no practical limit to the shapes that can be created.

No doubt other suppliers will announce their equivalents to Illustrator in time, but it is possible — even likely — that Illustrator will become accepted as a de facto standard for illustrating (much as Adobe's PostScript is becoming a de facto standard page description language). Already, clip art libraries are converting to Illustrator format for electronic storage.

Illustrator works from scanned originals in two or three dimensions. Alternatively, you can use it to create illustrations from scratch.

Figure 2.12 shows the steps in preparing finished line art from a low-quality hand-drawn sketch. The finished picture has been filled in with shading of different densities. You can select any part of the finished image and edit it — rotate it, scale it, crop it, or even colour it, given the right equipment — as necessary.

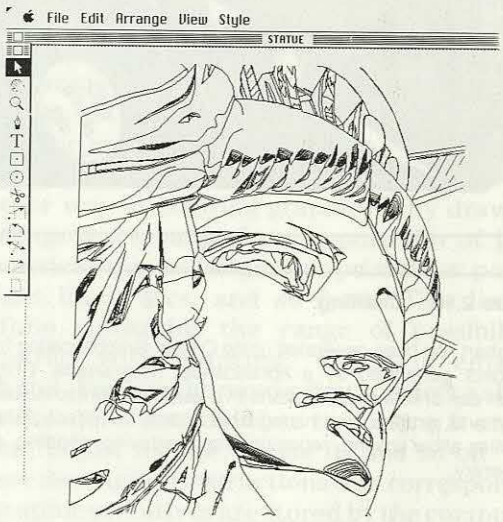
At the heart of Illustrator is a technique for drawing curves. When you use electronic painting and drawing tools the mouse acts like a pencil: you move it, and a line appears on the screen. With Illustrator, you specify points which it then connects up for you. To draw a curved segment you

Figure 2.12 Creating finished artwork with Illustrator

The sequence shows the three main steps from original sketch to finished artwork.

Scanned image template

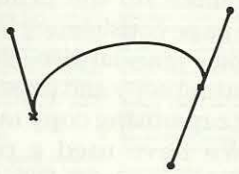
Tracing



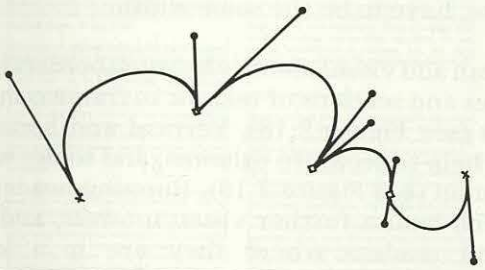
Finished artwork

Figure 2.13: Illustrator curve segment

Creating a curve segment requires two anchor points (A_1 and A_2) and two direction points (D_1 and D_2). Lines A_1D_1 and A_2D_2 appear only temporarily.



Further lines drawn between anchor and direction points generate further curve segments continuing from the first.



specify four points (see Figure 2.13) — two anchor points, A1 and A2, and two direction points, D1 and D2, to define the curve's shape. The straight lines A1 D1 and A2 D2 appear temporarily on the screen. The curved segment that is created between the anchor points is always tangential to the straight lines at the two anchor points. A straight line is created in a similar way: it is simply a special case of a curve, in which you make the anchor points and direction points at each end coincide.

To create the outline of a finished picture from a scanned original 'template', you trace round the template by fitting a series of curved segments to the template outline (see Figure 2.14). The key to success lies in finding the best place to position the anchor points in the outline. Tracing inaccuracies can be corrected at any time, simply by picking up and repositioning the anchor and direction points. Alternatively, you can use one of Illustrator's tools to fasten onto curves and drag them into new positions by using the mouse.

Figure 2.14 Tracing a template

You can use Illustrator to trace the outline of the template.

Illustrator's toolkit lets you manipulate all or part of an illustration in a number of ways — for instance by mirroring it, duplicating it, moving it, expanding it, or contracting it. There is a range of line weights and thicknesses for outlining, and a range of shades and textures for filling in areas at densities specifiable between 0 and 100 per cent. Text editing is also available in a range of typefaces and sizes, and characters or whole words can be treated as illustrations and manipulated in the same way. Figure 2.15 overleaf shows examples of what can be done with Illustrator, starting from scanned originals.

Illustrator can also be used to create artistic graphics from scratch. The process is not quite like free-hand drawing, of course, because of the special technique required to create curved segments. The technique seems to be readily acquired, however. Tests have shown that most people can gain the necessary skills for using Illustrator in a short time, sometimes only hours.

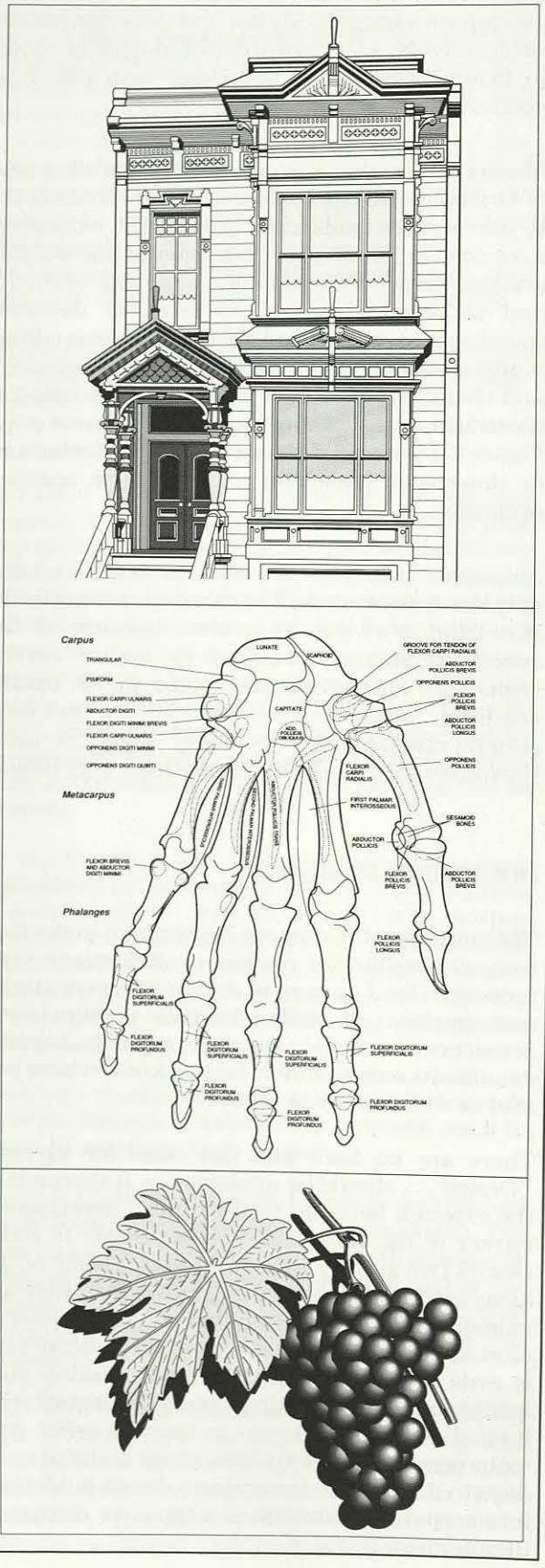
DOCUMENT DESIGN

The purpose of document design is to make it as easy as possible for readers to understand your message. Good document design improves clarity and impact. It differentiates publications, preserves consistency and style, and helps to make documents easy to follow (so you know where you are) as well as easy to read.

There are no hard and fast rules for success. "Design . . . should be unobtrusive. It succeeds to the extent it becomes transparent," says Roger C Parker in his booklet *The Aldus Guide to Basic Design* (we are indebted to Aldus for some of the ideas in the paragraphs that follow). But there are guidelines for good design that can be adapted to most situations. Knowing what these guidelines are is even more important now that desktop publishing software is making it possible for staff with limited experience to do in minutes what previous generations of designers took hours or even days to do. How to incorporate design guidelines into corporate standards is a topic we discuss in Chapter 5.

Figure 2.15: Illustrator artwork

The figure shows artistic graphics that are typical of the quality that can be produced using Illustrator.



DOCUMENT FORMAT

Start by creating a page grid. A grid consists of a series of nonprinting horizontal and vertical lines defining the placement of text and graphic elements that make up the printed page. Grids ensure page-to-page consistency (see Figure 2.16). Within the grid, standardise the margins for headlines, indenting copy and page numbering, and use the grid for organising copy into columns (see Figure 2.17). We have used a convenient two-column format to produce the report you are reading. Three-column formats are popular, and provide surprising flexibility. Columns do not, of course, have to be the same width.

You can add visual identity by using borders to box figures and sections of text, or to frame complete pages (see Figure 2.18). Vertical and horizontal rules help to separate columns, and topics within a column (see Figure 2.19). Running headers (or footers) lend a further visual interest, and help remind readers where they are in a longer document (see Figure 2.20).

Figure 2.16: Creating a page grid

You start by creating a page grid positioning margins and columns.

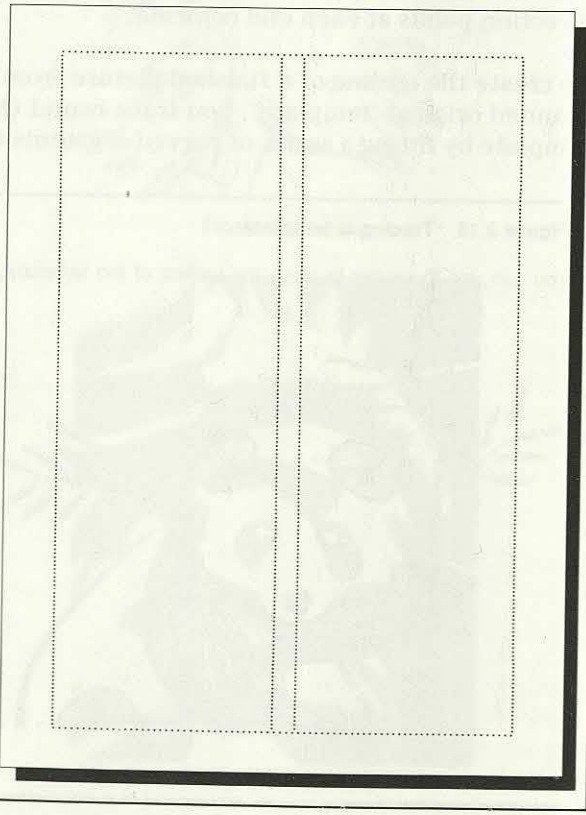
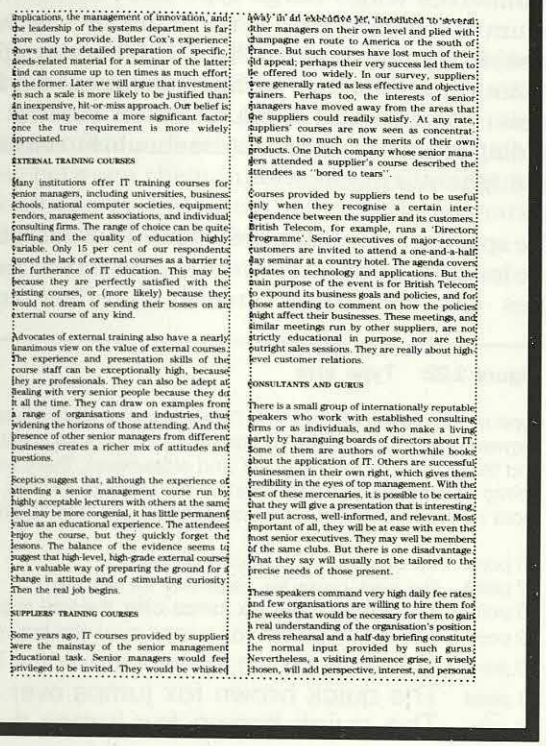


Figure 2.17: Standardised margins

Headings and text are accommodated within the grid.



implications, the management of innovation, and the leadership of the systems department is far more costly to provide. Butler Cox's experience shows that the detailed preparation of specific needs-related material for a seminar of the latter kind can consume up to ten times as much effort as the former. Later we will argue that investment on such a scale is more likely to be justified than an inexpensive, hit-or-miss approach. Our belief is that cost may become a more significant factor once the true requirement is more widely appreciated.

EXTERNAL TRAINING COURSES

Many institutions offer IT training courses for senior managers, including universities, business schools, national computer societies, equipment vendors, management associations, and individual consulting firms. The range of choice can be quite baffling and the quality of education highly variable. Only 15 per cent of our respondents quoted the lack of external courses as a barrier to the furtherance of IT education. This may be because they are perfectly satisfied with the existing courses, or (more likely) because they would not dream of sending their bosses on an external course of any kind.

Advocates of external training also have a nearly unanimous view on the value of external courses. The experience and presentation skills of the course staff can be exceptionally high, because they are professionals. They can also be adept at dealing with very senior people because they do it all the time. They can draw on examples from a range of organisations and industries, thus widening the horizons of those attending. And the presence of other senior managers from different businesses creates a richer mix of attitudes and questions.

Sceptics suggest that, although the experience of attending a senior management course run by highly acceptable lecturers with others at the same level may be more congenial, it has little permanent value as an educational experience. The attendees enjoy the course, but they quickly forget the lessons. The balance of the evidence seems to suggest that high-level, high-grade external courses are a valuable way of preparing the ground for a change in attitude and of stimulating curiosity. Then the real job begins.

SUPPLIERS' TRAINING COURSES

Some years ago, IT courses provided by suppliers were the mainstay of the senior management educational task. Senior managers would feel privileged to be invited. They would be whisked away in an executive jet, introduced to several other managers on their own level and plied with champagne en route to America or the south of France. But such courses have lost much of their old appeal; perhaps their very success led them to be offered too widely. In our survey, suppliers were generally rated as less effective and objective trainers. Perhaps too, the interests of senior managers have moved away from the areas that the suppliers could readily satisfy. At any rate, suppliers' courses are now seen as concentrating much too much on the merits of their own products. One Dutch company whose senior managers attended a supplier's course described the attendees as "bored to tears".

Courses provided by suppliers tend to be useful only when they recognise a certain interdependence between the supplier and its customers. British Telecom, for example, runs a 'Directors' Programme'. Senior executives of major-account customers are invited to attend a one-and-a-half day seminar at a country hotel. The agenda covers updates on technology and applications. But the main purpose of the event is for British Telecom to expound its business goals and policies, and for those attending to comment on how the policies might affect their businesses. These meetings, and similar meetings run by other suppliers, are not strictly educational in purpose, nor are they outright sales sessions. They are really about high-level customer relations.

CONSULTANTS AND GURUS

There is a small group of internationally reputable speakers who work with established consulting firms or as individuals, and who make a living partly by haranguing boards of directors about IT. Some of them are authors of worthwhile books about the application of IT. Others are successful businessmen in their own right, which gives them credibility in the eyes of top management. With the best of these mercenaries, it is possible to be certain that they will give a presentation that is interesting, well put across, well-informed, and relevant. Most important of all, they will be at ease with even the most senior executives. They may well be members of the same clubs. But there is one disadvantage. What they say will usually not be tailored to the precise needs of those present.

These speakers command very high daily fee rates, and few organisations are willing to hire them for the weeks that would be necessary for them to gain a real understanding of the organisation's position. A dress rehearsal and a half-day briefing constitute the normal input provided by such gurus. Nevertheless, a visiting éminence grise, if wisely chosen, will add perspective, interest, and personal

Figure 2.18: Borders for visual identity

A box border can be used to pick out an area of text.

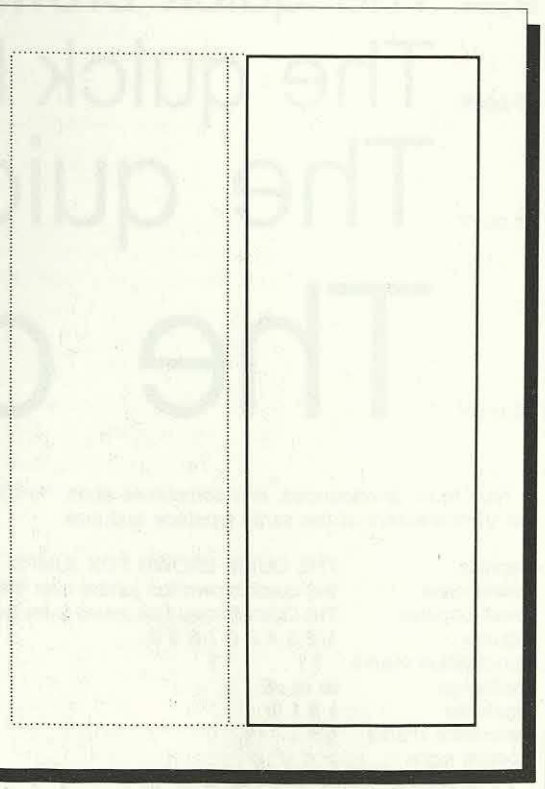


Figure 2.19: Rules

Rules can be both horizontal and vertical, and of varying weight.

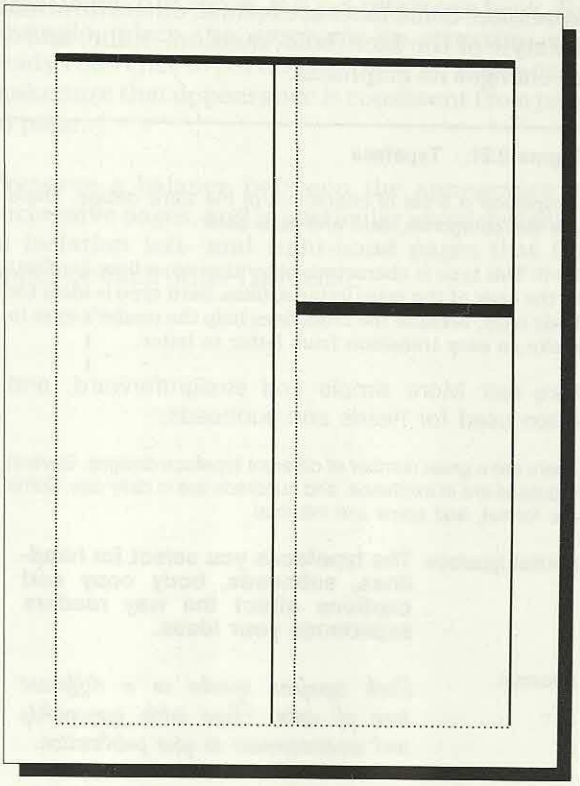
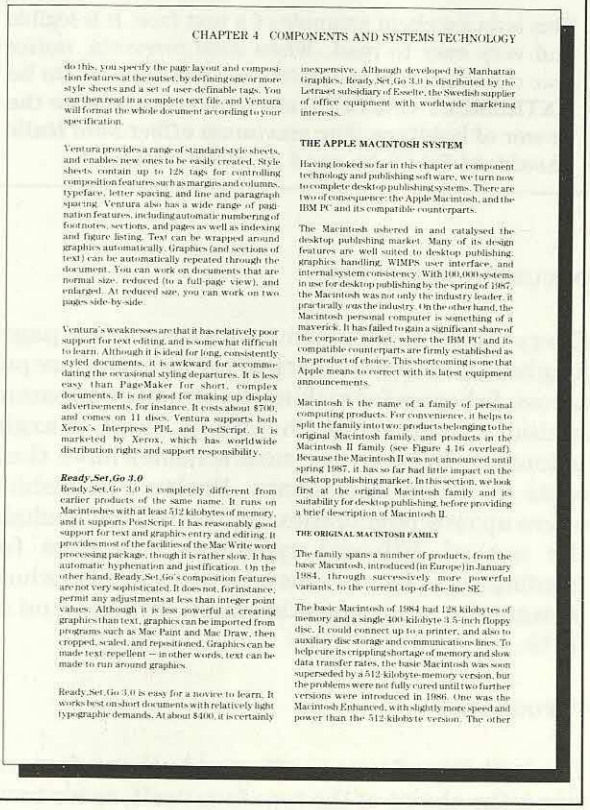


Figure 2.20: Running headers

The illustration shows the use of running headers to keep readers informed of their position.



CHAPTER 4 COMPONENTS AND SYSTEMS TECHNOLOGY

do this, you specify the page layout and composition features at the outset, by defining one or more style sheets and a set of user-definable tags. You can then read in a complete text file, and Ventura will format the whole document according to your specification.

Ventura provides a range of standard style sheets, and enables new ones to be easily created. Style sheets contain up to 128 tags for controlling composition features such as margins and columns, typeface, letter spacing, and line and paragraph spacing. Ventura also has a wide range of pagination features, including automatic numbering of footnotes, sections, and pages as well as indexing and figure listing. Text can be wrapped around graphics automatically. Graphics (and sections of text) can be automatically repeated through the document. You can work on documents that are normal size, reduced (to a full-page view), and enlarged. At reduced size, you can work on two pages side-by-side.

Ventura's weaknesses are that it has relatively poor support for text editing, and is somewhat difficult to learn. Although it is ideal for long, consistently styled documents, it is awkward for accommodating the occasional styling departures. It is less easy than PageMaker for short, complex documents. It is not good for making up display advertisements, for instance. It costs about $700, and comes on 11 discs. Ventura supports both Xerox's Interpress PDL and PostScript. It is marketed by Xerox, which has worldwide distribution rights and support responsibility.

Ready,Set,Go 3.0

Ready,Set,Go 3.0 is completely different from earlier products of the same name. It runs on Macintoshes with at least 512 kilobytes of memory, and it supports PostScript. It has reasonably good support for text and graphics entry and editing. It provides most of the facilities of the Mac Write word processing package, though it is rather slow. It has automatic hyphenation and justification. On the other hand, Ready,Set,Go's composition features are not very sophisticated. It does not, for instance, permit any adjustments at less than integer point values. Although it is less powerful at creating graphics than text, graphics can be imported from programs such as Mac Paint and Mac Draw, then cropped, scaled, and repositioned. Graphics can be made text-repellent – in other words, text can be made to run around graphics.

Ready,Set,Go 3.0 is easy for a novice to learn. It works best on short documents with relatively light typographic demands. At about $400, it is certainly inexpensive. Although developed by Manhattan Graphics, Ready,Set,Go 3.0 is distributed by the Letraset subsidiary of Esselte, the Swedish supplier of office equipment with worldwide marketing interests.

THE APPLE MACINTOSH SYSTEM

Having looked so far in this chapter at component technology and publishing software, we turn now to complete desktop publishing systems. There are two of consequence: the Apple Macintosh, and the IBM PC and its compatible counterparts.

The Macintosh ushered in and catalysed the desktop publishing market. Many of its design features are well suited to desktop publishing: graphics handling, WIMPS user interface, and internal system consistency. With 100,000 systems in use for desktop publishing by the spring of 1987, the Macintosh was not only the industry leader, it practically was the industry. On the other hand, the Macintosh personal computer is something of a maverick. It has failed to gain a significant share of the corporate market, where the IBM PC and its compatible counterparts are firmly established as the product of choice. This shortcoming is one that Apple means to correct with its latest equipment announcements.

Macintosh is the name of a family of personal computing products. For convenience, it helps to split the family into two: products belonging to the original Macintosh family, and products in the Macintosh II family (see Figure 4.16 overleaf). Because the Macintosh II was not announced until spring 1987, it has so far had little impact on the desktop publishing market. In this section, we look first at the original Macintosh family and its suitability for desktop publishing, before providing a brief description of Macintosh II.

THE ORIGINAL MACINTOSH FAMILY

The family spans a number of products, from the basic Macintosh, introduced (in Europe) in January 1984, through successively more powerful variants, to the current top-of-the-line SE.

The basic Macintosh of 1984 had 128 kilobytes of memory and a single 400-kilobyte 3.5-inch floppy disc. It could connect up to a printer, and also to auxiliary disc storage and communications lines. To help cure its crippling shortage of memory and slow data transfer rates, the basic Macintosh was soon superseded by a 512-kilobyte-memory version, but the problems were not fully cured until two further versions were introduced in 1986. One was the Macintosh Enhanced, with slightly more speed and power than the 512-kilobyte version. The other

The choice of typeface can make a significant difference to a publication (see Figure 2.21). Each typeface design adds its own personality and expression. Some faces are formal, others informal. The style of the face (bold, medium, italic, and so on) changes its emphasis.

Figure 2.21: Typeface

A typeface is a set of characters of the same design. There are two categories, serif and sans serif:

Serif: This type is characterised by tiny cross-lines (or feet) at the ends of the main letter strokes. Serif type is ideal for body copy, because the cross-lines help the reader's eyes to make an easy transition from letter to letter.

Sans serif: More simple and straightforward, and often used for heads and subheads.

There are a great number of different typeface designs. Several thousand are in existence, and hundreds are in daily use. Some are formal, and some are informal.

Formal typeface: **The typefaces you select for headlines, subheads, body copy and captions affect the way readers experience your ideas.**

Informal: *Each typeface speaks in a different tone of voice. Type adds personality and expressiveness to your publication.*

Typefaces are grouped in families, each member of a family being derived from one basic design, but varying in weight, width, or other special treatment. Each speaks in a different tone. Italic type adds emphasis, boldface is authoritative, bold italic gives a sense of action:

This is an excellent example of a text face. It is legible and very easy to read. *When used correctly, notice how distinguished the italic face can appear.* **Do be EXTREMELY CAREFUL not to over-emphasise the power of boldface.** ***For maximum effect bold italic should ALWAYS be used in moderation.***

DOCUMENT STRUCTURE

Every business document more than a few pages long has a structure to marshal the ideas that are put across. Schemes for making the structure apparent include numbering, headings, and margin indention. In business, most schemes have their roots in typed documents. Desktop publishing opens up new possibilities, however. They include the use of different typefaces and sizes for headings, bold face or sans serif to emphasise whole paragraphs, white space between sections, and so forth.

TYPOGRAPHY

The legibility of type is affected by many factors. One is the choice of the typeface itself, as we have mentioned. A second is type size — which we illustrate in Figure 2.22 — and its relationship to line length (column width). Twelve-point body text is easiest to read when set in columns 80 to 120 millimetres wide. Large type sizes match wider columns. Leading (the vertical distance between lines) is another factor. Slightly tightening up the leading, particularly within headlines, can help preserve space and make for easier reading. The leading of each element of text should be consistent throughout a publication.

The spacing between words should not exceed the line leading. Long inter-word spaces on successive lines can sometimes create an effect called

Figure 2.22: Type size

Type size is measured in points. (There is a very slight difference between point sizes used in continental European countries, and those used in the USA, UK and elsewhere). There are 12 points to a pica and approximately six picas to an inch. The most common sizes for text composition are 6 to 12 points:

6 point The quick brown fox jumps over the lazy dog.
7 point The quick brown fox jumps over the lazy dog.
8 point The quick brown fox jumps over the lazy dog.
9 point The quick brown fox jumps over the lazy dog.
10 point The quick brown fox jumps over the lazy
11 point The quick brown fox jumps over the
12 point The quick brown fox jumps over

Type sizes beyond 12 point are known as display sizes. Sizes up to 72 point are common:

24 point The quick brown
36 point The quick b
48 point The quic
72 point The q

A type fount (pronounced, and sometimes spelt, 'font') is a set of characters of the same typeface and size:

Capitals	THE QUICK BROWN FOX JUMPS
Lower case	the quick brown fox jumps over the
Small capitals	THE QUICK BROWN FOX JUMPS OVER THE
Figures	1 2 3 4 5 6 7 8 9 0
Punctuation marks	. ? ! , : ;
Dipthongs	æ œ Æ
Ligatures	fi ffi fl ffl
Reference marks	§ † ‡ * ¶
Special signs	> < √ ψ
(Pi characters)	✂ ☎ ✉ ✈

rivering or guttering. The interword spaces can be reduced by hyphenating and kerning (respectively breaking words at the end of lines and closing up intercharacter spaces, as shown already in Figure 2.5).

Justification is yet another typographic factor. Columns can be aligned on the left margin only, with the right margin ragged. Alternatively, they can be justified on both margins. There is little to choose between them in terms of readability and space efficiency, but a justified right-hand margin usually looks more professional.

DOCUMENT STYLE

Finally, design the document for the purpose it is going to have to serve. If it is a reference book, for example, place the emphasis on structure and ready reference to portions of the text. In any case, make sure that appearance is consistent from page to page.

Preserve a balance between the appearance of successive pages, and in particular avoid designing in isolation left- and right-hand pages that fall opposite each other (spreads).

Chapter 3

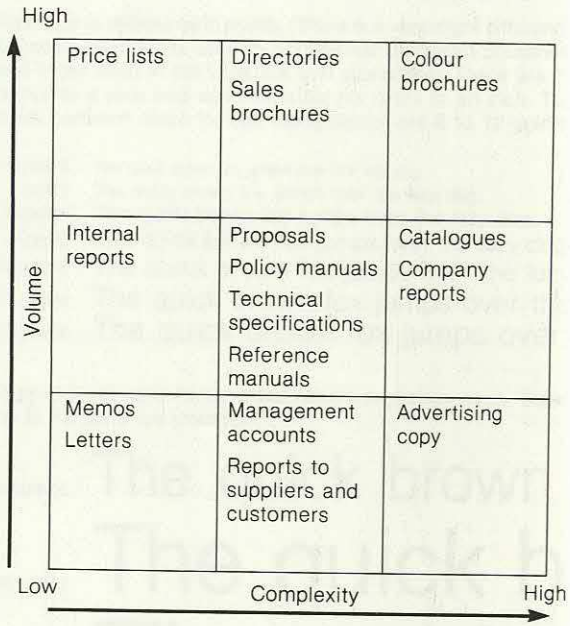
APPLICATIONS AND BENEFITS

For most managers concerned with desktop publishing, the key questions are those of benefits and justification: what can be delivered that is beneficial to the organisation, and at what cost? The value of desktop publishing depends, rather obviously, on the applications for which it is used. So in this chapter we begin with an examination of suitable applications. We go on to analyse the benefits that can be obtained, then the additional costs of implementation, and finally the business case.

In summary we show how, although desktop publishing can be used as a tool for tackling a wide range of document types in a business, it is unlikely to be well suited to them all. But for those applications that it does suit, the benefits can be considerable — as is borne out by our survey results. The costs of implementing it need not be great, provided that complications are avoided. Making a business case is straightforward, and the result is usually compelling. The payback, both sought and claimed in practice, is attractive. And because of the size of the publications activity in many organisations, this return can translate into a significant bottom-line impact.

Figure 3.1: Diversity of corporate document types

Documents in an organisation vary widely in terms of volume (length, number of copies) and complexity (tables, charts, illustrations, etc), as illustrated below.



APPLICATIONS OF DESKTOP PUBLISHING

Printed documents are much the most important application area of desktop publishing. A second general application area, however, is visual aids for presentations. In this section we discuss these two in turn before looking at the applications selected by our survey respondents as the most significant.

DOCUMENTS

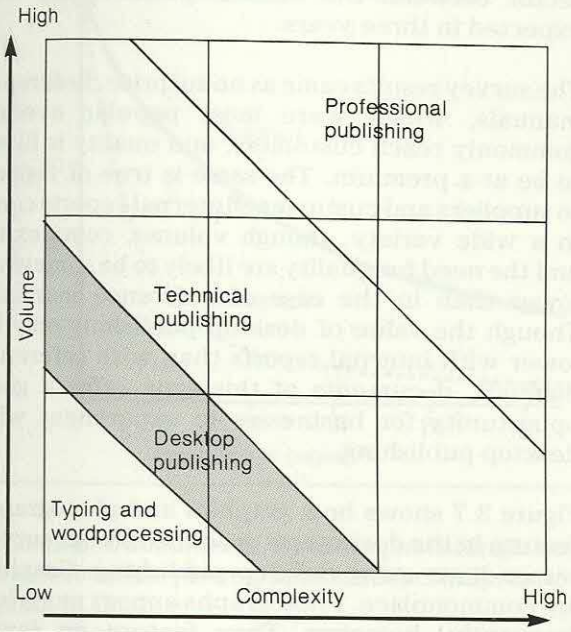
Corporate documents vary greatly in terms of length, number of copies needed, graphic requirements, life cycle, and so on. This diversity is illustrated in Figure 3.1. It positions a number of different types of corporate document on a grid using two parameters: volume (combining both number of copies and document length) and complexity (amount of tables and graphics and so forth).

By no means are all of these document types likely to be suitable applications for desktop publishing. Desktop publishing is only one form of corporate electronic publishing, as we explained in Chapter 1. It lies on a spectrum that extends from word processing to professional publishing. As a rule of thumb, the applications best suited to desktop publishing are those of medium volume and complexity. This is illustrated by the shaded band in Figure 3.2, which contrasts with three other bands that are better suited to alternative publishing methods. In many organisations, however, the proportion of documents falling into the shaded area is high (see Figure 3.3).

A rather more refined way of identifying documents suitable for desktop publishing is shown in the analysis chart in Figure 3.4. Rather than considering merely the two broad parameters of

Figure 3.2: Document types suited to desktop publishing

The matrix is the same as that of Figure 3.1, but this time the most appropriate means of production is shown. Documents best suited to desktop publishing are those of medium volume and complexity.



volume and complexity, this analysis chart takes account of a wider range of criteria by which documents can be assessed. Using the chart, documents can be scored to reflect their suitability for desktop publishing.

Figure 3.3: Proportion of document types

The proportion of documents suited to desktop publishing is a significant one (the curves are for manufacturing industry).

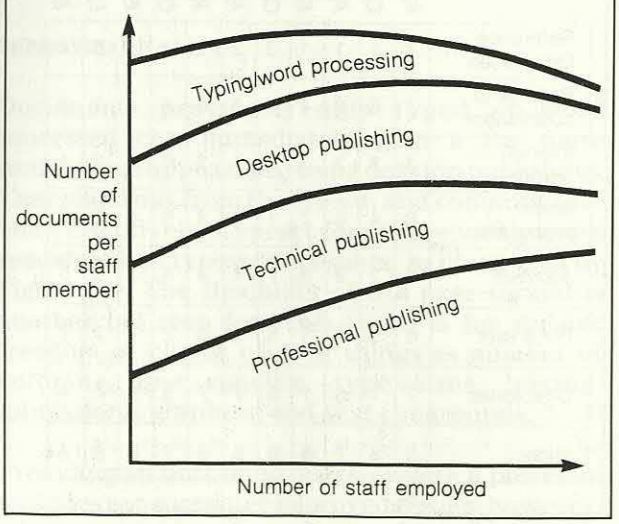


Figure 3.4: Document analysis chart

To assess their suitability for desktop publishing, documents can be scored according to criteria as shown below. Candidates for desktop publishing score a total in the range of 10 to 20 points.

Criteria	Value					Score
	5	4	3	2	1	
Length	Long				Short	
Copies	Many				Few	
Typographic quality	High				Low	
Tables	Many				Few	
Graphic complexity	High				Low	
Urgency	Fast				Slow	
					TOTAL	

VISUAL AIDS

Visual aids for corporate presentations represent a second very significant application area for desktop publishing. Although dwarfed by the market for hard-copy documentation, corporate slides and overhead transparencies represent a market worth $6 billion a year in the United States alone, according to a study by 3M Corporation, and the market is growing at almost 10 per cent a year. The study puts the number of business people in the United States who are frequent presenters — that is, requiring 100 or more 35 mm and overhead transparency slides a year — at more than 10 million. At present, the artwork for visual aids is produced almost entirely by traditional methods not unlike those employed in conventional publishing. Text and graphics are pasted onto a board that is used as the original from which the visual is made, either by a photochemical or heat-transfer process.

The personal computer is the key engine of change in this process. A desktop slide maker consists of a slide-making adaptor which plugs into a personal computer. With this adaptor, multicolour screen images can be transferred onto photographic film in a variety of formats. An example of a high-performance adaptor is the Imagemaker from Presentation Technologies of Sunnyvale, California, announced in 1986. Versions to work with IBM PCs and compatibles and Apple Macintoshes are priced at around $5,000. The Imagemaker can produce slides for as little as a dollar each, inclusive of film and developing costs. This is a huge saving over traditional methods, which typically amount to $30 to $50 a slide.

A further recent development has been the introduction of software aimed at simplifying the task of designing visual aids. PowerPoint, from Forethought Inc of Sunnyvale, California, is such

a case. Designed to produce overhead transparencies from a Macintosh, PowerPoint's features include word processing for multilevel bar charts and drawing tools for diagrams and illustrations. PowerPoint treats the overhead presentation as a whole, rather than a series of discrete files that have to be assembled and edited separately. The slide sequence can be re-sorted, for instance, simply by changing the numbering of the transparencies. Presenters can print sheets of paper, each sheet containing a miniature of the transparency together with an accompanying set of notes, for distribution to the audience. Apple's chairman, John Sculley, has welcomed PowerPoint as a catalysing product: "Just as Aldus PageMaker helped to create the desktop publishing business, so PowerPoint could launch the desktop slide-making market".

APPLICATIONS IN PRACTICE

Despite the market potential, visual aids are still a secondary application area for most desktop publishing users, whose prime interest is firmly in hard-copy documents. To find out which types of document are being selected in practice for desktop publishing, we asked respondents in our survey to rank applications in order of importance to their organisations, both now and in three years time.

The results are shown in Figure 3.5. Reference manuals came out on top overall, followed by correspondence with customers and suppliers, internal reports, and proposals. There was some variation by industry sector, as shown in Figure 3.6, but no significant variation either overall or by sector between the current position and that expected in three years.

The survey results came as no surprise. Reference manuals, which were most popular overall, commonly reach customers, and quality is likely to be at a premium. The same is true of reports to suppliers and customers. Internal reports come in a wide variety, though volume, complexity, and the need for quality are likely to be somewhat lower than in the case of reference manuals. Though the value of desktop publishing may be lower with internal reports than with reference manuals, documents of this type offer a good opportunity for businesses to experiment with desktop publishing.

Figure 3.7 shows how graphics and photographs feature in the documents produced by our survey respondents using desktop publishing. Graphics are commonplace. Photographs appear much less frequently, however. They feature on fewer than five per cent of pages in the majority of

Figure 3.5: Top-rated applications: overall

The chart shows how our survey respondents rated applications in terms of importance.

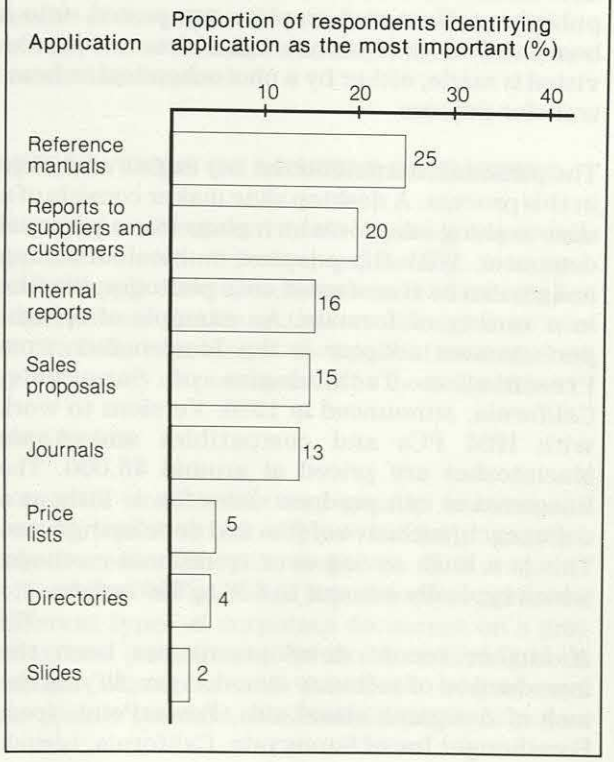


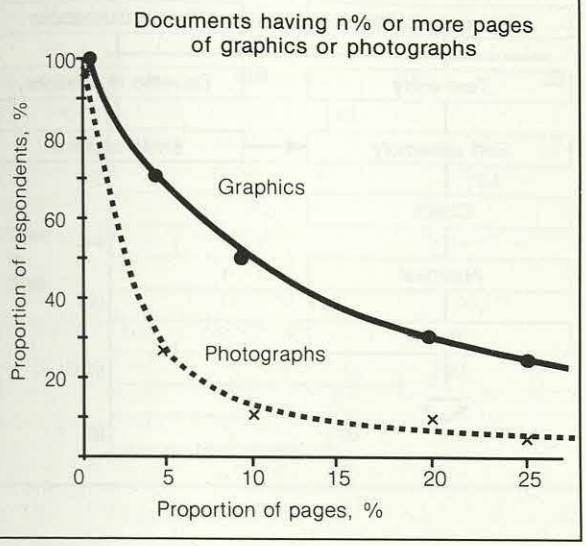
Figure 3.6: Top-rated applications: by sector

The table shows how our survey respondents rated applications in terms of importance by sector. The numbers show the rank ordering.

	Financial	Chemical/pharmaceutical	Paper/print	Engineering	Construction	Food/drink/tobacco	Wholesale/retail	Other manufacturing	Energy	Local government	Education
Reference Directories	4	1	1	1	3	2	1	1	1	5	2
Reports to custs/supps	1	6	8	4	4	3	6	4	4	1	3
Internal reports	3	3	3	3	2	1	2	5	2	2	1
Sales proposals	8	4	6	2	1	8	3	6	6	6	6
Journals	2	2	2	8	7	4	4	8	3	3	5
Price lists	6	5	4	5	5	5	5	2	7	7	7
Directories	7	7	5	7	8	7	7	3	5	4	4
Slides	5	8	7	6	6	6	8	7	8	8	8

Figure 3.7: Use of graphics and photographs

Graphics and photographs were features of the documents prepared by our survey respondents using desktop publishing. Graphics were far more common than photographs.



respondents' documents. Desktop publishing is not yet able to tackle photographs satisfactorily, as we explain in Chapter 4.

BENEFITS OF DESKTOP PUBLISHING

What managers want from desktop publishing are business benefits. Included amongst the many benefits that have been claimed by one user or another are improved appearance, better readability, increased staff productivity, reduced manual redrafting, faster turnaround, and in-house control. There is a considerable overlap on this list of advantages, and in any case the list is incomplete. In fact, benefits really boil down to three, as shown in Figure 3.8: improved document quality, faster turnaround, and reduced cost. (A fourth, revenue generation, is a special case.)

IMPROVED QUALITY

Documents previously only typed or word processed can immediately gain a far more professional appearance using desktop publishing. They stand out from the crowd, and communicate more effectively. Typeset founts are vastly more readable than typewriter founts, as illustrated by Figure 3.9. The flexibility of the page format is another big step forward: there is far greater freedom of choice of such things as number of columns, line spacing, type sizes, boxing, tabulations, graphics, and text runarounds.

Providing an untrained operator with a powerful tool does not guarantee improved results, however,

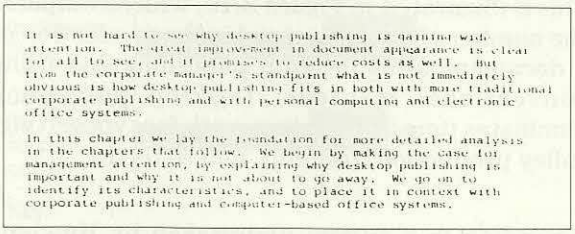
Figure 3.8: Three main benefits of desktop publishing

The many benefits of desktop publishing can be classified under three headings.

Benefit	Improved quality	Faster turnaround	Reduced cost
Faster reading	✓		
Longer and more accurate retention in the mind	✓		
Better visual quality	✓		
Improved readability, legibility	✓		
Easier maintainability		✓	✓
Increased staff productivity		✓	✓
Reduced waiting time		✓	
Faster turnaround		✓	
Improved quality of editing	✓		
Reduced manual drafting		✓	
Better in-house control		✓	
More frequent publications		✓	✓
Lower subcontract costs			✓
Decreased cost per page			✓
Increased throughput capacity	✓	✓	✓
Wider scope of design	✓		✓
More paperless environment	✓		✓
Enhanced format flexibility	✓		✓
Fewer errors			✓
Tighter security			✓
Reduced paper consumption			✓

Figure 3.9: Improved document quality with desktop publishing

Text from a word processor lacks the quality of that produced by a desktop publishing system (compare this with the remainder of this page).

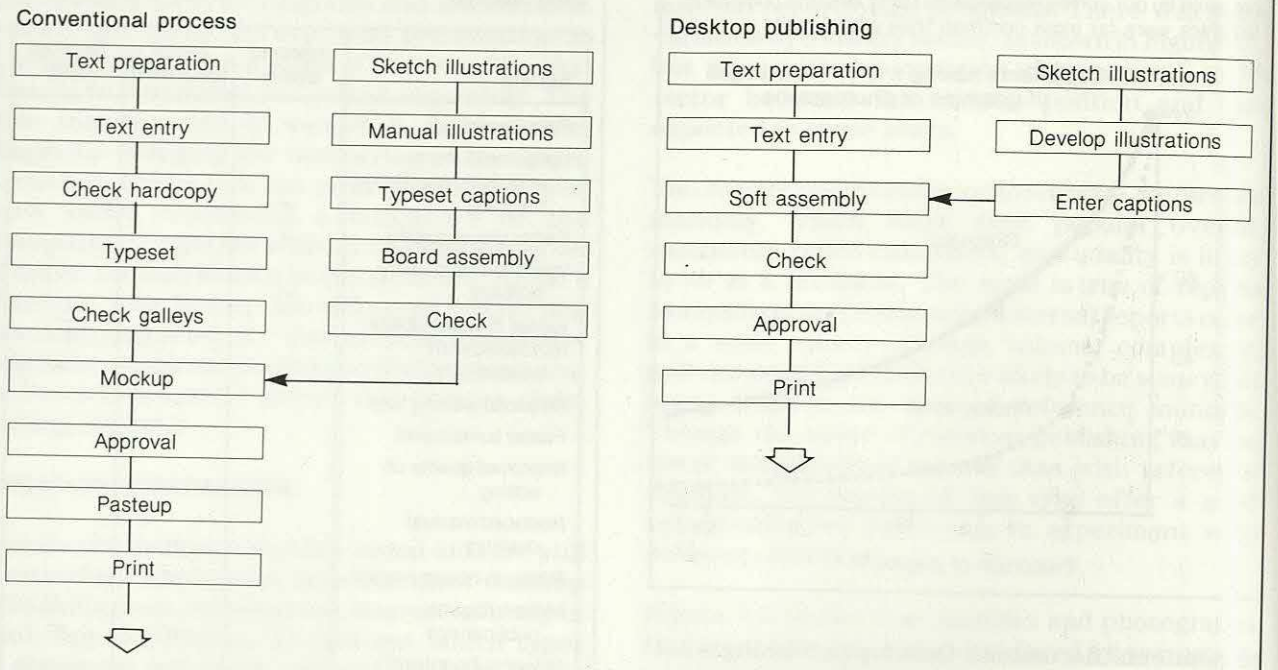

It is not hard to see why desktop publishing is gaining such attention. The great improvement in document appearance is clear for all to see, and it promises to reduce costs as well. But from the corporate manager's standpoint what is not immediately obvious is how desktop publishing fits in both with more traditional corporate publishing and with personal computing and electronic office systems.

In this chapter we lay the foundation for more detailed analysis in the chapters that follow. We begin by making the case for management attention, by explaining why desktop publishing is important and why it is not about to go away. We go on to identify its characteristics, and to place it in context with corporate publishing and computer-based office systems.

just as most amateur carpenters cut straighter lines with a good handsaw than with an electric one. Permitting amateur page designers to indulge

Figure 3.10: Steps in document production

Desktop publishing eliminates many of the production steps, as illustrated in simplified form by the two flow charts.



themselves risks taking a step back in quality, rather than a step forward. This can turn into one of the hidden costs of desktop publishing, as we discuss on page 28. But when constrained by common sense and practical guidelines, there is no question that the average user can produce a far higher quality document with desktop publishing than with a conventional typewriter or word processor.

FASTER TURNAROUND

The second of the three main benefits of desktop publishing is faster document turnaround. This benefit arises when desktop publishing replaces conventional typesetting undertaken by a specialist publications department or external subcontractor. Faster turnaround results from fewer process steps. This is illustrated in Figure 3.10, which compares the number of steps involved in the production of a document using desktop publishing and using conventional methods. Desktop publishing eliminates time lost sending work for typesetting, galley production, pasteup, and so forth.

According to a survey undertaken by Hewlett-Packard (see Figure 3.11), the process steps that can be eliminated using desktop publishing can amount to 65 per cent of production time. The same survey revealed the number of days taken to prepare a document by conventional external typesetting: 37 per cent took more than nine days (see Figure 3.12).

Figure 3.11: Time spent on process steps

According to a survey undertaken by Hewlett-Packard, the process steps that can be eliminated by adopting desktop publishing amount to some 65 per cent of total production time.

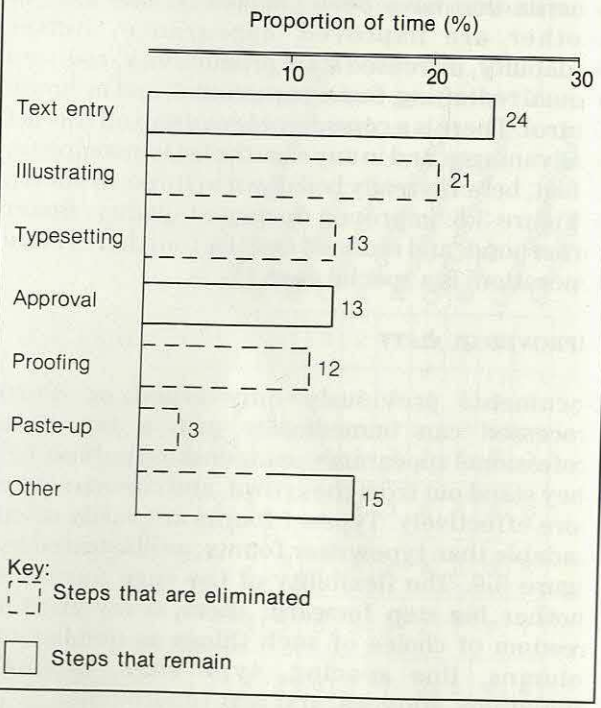


Figure 3.12: Time spent preparing a master document conventionally

The same survey as in Figure 3.11 assessed the time taken to prepare a document by conventional methods.

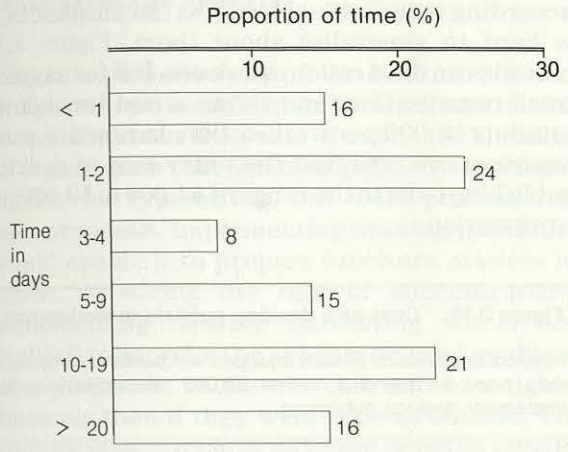


Figure 3.13: Reduced cost

The benefit of reduced cost applies when work that was previously subcontracted is brought in-house (The example is of IBM Science Research Associates, Chicago, as quoted at the CEPS V Conference in March 1987).

		1983 Subcontract	1985 In-house
Master pages, 000s		23	24
Costs	Internal $000	320	420
	External $000	840	340
	Total $000	1160	760
Cost/page	$	50.4	31.7

REDUCED COST

The third of the three main benefits of desktop publishing is reduced cost. As in the case of faster turnaround, this benefit is realised when desktop publishing replaces conventional publishing by traditional means. There are a number of sources of reduced cost (as indicated earlier in Figure 3.8). They boil down to two: reduced costs of sub-contracting and improved staff productivity from savings in activities such as checking and amending.

IBM has provided an example of the savings obtained from switching its typeset document production from an external contractor to an internal system. IBM is one of the world's largest publishers. Worldwide, the number of staff wholly dedicated to the production of manuals and formal documents amounts to 1,700, including planners, designers, artists, and editors. Each year, the company produces 7,000 titles, more than one million camera-ready masters, and more than six billion printed pages. The workload is characterised by urgent deadlines, extensive revisions, and long document retention times. At the company's Science Research Associates subsidiary in Chicago, the per-page cost was reduced from $50 to $32, a saving of 36 per cent (see Figure 3.13). Admittedly, this was achieved by replacing the previous external subcontract service with an internal system running on a mainframe computer, but it demonstrates the scope of savings possible with desktop publishing, which is similar in principle.

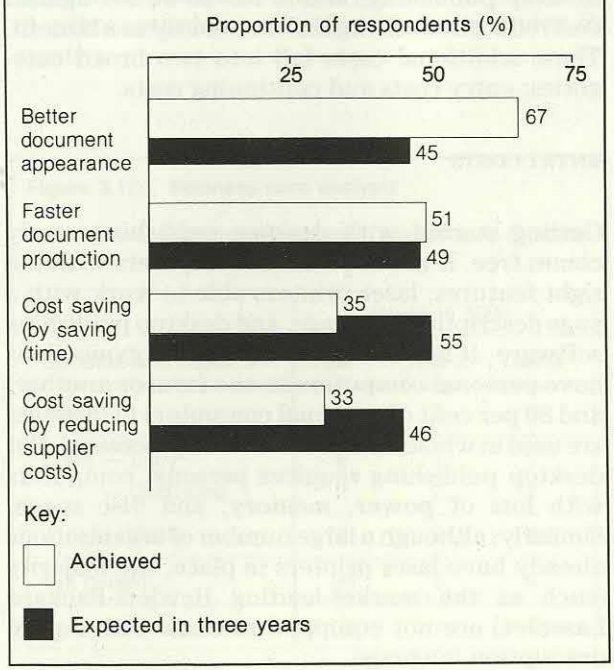
BENEFITS ACHIEVED IN PRACTICE

In our survey, we asked respondents to identify the main benefit of desktop publishing achieved now and expected in three years' time. Improved quality of appearance was most frequently cited, though cost savings in different forms added up to the single biggest benefit. Cost savings will become even more important in the future, according to our respondents (see Figure 3.14).

One further benefit beyond the three that we have discussed — improved document quality, faster turnaround, and reduced cost — is one that can occur in special cases. It is that of revenue generation. Some companies, having adopted

Figure 3.14: Benefits achieved in practice

In our survey, respondents identified benefits currently achieved and expected.



desktop publishing to improve their own internal operations, are using their expertise as a means of earning revenue by providing a specialist publishing service to third parties. A growing number of such companies is springing up, often from the design, marketing, communications, and consulting sectors. Sampson/Tyrrell is a case in point. Based in London, the company employs about 40 staff and has a turnover of $3 million. It specialises in the design and management of corporate identities, providing a range of marketing support programmes and materials. The company introduced Apple Macintoshes in 1984. PageMaker software and LaserWriters were brought in at the end of 1985, primarily to improve product quality.

Sampson/Tyrrell now uses desktop publishing for virtually every item of communication that goes outside the company: client proposals, estimates, correspondence, reports, and so forth. An in-house newsletter is also produced. Following the success of its own internal desktop publishing operation, Sampson/Tyrrell now uses desktop publishing to generate a revenue stream. It has started to provide a service for outside customers that includes the production of house journals and consulting on production standards and documentation quality. This step was not envisaged when desktop publishing was first installed.

ADDITIONAL COSTS

To gain the benefits of desktop publishing nearly always means spending money. This additional spending would not be incurred in the absence of desktop publishing, and it has to be set against cost reductions arising simultaneously as a benefit. These additional costs fall into two broad categories: entry costs and continuing costs.

ENTRY COSTS

Getting started with desktop publishing rarely comes free. It needs personal computers with the right features, laser printers able to work with a page description language, and desktop publishing software. It is true that today most organisations have personal computers in one form or another, and 80 per cent of personal computers in business are used in whole or in part for word processing. But desktop publishing requires personal computers with lots of power, memory, and disc space. Similarly, although a large number of organisations already have laser printers in place, the majority (such as the market-leading Hewlett-Packard LaserJet) are not equipped to work with a page description language.

Apart from equipment and software, there are other costs of entry into desktop publishing. They include surveys to identify applications, the cost of setting standards, procedural changes, and staff training. Because these entry costs vary widely according to individual business circumstances, it is hard to generalise about them. Figure 3.15 provides an illustration, however. It is for a typical small organisation, and shows a cost breakdown totalling $8,000 per workstation. In practice, most organisations will find the entry cost of desktop publishing to be in the range of $4,000 to $9,000 per workstation.

Figure 3.15: Cost of a desktop publishing workstation

A typical organisation already equipped with personal computers may need to spend a further $8,000 per workstation to implement desktop publishing.

Cost of implementing desktop publishing	Cost/workstation ($000)
Basic personal computer	2.5
Additional workstation hardware and software	
Additional memory/graphics adaptor	1.5
Hard disc	1.0
Laser printer with PDL	3.0
Page makeup software	0.5
Implementation costs	
Application selection	1.0
Standards and training	1.0
Total additional cost	8.0

CONTINUING COSTS

After implementing desktop publishing, most organisations can expect to face further costs attributable to such things as equipment downtime, staff retraining, loss of control when standards are not implemented properly, and post-implementation audit.

It is even harder to generalise about these continuing costs than it is about entry costs. Usually, the better a business is organised, the lower the continuing costs will be. A cost per workstation in the range of $1,000 to $2,000 a year is likely for many organisations, however.

JUSTIFYING DESKTOP PUBLISHING

Desktop publishing lends itself to formal justification on the basis of costs and benefits.

Projecting the costs is not too difficult. The problem, in common with many other computer applications, is evaluating the benefits.

EVALUATING THE BENEFITS

Evaluating benefits is a problem because it is hard to separate one benefit from another, and hard to be realistic about the value of each one. Consider an organisation that sends its publicity brochures outside for typesetting, but word-processes its sales proposals. Implementing desktop publishing would enable it to prepare brochure masters in-house, so saving the cost of subcontracting. Implementing desktop publishing would also enable it to improve the appearance and quality of sales proposals, at a lower cost and to a tighter timescale than if they were typeset outside. This example illustrates how different benefits arise for different applications within the same company. So when building a business case to justify desktop publishing, it helps to consider each application separately. It is also important to avoid counting benefits twice for the same application. Take the sales proposal just cited: introducing desktop publishing would yield the benefit of improved appearance, but not the benefits of cost or time saved in subcontracting because there is no subcontracting to be displaced.

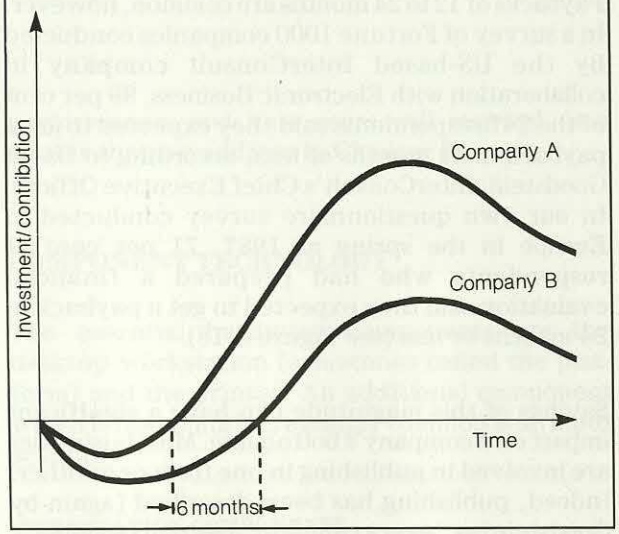
Consider now in turn the three categories of benefit that we have already mentioned. The value of the first one, improved document appearance, is rarely easy to assess. What is the value of, for instance, a better-looking price list? This is very much a matter of judgement. In some cases, improved quality can be vitally important. It can make the difference between gaining and losing a sale, or staying ahead of, or only abreast of, the competition.

The value of faster turnaround is usually somewhat easier to assess than the value of improved document appearance. Again, the nature of the application in question is critical. In some businesses — manufacturing complex assemblies, for instance — documentation is so critical that the product cannot be shipped until it is ready. The cost of a delay could spell the difference between business success and failure (see Figure 3.16).

It is the third of the three categories of benefit, cost reduction, that is most readily quantifiable. Assessing cost savings from reductions in subcontract charges and internal staff time is unlikely to prove a daunting undertaking in most organisations.

Figure 3.16: Importance of time to market

Product life-cycles are shortening as the pace of innovation intensifies, emphasising the importance of avoiding delays in bringing new products to market. A study (by McKinsey) shows that, for a product life cycle of five years in a market growing 20 per cent a year and having 12 per cent annual price erosion, coming to market six months late (see Company B) cuts profits by 33 per cent.



THE BUSINESS CASE

A business case for desktop publishing compares costs against benefit values, to show the payback period (time taken to return the investment). Figure 3.17 shows a simple worked example. Annual benefit values are compared against annual costs to yield a net benefit value. The cumulative net benefit value becomes positive in year two: in other words, payback occurs in under 24 months.

Figure 3.17: Business care analysis

This simple analysis compares benefit against costs to project a payback period.

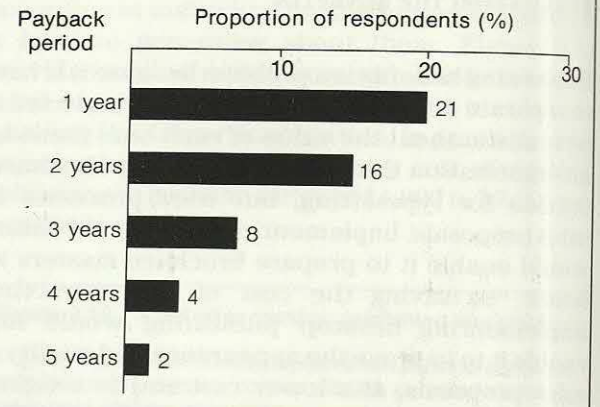
Benefits and costs	Values in $000		
	Year 1	Year 2	Year 3
Benefit	6	7	8
Costs — Entry	8	-	-
— Continuing	2	2	2
— Total	10	2	2
Net benefit	(4)	5	6
Cumulative net benefit	(4)	1	7

JUSTIFICATION IN PRACTICE

Some surprisingly rapid payback periods have been claimed for desktop publishing by enthusiastic pioneers. Paybacks of just a few days have been reported when desktop publishing is purchased for a specific high-payoff application, but success stories of this magnitude are admittedly rare. Paybacks of 12 to 24 months are common, however. In a survey of Fortune 1000 companies conducted by the US-based InterConsult company in collaboration with Electronic Business, 89 per cent of the 247 respondents said they expected to get a payback in 24 months or less, according to David Goodstein, InterConsult's Chief Executive Officer. In our own questionnaire survey conducted in Europe in the spring of 1987, 71 per cent of respondents who had prepared a financial evaluation said they expected to get a payback in 24 months or less (see Figure 3.18).

Figure 3.18: Expected payback

Of our survey respondents, 51 per cent had prepared a financial evaluation. Of these, 71 per cent (37 per cent of all respondents) expected a payback in two years or less.



Savings of this magnitude can have a significant impact on a company's bottomline. Most businesses are involved in publishing in one form or another. Indeed, publishing has been described (again by Goodstein) as "every company's second business". Corporate spending can be as much as 10 per cent of revenue, according to Goodstein, even in companies whose primary purpose is nothing to do with publishing. Digital, for instance, says it spends $500 billion annually on publishing, about 6 per cent of revenues. With the potential to pay back within two years on activities currently costing up to 10 per cent of revenue, it is no wonder that desktop publishing is attracting attention.

Paybacks achieved in practice can improve significantly on predictions. The experience of Ferranti Computer Systems is a case in point. Ferranti manufactures computer defence systems primarily for naval use under contract to the UK government. There are four sites in the south and west of England, of which the facility in Bracknell, Britain's Silicon Valley 40km to the west of London, is the largest, employing 3,800 people. Desktop publishing is used for the preparation of formal computer systems documentation for the Ministry of Defence, in accordance with standards and guidelines laid down by the MoD. Here, the emphasis is on graphics. Desktop publishing is also used for preparing sales proposals for technical reports and for handbooks.

The desktop publishing system is networked within each of the four sites, though it is concentrated in Bracknell. Fifty workstations are connected for use by authors, design engineers, illustrators, and word processor operators (altogether there are 300 registered users). Comparative trials of desktop publishing versus the conventional alternative began in 1983, initiated by a review of word processing. "Compared with the conventional alternative, desktop publishing has given us a 350 to 400 per cent improvement in productivity," says Don Gray, Information Services Manager. "Originally we forecast a payback period of 25 months for the initial installation. In reality, we achieved 14 months."

Encouraged by this success, Ferranti is adding further equipment. The plan is that several hundred PC-compatible workstations will be connected to the network. Ferranti is actively developing the system to include document management and document distribution through the network. Tight standards are laid down and promulgated through an in-house training programme.

Chapter 4

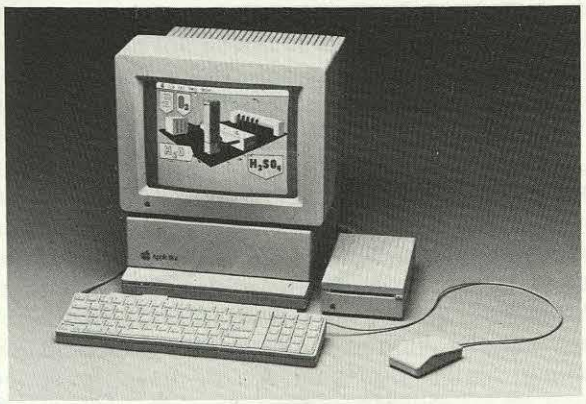
COMPONENT AND SYSTEMS TECHNOLOGY

To appreciate the capabilities and limitations of desktop publishing systems, it is necessary first to gain a basic understanding of the components — what they are, how they work, and how they fit together. In this chapter we begin by looking at hardware components and then at desktop publishing software. In the remainder of the chapter we examine the leading systems (combinations of hardware and software) on the market today: those based on the Apple Macintosh, and those based on the IBM PC and its counterparts from non-IBM suppliers. For completeness, the chapter finishes with a brief look at systems other than these.

Although today's desktop publishing systems deliver a performance simply not available before at anywhere near the price, the fact is that they are very much first-generation devices. There is a lot of room for improvement, as we show in this chapter. Such improvements are unlikely to be long delayed. How today's first-generation systems will evolve in terms of functionality and price performance, and how users will respond, is a matter that we address in Chapter 6.

Figure 4.1: Desktop publishing workstation

The workstation consists of a graphics display screen, keyboard/mouse, and a box to house a processor and screen memory for handling graphics as well as text and a large file store.



Acknowledgement to Apple Computer UK Limited

COMPONENT TECHNOLOGY

The essential hardware components are the desktop workstation (sometimes called the platform) and the printer. An additional component which is becoming increasingly common is an input scanner.

WORKSTATION COMPONENTS

Consisting of screen, keyboard, and box to house the processor and file store, the basic desktop publishing workstation is nothing more than a powerful business personal computer (see Figure 4.1).

The screen

Ideally a desktop publishing display screen should be able to replicate the characteristics of office paper. This ideal is unobtainable today at a realistic price. Display screens are a compromise of performance and price. The compromise is apparent in screen size, definition, and colour.

A standard sheet of A4 office paper measures 21 cm x 29.6 cm (8.25 inches x 11.75 inches), equivalent to about 100 square inches. It would be nice if screens could display a full page at normal size. But to save money (and desktop space) standard personal-computer screens are smaller than A4. Shaped like TV tubes, whose technology they share, they act like windows through which an operator normally sees only part of a page at a time by scrolling the screen about. Although most screens enable viewing of the whole page in reduced form, text is mostly then unreadable. The full width of text on a paper page (normally about 7 inches allowing for borders) can be displayed in unreduced form on a screen as small as 9-inch diagonal (about 40 square inches), but such a screen is only high enough to display about half an A4 page.

Because of technical limitations, standard screens are also unable to display the shape and spacing of characters exactly as they appear on the printed page. Displays of characters and graphics are formed from dots, called pixels (picture elements). A pixel is formed when a small area of the phosphor which is coated on the back of the screen is momentarily illuminated by an electron beam. The beam continously sweeps a repeating pattern called a raster scan. It is the raster scan frequency and the rate at which the beam can be switched on and off that (together with the characteristics of the phosphor) govern the size and sharpness of individual pixels. In today's desktop computers, the practical lower limit to pixel size is about 300 microns, equivalent to about 70 pixels per linear inch. Such screens are said to have a resolution of 70 dots, or spots, per inch.

Screen resolution is much less than the resolution of ink spots used to form characters on a printed page (typically 300 dots per inch from a desktop laser printer) and much less than can be distinguished by the human eye (typically 400 dots per inch for text, and even more for graphics). So standard displays look coarse. Diagonal lines appear jagged, typeface designs cannot be accurately reproduced, and text of small size (below about 8 point) is often illegible.

Displays of halftones, simulating the continuous gradation of a photographic image, also look crude. Figure 4.2. explains how halftones are produced and why they can look coarse. The satisfactory rendering of a halftone requires a device resolution of at least 680 dots per inch, which is well beyond the capacity of today's desktop publishing screens and printers.

The screen viewing window can be used as a magnifying glass, zooming in on designated areas to expand them to more readable size. Alternatively, standard screens can be complemented by screens of larger size and therefore more pixels, and sometimes higher pixel density as well to improve the display definition. Such high-performance screens are expensive, however. Most of them enable a full A4 page to be displayed with little or no size reduction (see Figure 4.3). Some can display two full-sized pages side by side simultaneously.

Figure 4.2: Halftones and grey scale

Photographs are continuous-tone (grey tone or contone) images: the gradation of tone across them is continuous. To create the same impressions as a photograph, display screens and laser printers adopt a technique called halftoning. In a halftone, levels of grey are simulated by using dots that can only be either black or white (on or off). Halftones are bi-tone renderings of original contone images.

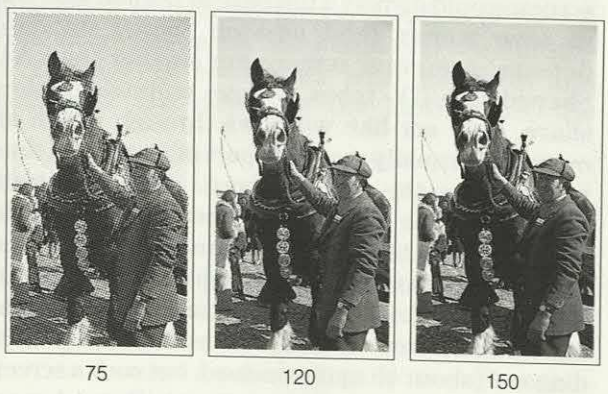
Halftones are formed from a mesh of cells (called, confusingly, a screen). Each cell contains a number of dots — pixels in the case of a display screen, ink spots in the case of a laser printer. The coarseness of the mesh defines the resolution of the halftone, and the number of dots per cell defines the number of levels of grey (grey scale) that can be created.

Mesh coarseness is measured in cells per linear inch, called screen lines. A mesh of 55 screen lines has 55 cells per inch; 85 screen lines is about the minimum necessary to avoid seeing the mesh structure of a halftone.

Similarly, the minimum grey scale is 64 (though many human eyes can differentiate up to 128 grey levels). A grey scale of 64 is achievable by an array of 8 x 8 dots per cell. Each grey scale increment is achieved by switching on a further dot in a cluster arrangement called a spot function. The spot function dictates the position of the cluster in the cell (whether built outwards from the centre or inwards from one of the boundaries), and its shape. Spot functions are chosen to create the most accurate contone simulation. Some spot functions change the position and shape of the cluster in a cell according to its grey scale. Another way of improving halftone simulation is by 'screen angling' — placing halftone mesh cells at an angle to the horizontal pixel array.

The halftones on this page illustrate the effect of different screen lines and grey scales, for the same spot function and screen angle.

To achieve 85 screen lines and 64 grey levels at zero screen angle requires a device resolution of 680 (85 x 8) dots per inch, which is well beyond that of the standard display screen (70 dots per inch) and compact laser printer (300 dots per inch). This explains why neither of these devices is able to produce a satisfactory halftone. About the best compromise that can be achieved with a 300-dpi laser printer is 75 screen lines and 16 (4 x 4) grey levels. The chart shows the relationship between grey scale, screen lines, and dots per inch.



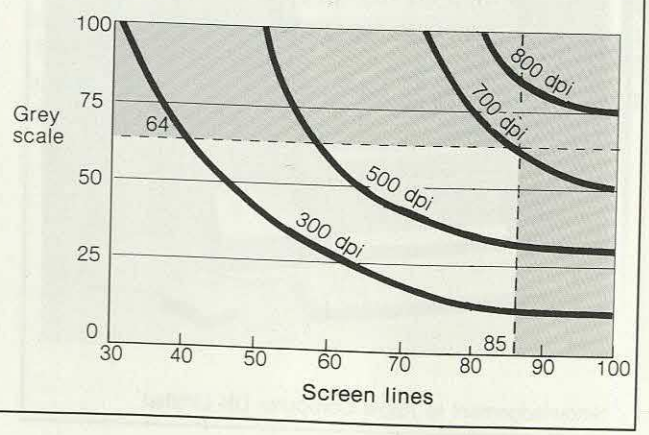
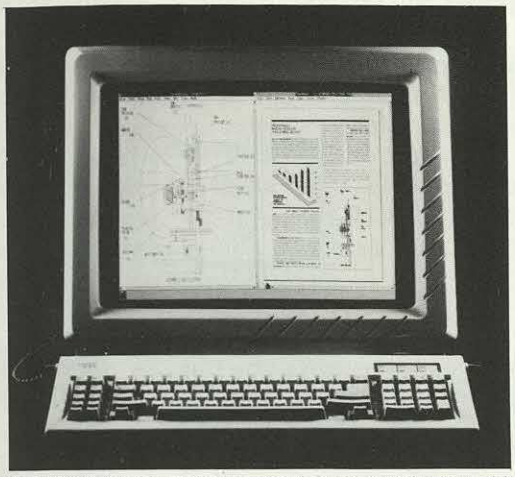


Figure 4.3: Large display screen

A large display screen can show a full sized A4 page, or even two pages (left and right) simultaneously.



Acknowledgement to ETAP Information Technology nv, Malle, Belgium

Pixel density, however, is still well below that of laser printers' ink-spot density. Moreover, many operators prefer to forgo the advantage of a full-page display, preferring the compactness of a small screen despite the need for scrolling and zooming.

Processor

Desktop publishing needs lots of processor power and memory. It is pushing the limits of even the most powerful of today's personal computers.

Processor power is measured roughly in terms of number of instruction cycles per second. In each cycle, a multiple of 8 bits (8, 16, or 32 bits) is handled simultaneously, depending on the processor. To perform power-hungry activities like graphics calculations and fount scaling without noticeably slowing down, desktop publishing system processors need the power to manage at least 1 million instructions per second, each instruction taking up a word length of 16 bits. That is equivalent to the power of an average mainframe computer only a few years ago. This level of power has only recently become available in business personal computers (see Figure 4.4).

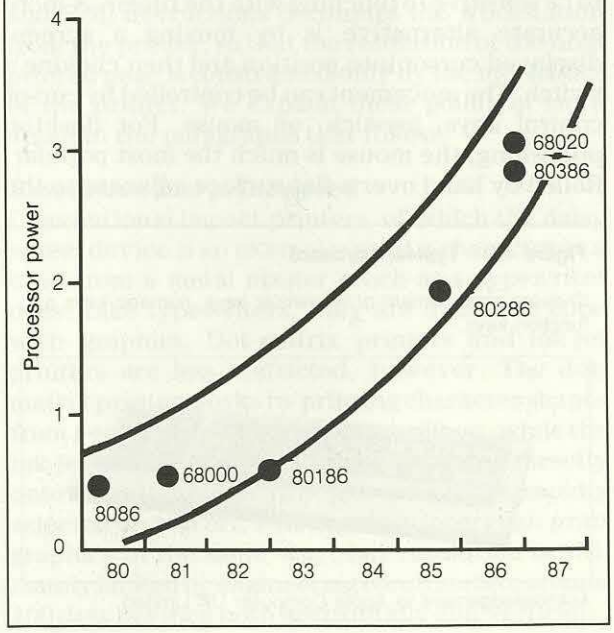
A large random access memory (RAM) is needed alongside the processor to store the processor's control software (called its operating system software), application software (such as a program for creating graphics), and the display memory. A RAM capacity of a megabyte (a million bytes) can soon get used up. A megabyte might sound excessively generous, remembering that 64 kilobytes was the most that a personal computer could support in 1980. But a desktop publishing software package can take up to half a megabyte of memory, leaving the remainder for the display memory (40 square inches takes up 20 kilobytes at 70 pixels per inch and one bit per pixel) and the operating system.

Desktop publishing demands complex operating system software. It looks after not only screen, printer, and file handling, but also the WIMPS user interface -- the arrangement of screen-displayed windows, icons, and menus that make desktop publishing a practical proposition for the business user. Windows provide a common format for moving data between programs and for switching from one application program to another. Multi-tasking, which enables a processor to print and edit text simultaneously, for instance, is not yet available on personal computers. If it were, it would use up yet more memory space.

The overall memory requirement depends in part on the extent to which the operating system functions are implemented in hardware. In the case of the Apple Macintosh family, a window operating environment and bit-mapped memory were built in at the outset, and the basic Macintosh's RAM capacity of 512 kilobytes is adequate for desktop publishing, though not generous (the more recent Macintosh Plus and Macintosh SE are far less restricted). The IBM PC was designed as a character, not a graphics, system. What is more, its operating system means

Figure 4.4: Processor power

The chart relates processor power and time. Measuring processor power is complex, and our measurements are only approximate.



that not more than 640 kilobytes of RAM can be directly addressed. Because essential overheads take up some of the space, the maximum memory configuration of 640 kilobytes is barely sufficient for desktop publishing.

Keyboard

The keyboard is for inputting alphabetic characters, numbers, and commands. Despite the advent of alternative technologies such as optical character recognition (OCR), scanners, and voice input devices, the keyboard continues to dominate. Designs vary widely in terms of arrangement of keys, key switch design (the way key strokes are converted to electrical pulses, affecting feel and reliability), and keyboard configuration (shape of keys, height and size of keyboard).

Of these design characteristics, it is the first one — the arrangement of the keys — that is the most immediately obvious, and arguably the most important. Keyboard arrangements group three different sets of keys. One set is for typewriter keys: ten digits, 26 letters of the alphabet, punctuation and spacing keys, making a total of about 40 keys arranged in five rows. The second set is a separate numerical keypad for digits and arithmetic functions, arranged like a calculator pad: usually about 18 keys to the right of the keyboard. The third set is for system control functions. Depending on the number of keys in this set, the keys can be arranged rather like a numeric keypad to left or right of the keyboard, or along the top (see Figure 4.5). An alternative is to dispense with function keys altogether, replacing them with screen-displayed 'soft' keys which can be selected on or off by pointing.

One way of pointing is by arranging for the screen to be sensitive to touching with the finger. A more accurate alternative is by moving a screen-displayed cursor into position and then clicking a switch. The movement can be controlled by cursor control keys, joystick, or mouse. For desktop publishing, the mouse is much the most popular. Rolled by hand over a flat surface adjacent to the keyboard, its movement is translated to position the cursor on the screen. Once in position, the cursor can be clicked through a switch on the mouse (see Figure 4.6).

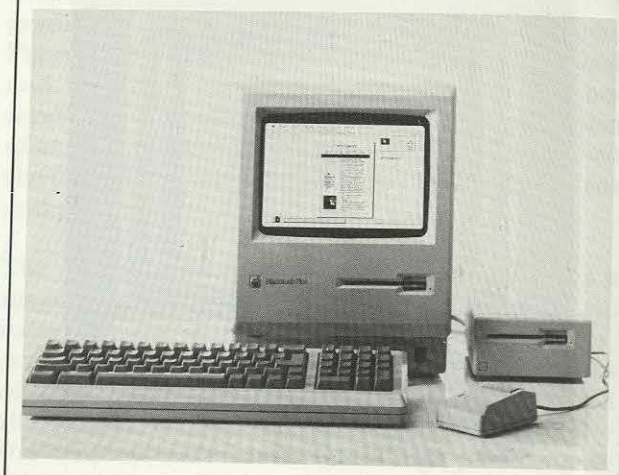
Figure 4.5: Typical keyboard

Showing arrangement of typewriter keys, numeric keys and function keys.

Acknowledgement to Apple Computer UK Limited

Figure 4.6: Mouse

The mouse steers the cursor on the screen. The built-in switch is for clicking once the cursor is in position. In the illustration, the mouse is in the right foreground.



Acknowledgement to Apple Computer UK Limited

Two variations on the mouse theme should be mentioned because of their particular advantages. One is the optical mouse. Rolled over a platen whose surface is ruled with fine grid lines, the optical mouse is more sensitive and accurate than its conventional mechanical counterpart, but has the disadvantage that it cannot be used on just any surface. The other takes the form of an inverted mouse with rollerball exposed for hand turning. Fixed in position, it eliminates the need for a flat surface but most people find it rather harder and slower to use than a mouse.

File store

Desktop publishing systems need lots of rapidly accessible file storage capacity. As a consequence, desktop publishing systems work best with high-capacity, fast-access hard discs rather than lower-capacity, slower floppy discs.

An average page of A4 text holds about 2,000 characters. Using the ASCII code, each character takes up a byte (eight bits) of storage. Together with layout control characters, a typical page of text will need anything up to 3 kilobytes of storage. A working file of 100 pages will take 300 kilobytes — say 1 megabyte for three working files. Images are another matter, however. At 70 pixels per inch, a 80-square-inch screen full of paintings or scanned line art takes up 40 kilobytes of storage. So 1

megabyte of storage would hold 25 screenfuls. Desktop publishing software needs file storage space as well as memory. Ventura, an example of desktop publishing software which we describe on page 42, needs 3 megabytes of file storage.

In practice, 10 megabytes of storage is about the practical minimum for desktop publishing. The storage needs to be rapidly accessible, to cope with the large number of transfers to and from the processor's memory without drastically slowing down the system. Again, in practice, a file access time of 30 milliseconds is about the practical minimum.

Floppy discs — replaceable magnetic discs a few inches in diameter that are standard on every personal computer — are limited to a capacity of around 1 megabyte and an access rate of around 200 milliseconds: too small and too slow for serious desktop publishing. The answer is hard discs, which start at about 10 megabytes capacity and 30 milliseconds access time. Some personal computers come with hard discs built in; others with hard discs housed in a separate box, about the size of a thick paperback book, connected to the workstation by a cable. Although more expensive to buy, hard discs work out cheaper per unit of storage than do floppies. They complement floppy discs rather than replace them: floppies are needed for file security.

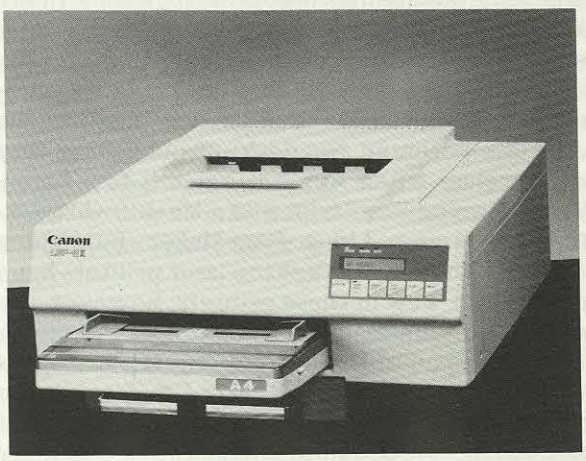
A way is needed to keep track of all the files that accumulate on a hard disc. Managing the files of large computer databases has become highly sophisticated over the years and is a subject in its own right. For desktop publishing files stored on hard discs, a simple arrangement called tree structuring is adequate for most users. A tree-structured hierarchical file store (HFS) is a system of folders within folders. There is one master or route directory containing folders of data files and other subdirectories at the level below. Each subdirectory in turn may contain files and lower-level subdirectories. Subdirectories can be likened to the branches of a tree; files to leaves. Operators using a HFS see a window-displayed folder. Clicking on the icon opens the folder and displays its content. Clicking on the icon on one of the content folders opens that folder, and so forth. Utility programs maintain the tree structure as files are added and deleted and help operators to find files whose position in the structure they may have forgotten.

LASER PRINTERS

Along with the WIMPS user interface and desktop publishing software, the laser printer is one of the cornerstones of desktop publishing, without which the industry would not exist (see Figure 4.7). In contrast with earlier character printers used widely for word processing, laser printers can print graphic designs and near-typeset-quality text in a great variety of typefaces and sizes. They are also quiet and compact. Their shortcomings of relatively slow speed (about 5 to 10 pages a minute at best) and high price ($3,000 to $8,000 each) are diminishing as a result of engineering improvements.

Figure 4.7: The desktop laser printer

Desktop laser printers are compact and quiet.



Acknowledgement to Canon (UK) Limited

Desktop laser printers work a page at a time by first building up a complete image of the page in a buffer memory, then transferring the buffer contents to sheets of paper using technology similar to a copying machine. Creating the page image in the buffer is the job of a microprocessor called a raster image processor (RIP) that works from page description language (PDL) instructions sent to it by the workstation processor. The combination of RIP and PDL instructions decouples the workstation from the printer, so that the resolution of the final printed page is constrained only by the mechanics of the printer. We explain these points in more detail in the paragraphs that follow.

Resolution and print speed

Conventional impact printers, of which the daisy wheel device is an example, print a character at a time from a metal master much as a typewriter does. Like typewriters, they are unable to cope with graphics. Dot-matrix printers and ink-jet printers are less restricted, however. The dot-matrix printer works by printing character shapes from needles impacting on a type ribbon, while the ink-jet printer sprays tiny droplets of ink directly onto paper through fine jets which are rapidly selected on and off. Dot matrix printers can print graphics in the same way, but resolution is ultimately limited by engineering constraints to around 100 dots per inch both horizontally and vertically.

Laser printers first appeared in the 1970s. Large, fast, and extremely expensive, they were designed to replace the mechanical line printers long used by large data processing computers. It was not until the early 1980s that the first desktop laser printer appeared, with Canon's announcement of its LBP-CX printer. Designed originally as a quiet alternative to daisy wheel and dot matrix printers, the LBP-CX's potential for desktop publishing first became clear when Apple coupled it to a LaserWriter running PostScript and a Macintosh workstation running Aldus PageMaker publishing software. The sales of desktop laser printers have since soared. Few of these printers, however, are equipped to work with a PDL and so are not suitable for desktop publishing. Hewlett-Packard's LaserJet, which uses the LBP-CX mechanism (engine), holds the lion's share of today's installed base, but in standard form is not equipped to work with a PDL.

Desktop laser printers have a print resolution of about 300 dots per inch. The print resolution is limited first by the gradation of particles in the toner fluid, and secondly by mechanical limitations within the print engine. Improving resolution up to 600 dots per inch is possible simply by developing more advanced versions of current toners and printers. To go beyond that will require a step forward in technical innovation, as we explain in Chapter 6.

The 300 dots per inch of today's desktop laser printers is vastly superior to the 70 dots per inch of standard screen images, and the 100 dots per inch of dot-matrix printers. It is less than can be distinguished by eye (400 dots per inch and above), however, and considerably less than the 1,000 to 2,500 dots per inch achieved by phototypesetters. Although to a professional typographer the quality limitation of a desktop laser printer is immediately apparent, it takes a sharp-eyed layman to see the difference. For many office documents, the quality difference can be ignored. Where documents must be produced to a higher standard, desktop publishing systems can drive phototypesetters when they both work with a common PDL. Some Linotype phototypesetting machines, for instance, are PostScript-compatible.

A shortcoming of the desktop laser printer is its slow speed, typically 5 to 10 pages per minute at best. The main constraint is the time taken by the RIP microprocessor to decode the PDL instructions into a bit-mapped image of the page to be printed. Every text character has to be decoded in this way, but because the same shapes come up over and over again, laser printers speed up after they have been switched on and are handling text. It is when they are handling images that they can really slow down. A page-sized painted image can take 10 minutes or more to print.

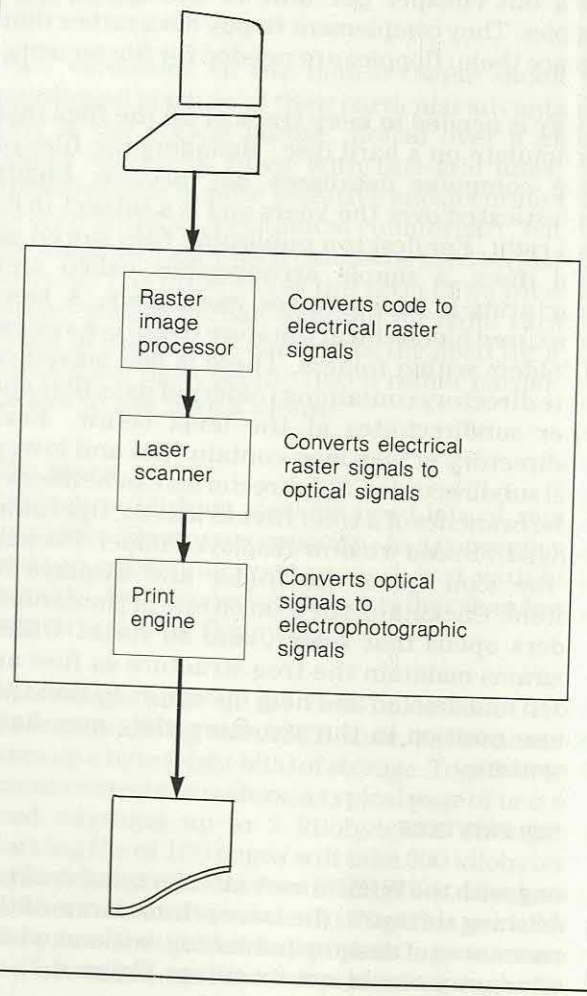
Components of a desktop laser printer

Inside the box of a desktop laser printer, there are three main components: a RIP, a laser scanner, and a print engine (see Figure 4.8).

The RIP takes incoming instructions from the desktop publishing workstation, using them to generate the bits (on or off) in a bit plane memory that corresponds to the dots of ink making up the final printed page. RIPs are actually dedicated microprocessors, programmed to work with a particular page description language. It is the characteristics of the different PDLs that account for important differences between RIPs, and hence between different printers, as we explain later.

Figure 4.8: Components of a desktop laser printer

There are three main components:



The laser scanner component reads the bit plane memory generated by the RIP for each page, converting it into charges on a photoconductive print drum. The charge pattern corresponds to the print images that will appear on the page. How the laser scanner works is illustrated in Figure 4.9. It consists of a semiconductor laser driven by an electronic bit plane memory reader, a rotating polygon mirror and an arrangement of lenses and mirrors to deflect the laser light so that it forms the shapes of characters as electrostatic images on the surface of the rotating print drum. It is in the print engine (the electrophotographic component of the printer) that these images attract a fine powdered toner and transfer it to pre-cut sheets of paper. This is similar to the way an office copier works. The paper sheets are finally run through a heat-sensitive fixer before delivery.

Page description languages (PDLs)

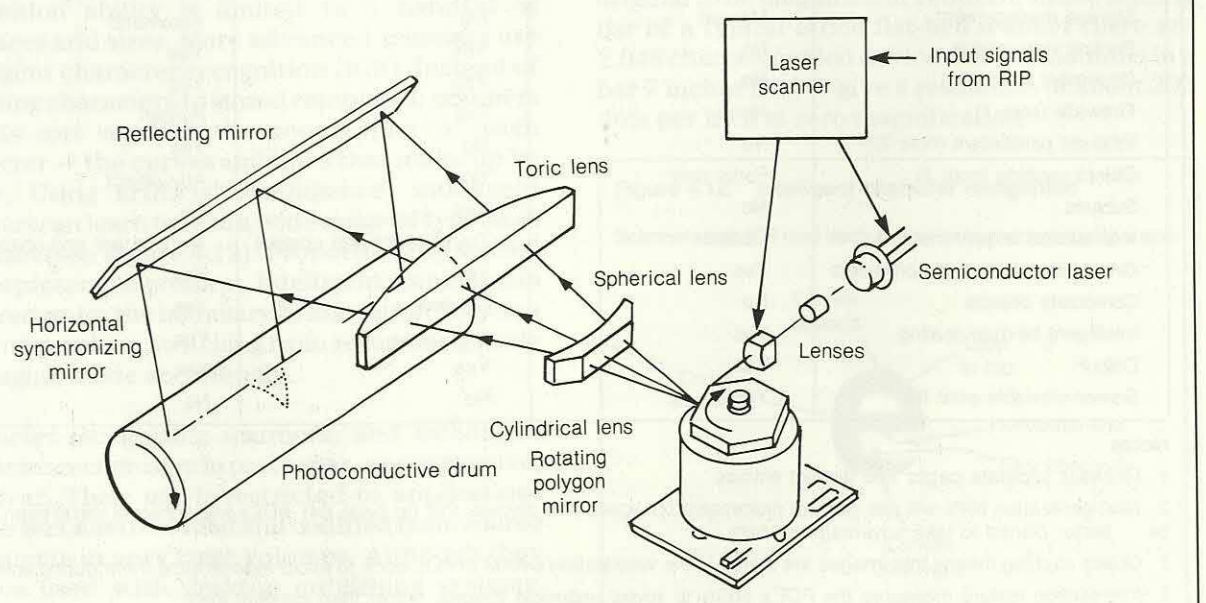
A PDL is a set of codes for specifying the text and graphics on a printed page. PDLs are fundamental to desktop publishing. All desktop publishing systems that correspond with our definition (see page 4) make use of a PDL.

Pages created by a workstation operator are converted into PDL codes by the desktop publishing software running in the workstation processor. The PDL codes are passed to the RIP in the laser printer, which translates them into a formatted page of text and graphics. The PDL codes work like the instructions of a high-level programming language. Text and graphics are encoded by the desktop publishing software in terms of standard graphic primitives such as lines, arcs, circles, and tints. The corresponding shapes are then generated within the RIP by the PDL program. Characters are treated as graphic shapes, and are encoded in terms of primitives in just the same way. PDLs do not generate the shape of every character each time it appears, however. Instead, they generate the shape of each character the first time it appears when the printer is switched on at the beginning of the day, then store it for re-use in the form of a bit map.

A PDL can create a virtually unlimited number of images — founts, lines, arcs, filled shapes, half tones — from a limited number of graphical primitives. So using a PDL between the processor and printer RIP makes it unnecessary to pass a mass of information at the pixel level, which saves time and memory space. A further — and most important — advantage of PDLs is device independence: they decouple the printer from the processor, with the result that printer resolution is limited only by the mechanical characteristics of the printer. The range of typefaces and sizes that a PDL can handle at one time is limited to a basic master set stored in the RIP's read-only memory. But the master set can be expanded virtually without limit by downloading additional sets into a RAM that the RIP can access. In an ideal world there would be one standard PDL. The reality is that several competitors have emerged, of which PostScript from Adobe, Interpress from Xerox, and DDL (document

Figure 4.9: How a laser printer works

The laser scanner component of a laser printer reads raster signals and converts them to optical signals via a rotating polygon mirror and a series of lenses and mirrors.



description language) from Imagen are the most important. The specifications of all three have been made public. Suppliers of RIPs and desktop publishing software may adopt any one of them. In practice, though, most RIP microprocessors come from the PDL suppliers. Adobe, for instance, is the major supplier of PostScript RIPs.

PostScript, Interpress, and DDL have common roots in the Press language developed at Xerox's PARC (Palo Alto Research Centre) in the mid-1970s. All three are designed to handle text, graphics, and halftone images. All three have numerous features for handling a wide range of different typefaces and sizes, scaling and rotating, colour, and so forth. Although all three are likely to coexist for the foreseeable future, PostScript has already become a *de facto* standard. Announced in 1984, it was adopted by Apple for its LaserWriter to team up with a Macintosh running PageMaker software in 1985, when desktop publishing was born. PostScript has since been adopted much more widely than the other contenders. By early 1987, more than 300 software packages were available with PostScript interfaces, and the language had been formally adopted by leading equipment suppliers, including Digital and IBM.

In contrast with PostScript, Interpress, Xerox's own language, has found little acceptance outside Xerox itself. Even Ventura, Xerox's highly successful desktop publishing software, is available in PostScript and DDL versions as well as Interpress.

Announced in 1986, and developed from Imagen's earlier Impress PDL, DDL is the most recent of the three contenders. Of the three it is richest in terms of features and flexibility for future enhancements, and is best suited to document as opposed to page processing. Something of a stir was caused when Hewlett-Packard, with the world's largest installed base of compact laser printers, announced its adoption of DDL at the end of 1986. More recently, Hewlett-Packard appears to have had second thoughts: new versions of its LaserJet family of printers will feature PostScript as well as DDL compatibility.

A comparison of the main features of the leading PDLs appears in Figure 4.10.

SCANNERS

Scanners are an alternative form of input. They enable material that has already been prepared to be read into a desktop publishing system without the tedium of rekeying (see Figure 4.11).

Although the market for scanners for desktop publishing is still small — at present there is fewer than one scanner for every 10 workstations — it is set to grow rapidly. This growth is being driven by a requirement for incorporating text that has already been created but is not available in compatible electronic form, and for incorporating signatures, drawings, and pictures that cannot be keyed in.

Figure 4.10: Features of leading PDLs

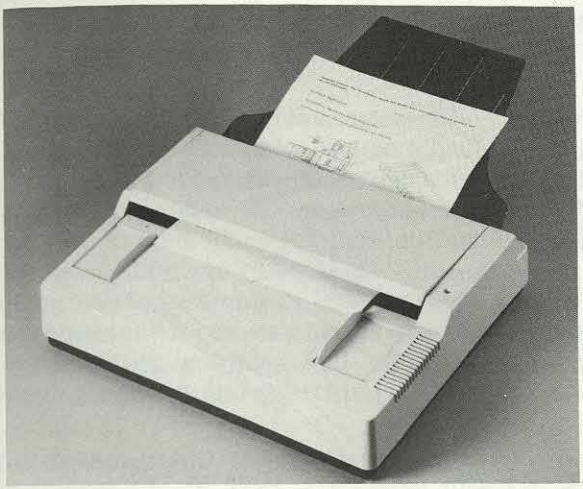
Features	PostScript	Interpress	DDL
Output format	ASCII	Binary	ASCII & binary
Storage management	Manual	n/a	Automatic
Printing instructions	No	Yes	Yes
Document control	No	Yes	Yes
Firewalls (note 1)	None	Full	Partial
Inherent parallelism (note 2)	No	No	Yes
Object caching (note 3)	Fonts only	No	Any object
Subsets	No	Yes	No
Intersection texture (note 4)	Opaque	Transparent and opaque	Transparent and opaque
Grey-scale to bit-map converters	Yes	Yes	Yes
Composite objects	No	Limited	Yes
Intelligent bit-map scaling	Yes	No	Yes
Colour	Yes	Yes	Yes
Screen-viewable print file	Yes	No	No

Notes

1. Firewalls separate pages into distinct entities.
2. Next-generation RIPs will use parallel processors for speed (we discuss this on page 64). PDLs with inherent parallelism will be better placed to take advantage of them.
3. Object caching means that images are stored in the workstation's RAM in PDL code,to avoid regenerating them during editing.
4. Intersection texture measures the PDL's ability to reveal underlaid images, rather than conceal them.

Figure 4.11: Typical flat-bed office scanner

The picture shows a Canon IX-12.



Acknowledgement to Canon (UK) Limited

Scanners work by shining a light on the subject, then using a sensor to measure the amount of reflection. Simple scanners, known as image scanners, are unable to recognise the reflections. They treat them simply as sequences of light and dark images. More sophisticated character-recognising scanners can read printed characters and convert them into computer code.

Character-recognising scanners work in one of two ways. The more mundane ones use template matching: they compare the shape of each character against a set of digitally stored templates to find a match. The technology is identical to that used in optical character recognition (OCR). The problem with scanners of this sort is that their recognition ability is limited to a handful of typefaces and sizes. More advanced scanners use intelligent character recognition (ICR). Instead of matching characters to stored templates, scanners of this sort analyse the topography of each character — the curves and lines that make up its shape. Using artificial intelligence, intelligent scanners can learn to read a wide range of typefaces and sizes (see Figure 4.12). Proportionally spaced founts present no problem. Intelligent scanners can even recognise the boundary demarcation between text and graphics, switching from recognising mode to imaging mode accordingly.

Character-recognising scanners, and intelligent character recognisers in particular, are expensive, however. Their use is restricted to applications where text has to be read and codified from source documents in very large volumes. Although they can be used with desktop publishing systems, character-recognising scanners are out of place in the average office for the same reason that a racing car is out of place in the average parking lot.

Image scanners come in several distinct forms. One is the digitising camera scanner. This uses either a hand-held or column-mounted digitising camera, adapted from the conventional electronic video version, as a sensor. As well as enabling solid objects to be scanned without the need for an intermediate photographic stage, such scanners offer a wider range of magnification than do flat-bed scanners. To get more detail of a subject, for instance, you simply move the camera in closer. But there is a penalty to be paid in terms of price and operating speed.

A related form of input device is the graphics tablet. It is used for entering large amounts of graphic information or line art quickly from a hand-held tablet directly on to the workstation's display screen. The coordinates of the tablet's position are continuously monitored by an electronic board upon which the tablet is placed (it is this which distinguishes the tablet from a mouse, which measures movement). Precision in hand movement is unnecessary; software that sits between the tablet and the screen can be used to clean up the image after entry.

The form of image scanner best suited to the commercial office environment, however, is the desktop flat-bed scanner of the sort shown already in Figure 4.11. The operating principle is much like that of an office plain-paper copier. Documents to be scanned are laid on top of a contact glass. Beneath the glass a scanner mechanism, consisting of light source, lens array, and sensing bar, moves from side to side to complete the scanning process (see Figure 4.13 overleaf). The lens array allows the original to be magnified or reduced. In the sensing bar of a typical office flat-bed scanner there are 2,048 charge-coupled devices (CCDs) mounted in a bar 7 inches long to give a resolution of about 300 dots per inch at zero magnification.

Figure 4.12: Intelligent character recognition

Scanners with ICR read each character by recognising its shape.

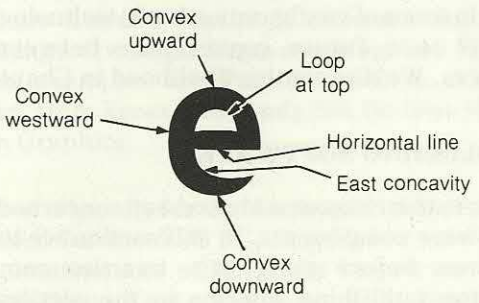
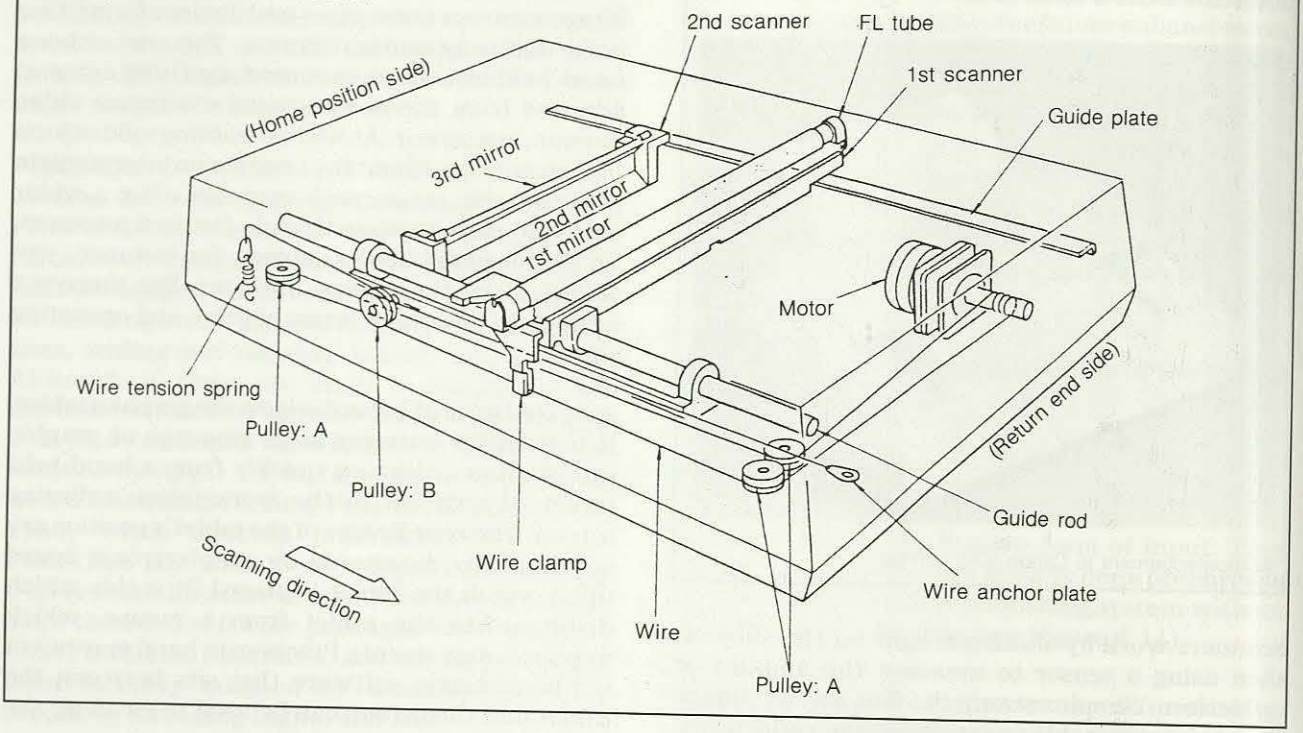


Figure 4.13: **Scanning drive mechanism**

The diagram is of a Ricoh IS30M2.



Some office scanners of this sort use one bit to capture each scanned dot as either on or off. Others use multiple bits per dot to capture shades of grey. Eight bits, for instance, can record 256 shades. Either way, the bit stream formed by the scanner has to be of a format acceptable to the desktop publishing system. At present there is no real equivalent to the printer's PDL for passing information between scanners and desktop publishing workstations. A contender for acceptance as a standard is Data Copy's PreScript language, but there is little evidence yet to suggest that it will be accepted.

It has been the availability of relatively inexpensive linear CCDs during the past four years or so that has made possible the low-cost office flat-bed scanner. These scanners are designed for working with two-dimensional originals — books, photographs, and office documents. The similarity of flat-bed office scanners to office copiers and fax machines, not only in terms of configuration but in technology too, points to a future convergence between the devices. We discuss this likelihood in Chapter 6.

PUBLISHING SOFTWARE

So far in this chapter we have been concerned with hardware components. In this section we look at software before going on to examine complete desktop publishing systems in the section that follows.

Publishing software is at the heart of desktop publishing. It was Aldus' PageMaker package that, with the Apple Macintosh and LaserWriter running PostScript, first heralded the desktop publishing industry in 1985. There is considerable confusion over exactly what publishing software is, however. The reason lies in the diversity of approaches adopted by suppliers. Although they all attempt to be electronic pasteup boards, in practice packages can be almost as different as chalk and cheese.

YARDSTICKS FOR COMPARISON

To compare different publishing software products, it helps to consider five rather broadly defined yardsticks: compatibility (what you need to run the software); text, graphics and file management (to do with getting information into the system); formatting method (how you use it); composition features (affecting the contents of a page); and pagination features (making up the pages of a document).

Compatibility

To be usable, publishing software has to be compatible with the host desktop publishing system. Software packages designed to run on the Macintosh, for instance, will not run on the IBM PC unless they are extensively reworked, and vice versa. Moreover, there has to be compatibility within the system. Publishing software packages are complex and demanding of system resources.

They need a minimum level of processor power, memory, and operating system environment, and they need a printer using a compatible PDL. To be effective, they should also be able to cooperate with imported application packages designed for editing text and creating graphics.

Text, graphics, and file management

Although text and graphics are usually created in advance using separate, imported software, all publishing packages should provide facilities of their own as well. These include authoring tools such as spelling checkers and online thesauri; editing tools for searching for and replacing words and phrases and for moving blocks of text; and tools for generating graphics and editing them by cropping, scaling, and stretching.

Most desktop publishing software is designed to be used by individuals. Even at this level, hierarchical directories and directory search aids are important tools. There is a clear and growing requirement for group working, however, by linking workstations in a network. The implications are far-reaching in terms of, for instance, file management, security, and backup.

Formatting method

Broadly there are two alternative methods of composition formatting. One is called command-driven formatting (known alternatively as code-driven or structured formatting); the other is wysiwyg, which is short for 'what you see is what you get'.

In command-driven formatting, used for years in the classic text composition systems for commercial typesetting, typographers have relied on monospaced display of text on the screen with command codes embedded into the text string. The command codes specify variables that govern what the body text will be, what the headlines will be, what typeface to use, how much space (leading) to leave between lines, where to break words for hyphenation, and so forth. Command codes are executed when the document is ready for printing.

In wysiwyg formatting, the screen display looks as nearly as possible the same as the final printed page. Typefaces and sizes, letter, word and line spacing, hyphenation and justification — all should be faithfully reproduced on the screen. The operator can see in advance what each page will look like, and can make adjustments as necessary. Wysiwyg is generally preferred by non-dedicated desktop publishing system operators, particularly for short documents. Command-driven formatting is usually best for experts and long documents. One problem with wysiwyg is that the screen display cannot be made to look exactly like the printed page, for the reasons we have already discussed on page 32. Figure 4.14 summarises the advantages of the two approaches.

Figure 4.14: Command formatting versus wysiwyg

The two broad composition methods are command formatting and wysiwyg. Both have advantages.

Advantages of command formatting	Advantages of wysiwyg
— Less cumbersome for long documents	— Easier for beginner to use
— Easier format standardisation	— Errors can be spotted and corrected immediately
— Better for auto functions (eg numbering, indexing, cross references)	— Contains more visual information
— Reduced need for expensive high-resolution bit-map display	— Pages are easy to modify
— Better for group working	— Structure is readily apparent
— Enables drafting and printing to take place in different sizes and styles	— Better for complex composition

Composition features

Publishing software is designed to serve broad markets, so must provide a wide range of features. Every package is different, however, in terms of the features that are available and the extent of operator control over them. Composition features include multiple typefaces and sizes, variable word spacing, kerning, tracking, line spacing, hyphenation, indention, tabular ruling, text runarounds, and subscripts and superscripts.

Pagination features

Pagination is the makeup of a page or pages into full documents. Pagination aids include style sheets for standardising the appearance of a page, page-formatting tools, features for inserting running headers and footers, indexing aids, and so forth.

PROFILES OF LEADING PRODUCTS

There are literally dozens of different desktop publishing software packages on the market. Three leading examples are PageMaker from Aldus, Ventura from Xerox and Ready,Set,Go from Manhattan Graphics.

Designed originally for the Macintosh, though since reworked for the IBM PC, PageMaker was first on the market and still has the largest number of installations. Ventura was one of the first publishing packages for the PC and has proved to be

Figure 4.15: Profiles of publishing software products

Feature	PageMaker	Ventura	Ready,Set,Go 3.0
Compatibility	— Macintosh with 512k or PC AT with 640k — PC version needs graphics, board, mouse — PC version needs Windows — PostScript printers	— XT or AT compatible — MS-DOS 2.1 upwards — Gem operating environment — 512k memory upwards — Graphics display, mouse — Supports PostScript and Interpress	— Macintosh with 512k — PostScript printer
Text graphics and file management	— Limited text aids, but cooperates well with wide variety of specialist programs	— Limited text and graphics aids, but cooperates well with range of specialist programs — Good file management	—Useful range of aids for text and graphics
Formatting method	— Wysiwyg	— Wysiwyg	— Wysiwyg
Composition features	— Good range of features in most recent versions	— Fast composing speed: 6-20k cps. — Moderate composition quality and limited typographic flexibility	— Moderate composition quality — Text-repellent graphics
Pagination features	— Page-at-a-time, lacks style sheets — Tedious for long, structured documents	— Uses resizeable frames, but lacks vertical justification — Best for long documents	— Uses linked frames — Best for short documents

very popular. Available only for the Macintosh at the time of writing, Ready,Set,Go has been well received in its most recent form (version 3.0), which makes an interesting contrast with PageMaker. Figure 4.15 summarises the main characteristics of these three packages. We describe them in more detail in the paragraphs that follow.

PageMaker

As the first serious desktop publishing software package, PageMaker rapidly became the industry leader. Since then, the product has been enhanced and reworked to run on PCs and compatibles as well as the Macintosh. PageMaker is still widely regarded as the benchmark against which competitors are judged. It allows complete beginners to become compositors (though not skilled compositors, of course) almost overnight. Its great strength lies in the ease and flexibility it allows for laying out pages (see the description in Chapter 2 beginning on page 10).

Using wysiwyg formatting, PageMaker emulates old-fashioned cut-and-paste. You start by creating an electronic pasteboard, then cut up blocks of text electronically and lay them out to fit. Flexibility of use is virtually unlimited, but you have to work a page at a time. Text-editing features are no better than fair, but text can be imported from a variety of specialist word processing programs. PageMaker has impressive graphics handling. Composition features are good. On the negative side, however, PageMaker does not offer any kind of style sheets or embedded coding, so it is not the best choice for multi-page publications or for highly-structured documents.

PageMaker is sold through specialist computer retailers trained by Aldus, and through strategic alliances with selected suppliers such as Digital. Aldus' marketing strength and customer support is strong, which is one reason for its dominance. PageMaker is priced at around $500.

Ventura

Ventura is designed for long, structured publications such as technical manuals, but it can also handle short publications where every page is unique. Ventura runs on IBM XT and AT models and compatible products. Its principal strengths are its speed of composition and excellent pagination facilities with a strong emphasis on the use of style sheets to preserve consistency and conformity with house standards. Here the approach taken by Ventura is substantially different from PageMaker.

Instead of making up pages one by one, the idea is that you make up a whole document in one go. To

do this, you specify the page layout and composition features at the outset, by defining one or more style sheets and a set of user-definable tags. You can then read in a complete text file, and Ventura will format the whole document according to your specification.

Ventura provides a range of standard style sheets, and enables new ones to be easily created. Style sheets contain up to 128 tags for controlling composition features such as margins and columns, typeface, letter spacing, and line and paragraph spacing. Ventura also has a wide range of pagination features, including automatic numbering of footnotes, sections, and pages as well as indexing and figure listing. Text can be wrapped around graphics automatically. Graphics (and sections of text) can be automatically repeated through the document. You can work on documents that are normal size, reduced (to a full-page view), and enlarged. At reduced size, you can work on two pages side-by-side.

Ventura's weaknesses are that it has relatively poor support for text editing, and is somewhat difficult to learn. Although it is ideal for long, consistently styled documents, it is awkward for accommodating the occasional styling departures. It is less easy than PageMaker for short, complex documents. It is not good for making up display advertisements, for instance. It costs about $700, and comes on 11 floppy discs. Ventura supports both Xerox's Interpress PDL and PostScript. It is marketed by Xerox, which has worldwide distribution rights and support responsibility.

Ready,Set,Go 3.0

Ready,Set,Go 3.0 is completely different from earlier products of the same name. It runs on Macintoshes with at least 512 kilobytes of memory, and it supports PostScript. It has reasonably good support for text and graphics entry and editing. It provides most of the facilities of the Mac Write word processing package, though it is rather slow. It has automatic hyphenation and justification. On the other hand, Ready,Set,Go's composition features are not very sophisticated. It does not, for instance, permit any adjustments at less than integer point values. Although it is less powerful at creating graphics than text, graphics can be imported from programs such as Mac Paint and Mac Draw, then cropped, scaled, and repositioned. Graphics can be made text-repellent — in other words, text can be made to run around graphics.

Ready,Set,Go 3.0 is easy for a novice to learn. It works best on short documents with relatively light typographic demands. At about $400, it is certainly inexpensive. Although developed by Manhattan Graphics, Ready,Set,Go 3.0 is distributed by the Letraset subsidiary of Esselte, the Swedish supplier of office equipment with worldwide marketing interests.

THE APPLE MACINTOSH SYSTEM

Having looked so far in this chapter at component technology and publishing software, we turn now to complete desktop publishing systems. There are two of consequence: the Apple Macintosh, and the IBM PC and its compatible counterparts.

The Macintosh ushered in and catalysed the desktop publishing market. Many of its design features are well suited to desktop publishing: graphics handling, WIMPS user interface, and internal system consistency. With 100,000 systems in use for desktop publishing by the spring of 1987, the Macintosh was not only the industry leader, it practically *was* the industry. On the other hand, the Macintosh personal computer is something of a maverick. It has failed to gain a significant share of the corporate market, where the IBM PC and its compatible counterparts are firmly established as the product of choice. This shortcoming is one that Apple means to correct with its latest equipment announcements.

Macintosh is the name of a family of personal computing products. For convenience, it helps to split the family into two: products belonging to the original Macintosh family, and products in the Macintosh II family (see Figure 4.16 overleaf). Because the Macintosh II was not announced until spring 1987, it has so far had little impact on the desktop publishing market. In this section, we look first at the original Macintosh family and its suitability for desktop publishing, before providing a brief description of Macintosh II.

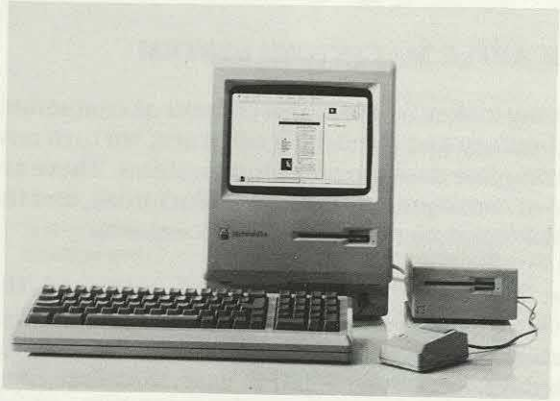
THE ORIGINAL MACINTOSH FAMILY

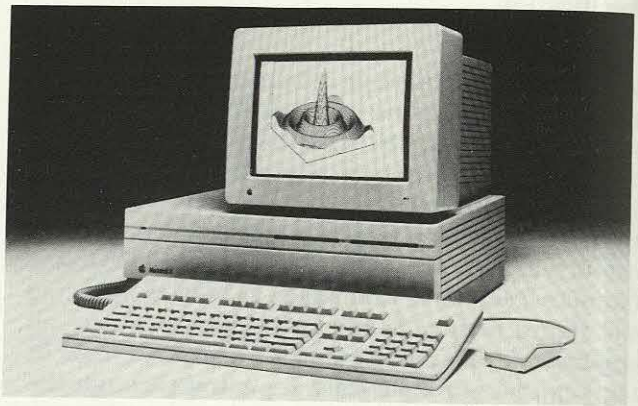
The family spans a number of products, from the basic Macintosh, introduced (in Europe) in January 1984, through successively more powerful variants, to the current top-of-the-line SE.

The basic Macintosh of 1984 had 128 kilobytes of memory and a single 400-kilobyte 3.5-inch floppy disc. It could connect up to a printer, and also to auxiliary disc storage and communications lines. To help cure its crippling shortage of memory and slow data transfer rates, the basic Macintosh was soon superseded by a 512-kilobyte-memory version, but the problems were not fully cured until two further versions were introduced in 1986. One was the Macintosh Enhanced, with slightly more speed and power than the 512-kilobyte version. The other

Figure 4.16: Original Macintosh and Macintosh II families

Members of the original family were all characterised by compactness, small screen size and portability. The Macintosh II, on the right, is much larger as well as more powerful.





Acknowledgement to Apple Computer UK Limited

(actually announced first) was the Macintosh Plus, with a 1-megabyte memory and numerous other improvements. The SE, announced in February 1987, is essentially a redesigned Plus, and probably will eventually replace it. It offers somewhat higher performance, an optional internal hard disc with capacity of up to 20 megabytes, and other improvements.

All the family members look much the same, and all share the same design philosophy. Small, light and transportable, all use the Motorola 32-bit 68000 processor series. All have a WIMPS user interface designed in from scratch. The WIMPS interface has its roots in work done by Xerox PARC in the 1970s. The WIMPS features — multiple overlayable windows for displaying text, graphics, and menus, and an icon and mouse combination for pointing and selecting — were all conceived at that time. Early attempts to bring the ideas to market, first by Xerox (with the Alto and Star) and later by Apple itself (with the Lisa) met with little success, mainly because of their price. It was not until the Macintosh's arrival that WIMPS really took hold.

Both the Plus and SE are powerful and congenial small computers that are well suited to desktop publishing. Both look similar, but in the SE Apple has produced what amounts to a second-generation family member. The differences between the two machines are summarised in Figure 4.17. Software that runs properly on the Plus will work just the same on the SE.

Their key strengths are the WIMPS interface, a sharp and stable bit-mapped display screen, excellent keyboard, and compactness. Other strengths are the consistency of the Macintosh operating environment: everything designed to work with a Macintosh — application software, printers, optional large screens, and so on — plugs in easily and works without the need for extensive conditioning. A major weakness of both Plus and SE is the small screen. Of great significance, too, is the Macintosh's low acceptability in the corporate environment, where many businesses reject it as a matter of policy, preferring instead to standardise on the IBM PC and its compatible counterparts. Apple has tried to do something about this, however, with the SE: it offers an optional bridge to the PC in the form of a compatible (8086) co-processor and IBM-format floppy disc controller.

Finally, Apple is strong in low-cost networking. Its AppleTalk network, introduced as an inexpensive way for several Macintoshes to share a LaserWriter, has blossomed into a fully fledged network architecture.

THE MACINTOSH II

While the Macintosh II continues with the WIMPS tradition, it is a completely new, more powerful, and physically larger machine than any member of the original family. It has the raw power of an engineering workstation, at the price of a top-end desktop computer. It can run software properly written for the original Macintosh family, but works better with new software written specially for it. It has the capacity and design features to allow it to work in cooperation with (and even, in emulation mode, actually as) a PC, which should help it go a step beyond the SE in reducing corporate resistance.

There is a choice of screens, both about double the area of that of the original family. One is a 12-inch

Figure 4.17: Comparison of Macintosh Plus and Macintosh SE

	Plus	SE
Screen	9" diagonal, 6¼" × 4¾" 512 × 342 square pixels, bit mapped	9" diagonal, 6¼" × 4¾" 512 × 342 square pixels, bit mapped
Keyboard	Typewriter keys, numeric keypad, cursor controls, mouse	Typewriter keys, numeric keypad, cursor controls, mouse
Processor/operating environment	68000, 1-megabyte memory, WIMPS	68000, up to 4-megabytes memory, WIMPS
File storage	Single floppy standard, with 800k HFS, optional external floppy disc or hard disc	Dual floppy standard, internal 20 megabytes hard disc optional with optional external hard discs
Features		Optional 8086 coprocessor for PC compatbility, external video drives

monochrome, the other a 13-inch colour screen. Both work with a 640 x 480 pixel display, which gives roughly the same number of pixels per inch as original Macintoshes (around 70 dots per inch). Up to 8 bits per pixel are available, which means 256 grey levels or 256 colour shades. The processor is a Motorola 68020. A 32-bit processor with a 32-bit datapath, it has four times the power of the Plus' S68000. Memory capacity is up to 8 megabytes. There is capacity for up to 80 megabytes of file storage internally, and more storage can be connected externally if necessary.

More importantly, the design of the Macintosh II is 'open', enabling it to connect with non-Apple equipment — most notably IBM's. Apple itself will sell a feature allowing the Macintosh II to read and write IBM floppy discs. Third-party suppliers are already moving to supply products that emulate the IBM PC. It could even be used as a Unix workstation (see page 47), raising the possibility of its running powerful technical publishing software such as Interleaf.

The Macintosh II justifies new application software to exploit its advantages fully, and we can expect to see a number of announcements in the near future. Whether Apple will continue to dominate the desktop publishing market with the Macintosh II is a question we address in Chapter 6.

IBM PC SYSTEM AND COMPATIBLES

Introduced in 1981, IBM's PC became an overnight success. It first made the industry respectable, then gave rise to a large number of compatible lookalikes from specialist suppliers anxious to offer the same or better performance at lower price. Sales of PCs and compatibles have exceeded 10 million, capturing 90 per cent of the business market for personal computers. But PCs and compatibles only began to make their mark in desktop publishing in 1987, two years behind the Macintosh. Designed as character rather than graphics machines, it was not until 1987 that sufficient add-on products became available to make them adequate for desktop publishing. These products are available from non-IBM suppliers. At the time of writing, IBM itself was not marketing a complete, turnkey desktop publishing product in Europe.

Like the Macintosh, the PC is a family of products. Unlike the Macintosh, compatible equivalents to each family member are widely available. Only the most powerful are suitable for desktop publishing, and then only as a basis for it — they have to be enhanced. IBM's recently announced new generation PS/2 range is better suited to desktop publishing. In the paragraphs that follow we describe first the PC family, then compatibles, and finally the PS/2.

THE IBM PC FAMILY

The IBM PC family ranges from the original PC to the much more powerful PC AT (AT for short). All are character (as opposed to graphics) machines, all use the Intel 8086 processor series, and all share a common operating system, Microsoft's MS-DOS, known as PC-DOS on the IBM family. PC-DOS places limits on memory capacity. Moreover, to provide a graphics capability, PC family members have to be fitted with a graphics adaptor, a graphics display screen, a mouse, and a WIMPS operating system able to run under PC-DOS. As a result, all but the most powerful PC family members are nonstarters for desktop publishing.

To understand how this has come about, a little history is helpful. When IBM introduced the original PC in 1981, it had a 64 kilobyte memory (with an option to expand to 128 kilobytes), one 5.25-inch floppy disc drive, and a processor based on the Intel 8088 chip. It was followed by the XT, with a hard disc having improved file management. Late in 1984, IBM introduced the AT, based on Intel's 80286 chip (a genuine 16-bit chip, as opposed to the

hybrid 8-bit/16-bit of the 8088). The AT is faster than the XT and is able to address more memory. Even so, the AT's memory capacity is limited. Because of a basic constraint in PC-DOS, only 640 kilobytes of memory are available for application programs. Another constraint of PC-DOS limits the size of a hard disc to 32 megabytes. (Using larger discs is possible, but the software splits them into separate units.)

The standard PC is driven by commands from the keyboard. There is nothing in MS-DOS that prevents an application program from offering a more congenial user interface. Graphic tables, mice, and touch screens are all available for it. But it is up to each application program to specify the use of these devices. As a result, each program is a little bit different. The IBM PC lacks the consistency of a Macintosh, in which everything works the same way.

For a PC to work effectively as a desktop publishing system, it first needs to be turned from a character into a graphics computer to permit graphics composition and wysiwyg displays, and it also needs to be given a WIMPS user interface.

Doing the first is relatively easy — for the AT, that is, which has become the standard PC for graphics applications. There is a choice of graphics adaptors for the AT. The two that are most practical are the Hercules monochrome adaptor and IBM's own Enhanced Graphics Adaptor (EGA). The Hercules adaptor has become a *de facto* standard for modest-cost, medium-resolution graphics on the AT. It produces the same quality text as the PC, together with full bit-mapped graphics at 720 x 348 pixels. Large screens are a useful addition, to improve readability. One of the most popular models for desktop publishing is the Wyse 700. Measuring 12 inches diagonally, the screen has a resolution of 1280 x 800 pixels, giving about 100 pixels per inch.

Figure 4.18: IBM PC with WIMPS interface

Acknowledgement to IBM United Kingdom Limited

WIMPS interfaces, on the other hand, have only recently become available on the AT. By far the most important is Microsoft's Windows operating system. A second is Digital Research's Gem. A cut-down version of Windows comes bundled in with the PageMaker software package for the PC. Similarly, a cut-down version of Gem is bundled in with Ventura. Figure 4.18 illustrates an IBM PC running with a WIMPS interface.

The overheads of graphics-handling and WIMPS on the PC are considerable. The top-of-the-range AT, with its full complement of memory, is barely enough to support them.

PC-COMPATIBLES

The business of making PC-compatibles has flourished since the PC's first success found IBM unable to meet demand. Suppliers of compatible computers have tried to achieve operating equivalence, at the same time offering improved performance at a similar price or equivalent performance at a lower price. Achieving equivalence has been difficult, particularly at the software level. The problem has been to avoid infringing IBM's own copyrighted code.

Not all computers claimed to be PC-compatible actually are that. Some — the so-called clones — get very close. Only the clones corresponding to the AT are of interest for desktop publishing. Others lack the necessary speed and power. The newest clones, such as Compaq's 386, use Intel's upgraded 80386 processor to provide more speed, but they still suffer the memory limitations of MS-DOS that we have already described.

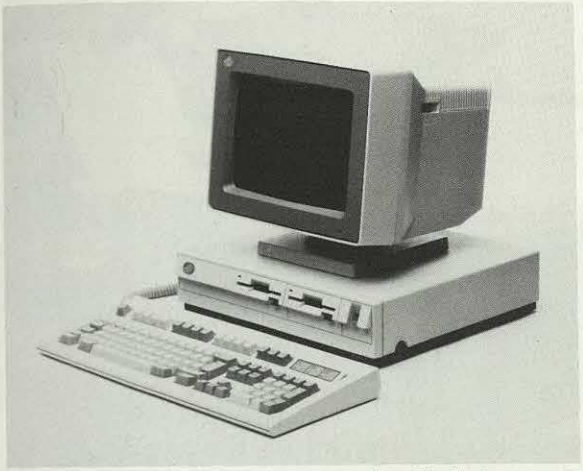
IBM's PS/2

In April 1987 IBM ended months of speculation and began a new chapter in personal computing with the announcement of the next-generation Personal System/2 series (see Figure 4.19). The PS/2 series is designed to overcome the limitations of the PC, and deliver IBM from the invasion of compatible suppliers (by 1987, compatibles were outselling the PC by two to one).

The PS/2 label really covers two distinct product lines. The low-end Model 30 is a 8086-based machine that preserves the old PC architecture and runs under PC-DOS. The remaining higher-level PS/2 machines, the models 50, 60, and 80, use the 80286 and 80386 chips, and will run under IBM's new OS/2 operating system. OS/2 overcomes the limitations of PC-DOS, but puts IBM in the position of promoting a new standard to replace the one it set six years ago.

Figure 4.19: IBM PS/2

IBM's PS/2 is a next-generation family of business personal computers. The illustration shows the PS/2 Model 30-002 with monochrome display 8503 and IBM Personal System/2 keyboard.



Acknowledgement to IBM United Kingdom Limited

At the same time, there is a single graphics environment that ties MS-DOS and OS/2 together: a new version of Microsoft's Windows. Virtually all new software for PS/2 will now be developed under Windows. This will include Ventura, which currently runs under Gem. It is the PS/2 models running Windows and OS/2 that will become the staple machines for desktop publishing. Neither these models nor the desktop publishing application software to run on them are likely to be available in any substantial quantities before 1988, however.

OTHER SYSTEMS

Desktop publishing in our view is characterised by its use of compact, low-cost equipment. Workstations are those of business personal computers, which can be used to perform a wide range of tasks. The price of a complete system, including software and laser printer, lies typically in the range $6,000 to $10,000.

Many other, more expensive, systems are used for corporate electronic publishing. At the top end are sophisticated professional typesetting systems, costing $50,000 and upwards. Between them and desktop publishing there is a middle ground of systems for office and technical publishing, costing typically in the range $15,000 to $30,000 per workstation. Compared with desktop publishing systems, their workstations are more powerful and they run, more often than not, under the Unix operating system. Because many have their roots in engineering workstations for CAD, their emphasis is on graphics rather than text handling. They are more adept at networking, too.

Inevitably, however, the distinction between technical publishing systems and desktop publishing is blurring. The former are gaining improved text editing, composition and pagination features, and are falling in price. The latter are becoming more sophisticated, particularly in their graphics handling. To complete this chapter we look briefly at two types of product that, strictly, fall outside our definition of desktop publishing yet are close to the boundary: the Xerox Documenter systems and Unix-based workstation systems.

THE XEROX DOCUMENTER

Xerox is one of the world's leading suppliers of office systems, and Documenter is its leading mass-market product for corporate electronic publishing. Priced in the range $10,000 to $15,000, Documenter is a complete turnkey package of workstation, software, and laser printer (see Figure 4.20 overleaf).

Designed for producing long, complex reports, Documenter has a number of attractive features. It is a direct descendant of the original Star system. It comes with a choice of two large, high-resolution monochrome screens. The larger, 19-inch, screen has 1184 x 925 pixels, and can show a full-size A4 page with room to spare. There is a QWERTY keyboard with function keys, and an optical mouse. The standard Documenter is supplied with 1.1 megabytes of RAM as standard and a 10-megabyte hard disc (both can be extended). The laser printer, the Xerox 4045, doubles as a photocopier.

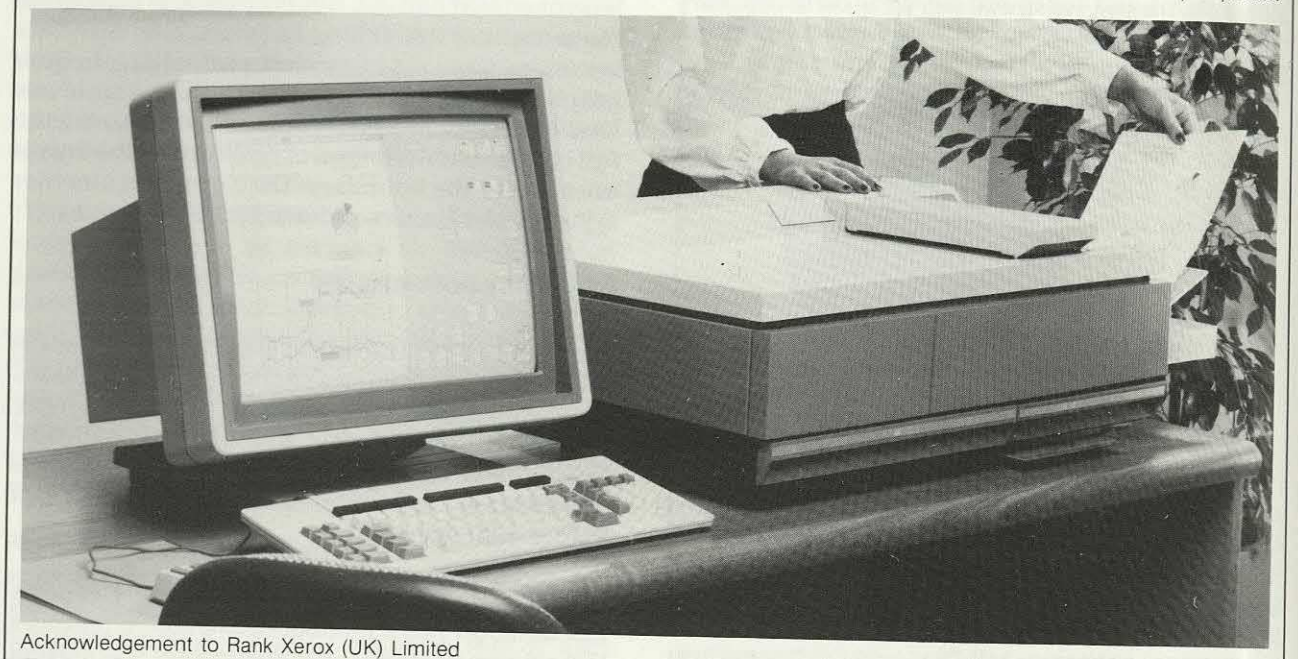
The Documenter runs with proprietary Xerox software called ViewPoint, which looks after the complete gamut of system operation, WIMPS user interface, editing, and page makeup. ViewPoint operators are impressed with the comprehensive range of aids it provides for text editing and graphics design. On the other hand, they have found the WIMPS user interface to be less straightforward than that of, for instance, the Macintosh. The Documenter can be equipped to emulate the IBM PC and so can run PC programs like Lotus's 1-2-3 spreadsheet. Surprisingly, Documenter is not able to work directly with Xerox's own Ventura publishing software.

UNIX WORKSTATION SYSTEMS

Unix is the standard operating system for workstations used in engineering, design, and research work. Nearly all of these workstations are more powerful and more refined than IBM PCs. Their importance for corporate electronic publishing lies in the growing volume of publishing software that is becoming available for them.

Figure 4.20: Xerox Documenter

The Documenter consists of the 6085 Professional Computer System running ViewPoint software and the 4045 laser copier/printer.



Acknowledgement to Rank Xerox (UK) Limited

Conceived by AT&T in the 1970s, Unix is vastly more sophisticated than MS-DOS. It has support for multitasking (enabling printing at the same time as text editing, for instance), multiple simultaneous users, intercomputer communications, and powerful program development tools all basic to its design.

Workstations running Unix are now well established, particularly in the manufacturing industry, design studios, and universities. Examples are workstations from Sun Microsystems, Apollo, Computer Corp, and Digital (with the microVax II). These workstations have much in common. Typically they feature a large, high-resolution bit-mapped screen (approximately 1024 x 1024 pixels), a processor from the Motorola 68000 family (though the Digital microVax II is an exception, using Digital's own proprietary chip), 1 to 4 megabytes of memory, and around 100 megabytes of hard disc storage. Because of the importance of graphics in engineering and design, there is always a WIMPS user interface.

The attributes that make Unix workstations attractive for CAD and graphic design also apply to publishing applications: powerful processors, high-resolution bit-mapped display screens, multitasking, and networking. Moreover, the professionals who operate these workstations spend a significant proportion of their time in technical writing. It is no wonder that a growing choice of publishing software already exists for Unix workstations, from suppliers such as Interleaf, Omnipage, Xyvision, and Texet. Often the software is sold as part of a turnkey system that bundles together a complete workstation, operating system, and application programs for graphics, text editing, and document production.

Interleaf, one of the best-known suppliers of publishing software, sells not only turnkey systems, but also a simplified version of its software through four selected suppliers — Apollo, Digital, Sun, and IBM (the RT personal computer is IBM's sole Unix system). The Interleaf software is extremely powerful. Its facilities for composing text — and particularly for creating and manipulating graphics — are more extensive and sophisticated than its counterparts, such as Ventura, designed for desktop publishing on low-cost business personal computers.

But Unix-based systems do have disadvantages. They cost several times as much as their desktop publishing counterparts. Moreover, Unix is more difficult than MS-DOS for the casual user. It is also less robust (Unix systems frequently justify a resident expert) and less well standardised.

Chapter 5

PLANNING AND IMPLEMENTING SUCCESSFUL DESKTOP PUBLISHING

Earlier chapters in this report have been concerned with what desktop publishing is, where it fits in, and what it can (and cannot) do. They have also examined the benefits and costs of using desktop publishing, and provided an introduction to the complex subject of system components and how they work.

From the standpoint of the senior executive charged with responsibility for describing whether, when, and how his organisation should enter the desktop publishing field, there is no more important subject than planning and implementing successful desktop publishing in the corporate environment.

Much depends, as ever, on planning in advance: identifying opportunities, selecting applications, and assessing the payback. Selecting equipment and software, managing the human resources involved, and monitoring and developing the installation are all steps that benefit from the application of a methodical approach. Such an approach is outlined in this chapter. With its emphasis on checklists and guidelines, it aims to provide a framework that readers may adapt to their own circumstances.

Figure 5.1: Steps in planning

Three activities divide into seven main steps

Activities	Steps
Investigating the current position	1. Review the need 2. Filter desktop publishing opportunities
Evaluating desktop publishing requirements	3. Evaluate desktop publishing requirements
Estimating costs and preparing a business case	4. Accumulate benefit values 5. Estimate cost of desktop publishing solutions 6. Select documents for desktop publishing 7. Prepare business case

ASSESSING THE OPPORTUNITIES

This section is about planning in advance of implementation. It is unwise to implement desktop publishing before establishing its financial justification. There are several steps to take, as shown in Figure 5.1 under three activity headings: investigating the current position, evaluating requirements, and preparing the business case.

Sometimes these steps will be carried out as part of a larger exercise in planning office systems; and at other times in isolation, as described here. Either way, there is no point in being overanalytical. Analysis is costly, and it takes time. If its only achievement is to delay reaping benefits, it is counterproductive.

INVESTIGATING THE CURRENT POSITION

There are two steps in this activity: reviewing the need for desktop publishing, and identifying opportunities.

Reviewing the need for desktop publishing is a simple preliminary step that helps to focus on objectives. It makes little sense to embark on desktop publishing before you know what it is you wish to achieve. Desktop publishing can bring benefits in many ways, as we have already pointed out in Chapter 3. They boil down to three: improved document appearance, faster turnaround, and reduced cost.

These same three benefits can be turned into goals. Figure 5.2 overleaf shows how symptoms can be linked to these goals. For instance, when it is known that a major source of concern is that corporate publishing costs are rising out of proportion to volume, it points to a requirement for reducing costs. Having a list of known symptoms like the one in Figure 5.2 should help to clarify the nature of the goals. Prioritising the symptoms by using a simple form of weighting enables the goals to be rank-ordered.

The next step in investigating the current position is to determine the scope for desktop publishing, identifying the broad classes of documents that are

Figure 5.2: Linking symptoms to goals

Recognised publishing symptoms can be linked to improvement goals

Symptoms	Goals		
	Improved quality	Faster turnaround	Reduced cost
Appearance of corporate documents is inconsistent	✓		
Corporate image needs updating	✓		
Documentation standards not tightly controlled	✓		
Appearance of key marketing document inferior to competition's	✓		
Typesetting and printing blockage causes delays		✓	✓
Internal control of document progress is haphazard		✓	✓
Corporate publishing costs rising out of proportion			✓
Publishing department is overloaded		✓	✓
Product delivery delayed awaiting documentation		✓	

suited to it by filtering them out from the remainder. In essence, this requires identifying the classes of documents that correspond to the shaded band shown in Figure 3.2 on page 23. Commonly, this entails a survey. The purpose is twofold: to identify the main document classes, and to collect enough information about each class to decide whether the class is appropriate for desktop publishing.

Identifying the main document classes is usually straightforward. The list is likely to bear at least some resemblance to that shown in Figure 1.7 on page 6. Collecting basic information about each class of document takes rather more effort, however. It involves sampling representative documents to build up for each class a general picture about document length, complexity, urgency, and so forth.

A form like the one shown in Figure 5.3 can be helpful for collecting the information. It enables document characteristics to be evaluated. They can then be scored, say on a scale of one to five. The total score can then be compared against a yardstick score range for desktop publishing, along the lines explained on page 22 (and illustrated

Figure 5.3: Document data collection form

Example of a form for collecting information about documents and document classes.

Document class .....
Document identification .....

Document characteristics:
- Frequency .....
- Length .....
- Copies .....
- Reprographic quality .....
- Tables .....
- Graphics .....
- Urgency .....

Improvement potential:
- Appearance .....
- Turnaround time .....
- Cost .....

Figure 5.4: Improvement assessment form

Example of a form for comparing before and after desktop publishing.

General characteristics:
- Document class .....
- Document number .....
- Description .....
- Source .....
- Distribution .....
- Pages per original .....
- Originals per year .....

Before desktop publishing

Department	Hours	Rate	Cost

Turnaround time:

After desktop publishing

Department	Hours	Rate	Cost

Turnaround time:

Benefit value of desktop publishing

	Per original	Per year
Improved appearance		
Reduced turnaround time		
Reduced cost		
Total		

in Figure 3.4). The form shown in Figure 5.3 has spaces on it for collecting further information at the same time about urgency, and improvement potential. This information helps in selecting which class of document to desktop-publish first.

EVALUATING DESKTOP PUBLISHING REQUIREMENTS

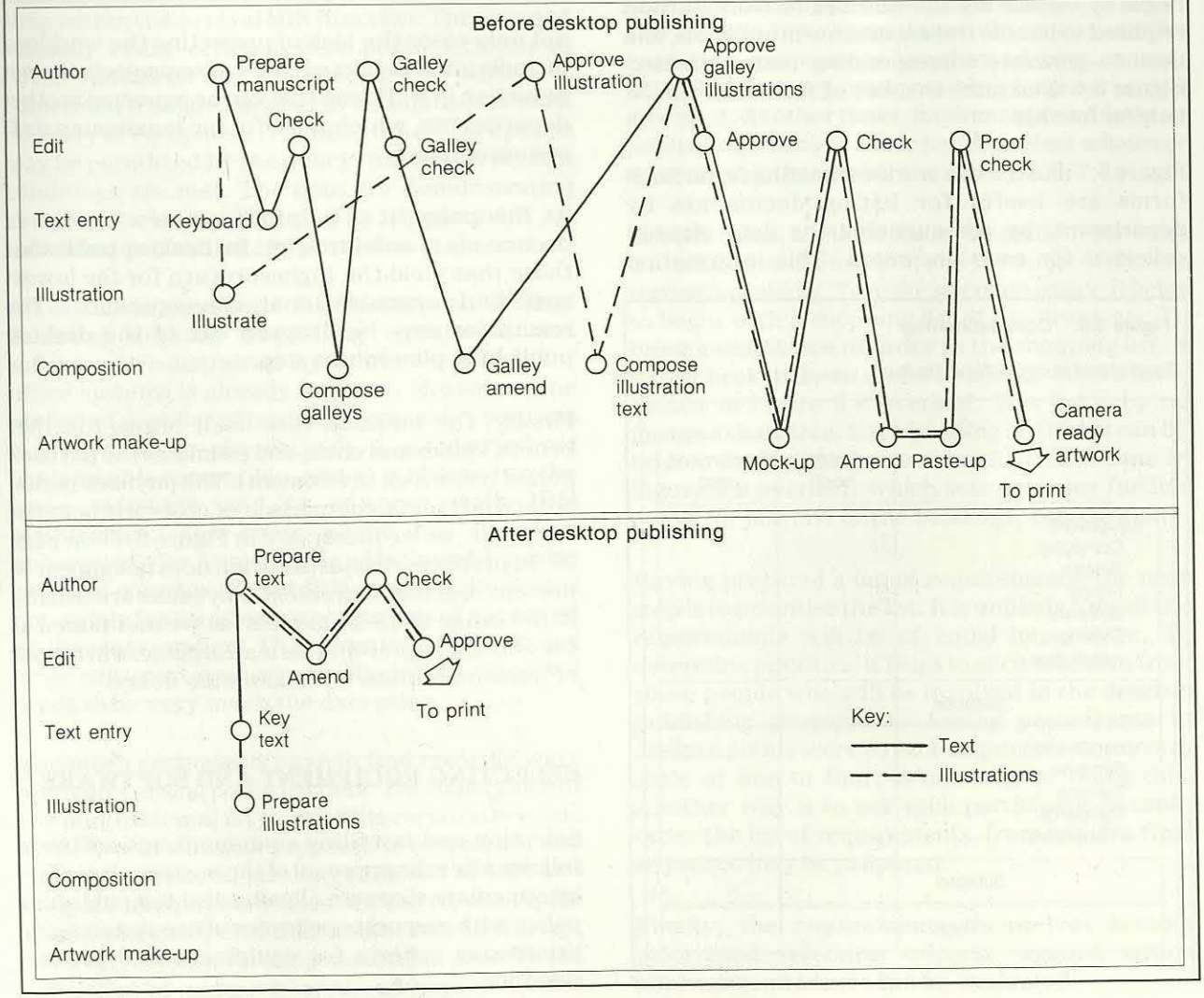
Having investigated the current position to assess the scope of desktop publishing opportunities, the next activity is that of evaluating requirements.

For each document class, the first step is to assess the value of improvements. This time it may be necessary to examine individual documents. The purpose is to build up a comparative before-and after-picture. Figure 5.4 illustrates the sort of form that can be used for this step, one form for each document (or document class). General characteristics of the document, such as its source and distribution, are first noted on the form. The main purpose of the form, however, is to capture before-and-after estimates of publishing elapsed time and production cost, to assess the benefit value of desktop publishing.

To obtain elapsed time and production cost estimates, it helps to prepare a workflow chart of the sort shown in Figure 5.5. This chart records the main processes or departments that a document passes through on its way from authoring to camera-ready artwork, both for conventional publishing ('before') and for desktop publishing ('after'). The time spent in each department can be estimated and noted on a form like the one shown in Figure 5.4; as can the publishing elapsed time. Finally, the benefit value of using desktop publishing may be obtained from the form, from the difference between the before and after estimates.

Figure 5.5: Document workflow

The charts illustrate the reduction in process steps after introducing desktop publishing.



ESTIMATING COSTS AND PREPARING A BUSINESS CASE

The final activity in the planning phase is the preparation of a business case. This means accumulating benefit values, estimating desktop publishing costs, selecting documents, and finally preparing a payback analysis.

The first step, accumulating benefit values, simply entails adding up the values recorded separately for each document. The second step, estimating costs, is rather more involved. In Chapter 3 we mentioned the cost elements that need to be taken into account and showed a summary of costs by workstation (Figure 3.15 on page 28). Assessing the cost on a per-workstation basis is one approach. To arrive at a final cost means estimating the number of workstations that will be required. That depends on the number and size of documents to be processed. This information can be extracted from the data collection forms (shown earlier in Figure 5.3 on page 50).

An alternative approach to cost estimation is to begin by estimating the number of workstations required to handle the documents in question, and then to generate corresponding cost estimates. Figure 5.6 illustrates the sort of form that can be helpful for this.

Figure 5.7 illustrates a work-estimating form. Such forms are useful for listing documents by department, by resequencing the data already collected for each document. This information not only eases the task of projecting the workload on individual departments, it also projects the net reduction in workload that can be expected in other departments, which is useful for reassigning staff responsibilities.

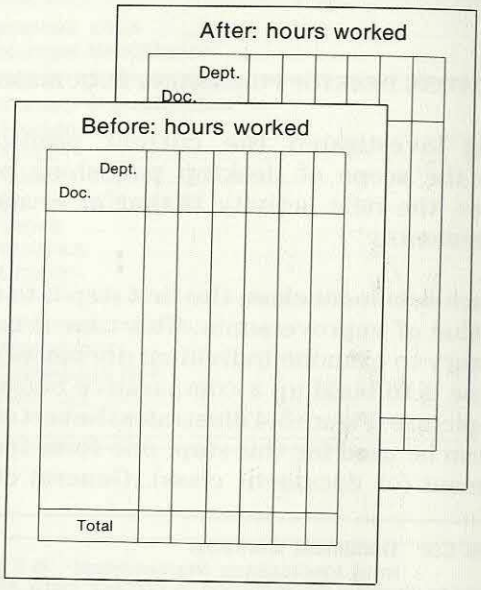
Figure 5.6: Cost estimating

Example of a cost-estimating form.

	Entry cost	Continuing cost
Equipment: Computer Screen Printer Software Cabling Installation		
Subtotal		
Administration: Surveys Training Standards Procedures		
Subtotal		
Total		

Figure 5.7: Work-estimating form

Example of a form to record workload by document, by department. The same form can be used before and after desktop publishing.



At this point, it is helpful to review the list of documents in order to select for desktop publishing those that yield the highest return for the lowest cost and organisational consequences. The remainder may be dropped out of the desktop publishing plan in this step.

Finally, the business case itself brings together benefit values and costs, and estimates the payback period (return on investment). The payback period is derived from a comparison of costs and benefits over time, as we illustrated in Figure 3.17 on page 29. In practice, cost justification does not appear to present much of a problem. Paybacks are usually in the range of 18-24 months (as we mentioned at the end of Chapter 3). This is an argument in favour of implementation with minimum delay.

SELECTING EQUIPMENT AND SOFTWARE

Selecting and installing equipment and software follows after the approval of the business case. Two intermediate steps are aligning desktop publishing policy with corporate policy for office systems, and prioritising criteria for equipment and product selection.

ALIGNING WITH CORPORATE POLICY

Today, most business organisations — certainly large organisations — have in place a policy for office systems. Office system policies enable the introduction of office systems, and particularly personal computers, to be controlled. The main purpose is to avoid the proliferation of incompatible products. This first became a worry in the late 1970s when personal computers became affordable on departmental budgets, below the level of the MIS radar. Today, office system policies are often administered by a review panel whose members represent functions such as office administration, finance, and MIS (according to Butler Cox research, MIS representatives tend to dominate, at least in Europe).

The value of an office system policy is becoming increasingly evident following the growth of distributed computer networks within organisations. According to a recent survey by the New York-based Diebold group of management consultants, major US companies now spend more on computing activities at the departmental level than within the central MIS function. The scope of virtually every office system policy extends to cover standards for equipment and software. Sometimes a single supplier is mandated for each category of equipment. At other times, exceptions may be permitted by the policy, but only if certain conditions are met. The onus for demonstrating compliance is usually on the department or individual requesting the purchase.

All of this is significant for desktop publishing. Selecting desktop publishing equipment and software is constrained by whatever policy for office systems is already in place. Moreover, the preferred supplier of business personal computers is often IBM, or alternatively a supplier whose equipment is compatible, and so is able to run the same software and to connect with IBM mainframes. The consequence has been an unhappy one for Apple. Apple's Macintosh business personal computer is not IBM-compatible, so it is not widely featured on corporate lists of approved equipment suppliers. This is particularly so among large organisations, where Macintosh approval tends to be very much the exception.

Macintosh enthusiasts have to find creative ways of circumventing policy barriers. The experience of one multinational is typical. This corporation, one of the world's largest suppliers of petroleum and chemical products, mandates the use of IBM and compatible equipment for office systems. Apple Macintoshes are permitted in some research areas, however. By interpreting somewhat loosely the definition of research area, advocates of the Macintosh as a tool for desktop publishing have been able to introduce them to work alongside IBM personal computers in document production areas, but only in small numbers.

Policy barriers excluding IBM-incompatible equipment from the office environment are, we believe, unlikely to be relaxed in the near future. But bridging between non-IBM and IBM environments will become easier, enabling the meaning of compatibility to be more liberally interpreted. This is what is meant by 'openness'. Apple's AppleTalk network can already accommodate IBM PCs and can connect to IBM local networks. The newest Macintoshes, the SE and the Macintosh II, can be made to run IBM PC files and even to run with IBM software.

PRIORITISING SELECTION CRITERIA

Some implementers of desktop publishing will be looking for software to install on the office workstations they already have in place. These will usually be IBM PCs or compatibles, which implies not only a desktop publishing software package but also the Windows operating environment and the hardware components (graphics adaptor, mouse, extended memory, and possibly a large screen) to go with it. At other times, implementers of desktop publishing will have a free hand to select whatever systems suit them best.

In both cases, a choice has to be made from what is available on the market, and the range of choices is growing rapidly. To make selection easier, it helps to begin with a shopping list of requirements. To bring a semblance of order to the shopping list, it is best broken down under headings. Such a list is shown in Figure 5.8 overleaf. This list is by no means exhaustive. Each heading on the list can be broken down into greater detail. This is done in Figure 5.9 overleaf, which sets out some further detail for just one of the headings, composition.

Having prepared a list of requirements, the next step is to prioritise the list. It is unlikely that all the requirements will be of equal importance. To determine priorities, it helps to elicit reactions from those people who will be involved in the desktop publishing programme. Asking participants to assign a points score to each requirement, say on a scale of one to four, is one way of doing this. Another way is to ask each participant to rank-order the list of requirements, from which a final sequence may be prepared.

Finally, the requirements themselves become prioritised selection criteria, against which alternative products can be evaluated.

Figure 5.8: Requirements list

The following is a typical shopping list of system requirements for desktop publishing:

Compatibility
- With imported files and software
- With the preferred supplier environment

Text, graphics and file management
- Authoring tools
- Editing tools
- Graphics packages

Formatting method
- Wysiwyg
- Command driven

Composition features
- Range of typefaces and sizes
- Spacing increments
- Hyphenation and justification
- Tabulation
- Kerning

Pagination and printing features
- Style sheets
- Page formatting tools
- Indexing aids
- Print speed
- Print resolution
- Page size
- Paper handling
- Printer work-rate limitations (duty cycles per month)

Ease of use
- Footprint
- Screen characteristics
- Response time
- WIMPS features
- Keyboard
- Split screen/large screen features

Ease of learning
- Switch on and use ('plug and play')
- Built-in prompts

Expendability
- Multiuser networking
- Multiuse features
- Office system links
- Mainframe and database links
- File capacity
- Processing power
- Document management

Supplier support
- Training
- Maintenance contracts
- Warranty
- Customer advisory centre
- Backup
- Instruction manuals
- Credibility
- Reputation

EVALUATING EQUIPMENT AND SOFTWARE

Given a list of prioritised selection criteria, evaluating alternative products is a matter of assessing how well each one meets the criteria. Figure 5.10 illustrates the approach. Three products labelled A, B, and C have each been evaluated on a scale of one to four against the criteria listed in Figure 5.8. Each selection criterion has been weighted, again on a scale of one to four, to represent its relative priority. The final choice is reflected by the total points scores.

The simple mechanistic nature of this procedure is designed to assist what is otherwise a complex evaluation, but nonetheless it hides several problems. The first is that of choosing weightings. Should the weighting scale be greater than, equal to, or less than the scale for scoring individual criteria? Should the scale be linear (as in Figure 5.10) or nonlinear? Quite aside from these questions, it is rarely easy to assess how different products score against the criteria. Objective information is not easy to find, and the rapid rate of change to product specifications presents a further difficulty. What is important is to collect comparative information rapidly and at a consistent level of detail from a variety of sources. Figure 5.11 lists some of the sources of information that are available.

Having selected the equipment, the order can be placed. In our survey of desktop publishing users, we asked respondents to name the department responsible for equipment ordering. The results are shown in Figure 5.12. At present there is little

Figure 5.9: Composition features

The following is a list of considerations:
- What constraints on typeface, point sizes, leading, line length, margin setting, indenting, text centring, graphics manipulation?
- How are formatting codes entered?
- How is hyphenation performed, and how can you control it?
- Can words be added/deleted, and with what impact on the whole document?
- Special features for ragged setting?
- Tabular setting features?
- What control over interword spacing?
- What control over interline spacing (leading)?
- What control over intercharacter spacing (kerning), and if so what increments?
- Automatic runaround of text past graphics?
- Control over text and graphics position, scale, stretch, and rotation?
- Multiple-page tables?
- Mathematical formulae?
- Multiple language founts?
- Syntax features?
- Speed of execution?
- Composed file can be reprocessed through conventional import and editing?
- Screen display represents what will print?

to choose between the MIS department and technical and professional staff in operating departments. This position is expected to change, though, according to our respondents: by 1990,

Figure 5.10: Scoring selection criteria and products

The table shows priority scores for selection criteria applying to three products: A, B, and C. Weightings are applied in the table, leading to total weighted scores for each product.

W: Weighting of criterion (Scale 1 to 4)
S: Scores how well product meets criterion (Scale 1 to 4)
WS: Weighted score

Selection criteria	W	A		B		C	
	Weighting	S	WS	S	WS	S	WS
Compatibility	4	3	12	3	12	2	8
Text, graphics and file management	2	4	8	3	6	4	8
Formatting methods	3	4	12	1	3	2	6
Composition features	3	3	9	3	9	2	6
Pagination features	1	1	1	3	3	3	3
Ease of use	3	3	9	1	3	2	6
Ease of learning	2	3	6	2	4	3	6
Extendability	4	1	4	3	12	3	12
Supplier support	4	2	8	2	8	1	4
Total weighted score			69		60		59

Figure 5.11: Sources of information

Information can be gathered from a number of sources:

— Suppliers' literature
— Specialist magazines
— Conferences and shows
— Consultants
— Training courses
— Specialist publications
— User groups
— Industry associations
— Publishing research groups

they expect MIS to be the dominant purchaser of desktop publishing equipment.

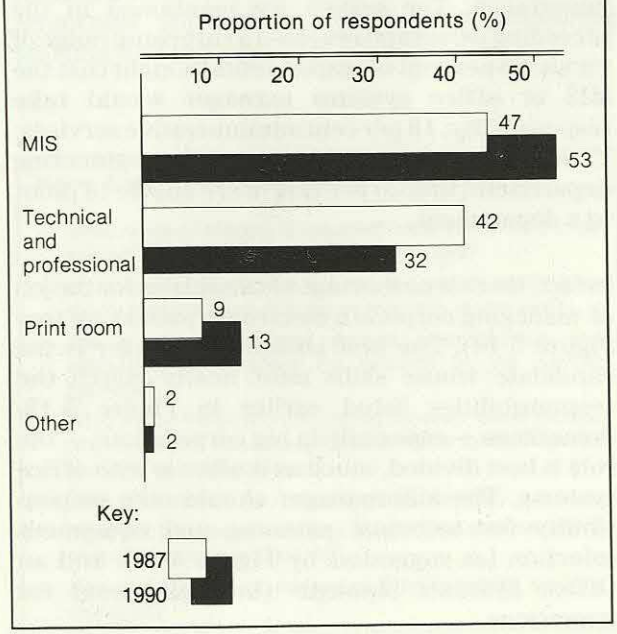
To help resolve problems, test procedures and standards, and evaluate resourcing and training requirements, introducing desktop publishing first on a pilot basis (or even through a service bureau) may be a good idea. There are few hard-and-fast rules about the wisdom of piloting desktop publishing before moving on to full-scale implementation. Although pilot trials are not usually cost-justified, a leading publishing house did justify theirs. This publisher is one of the leaders in the field of learned journals. Its Journals Department produces 400 titles a year, many of them in small runs. The company has been piloting desktop publishing in its marketing department, preparatory to introducing it much more widely in the Journals Department. Three standalone PC-compatible workstations (Apricot XD45s) have been used for the pilot trial, each equipped with a large A3 screen and each running PageMaker software. Page masters are printed on an Agfa P400 laser printer at 406 dots per inch, and are checked for quality by the studio manager.

The pilot trial has been arranged by the director of information technology and involves the marketing manager and four clerk-typists. The major benefit of desktop publishing in the marketing department has been a reduction in turnaround time from six weeks to two weeks for catalogues. Flysheets for mailing are produced within a day. Payback is expected within a period of 18 months in the marketing department, on the basis of improved turnaround alone. Publishing capacity is likely to be increased as well, however. Given more flysheets — for instance, for specialised book fairs — there could be an increase in sales.

Looking to the future, desktop publishing could mean a much larger payback for the organisation following its installation in the Journals Department. According to the director of information technology, the benefit would be one of cost reduction, amounting to at least 10 per cent per typeset page and saving the company more than £3 million ($4.8 million) a year.

Figure 5.12: Buyers of desktop publishing

Our respondents reported the following buying departments as being responsible for purchasing:



MANAGEMENT, STAFFING, AND TRAINING

Equipment selection is an important issue, but managing and staffing are vital considerations if the equipment is to be used efficiently. In this section we address this topic first, and then go on to examine the implications of group working.

MANAGING DESKTOP PUBLISHING

A characteristic of corporate electronic publishing is the lack of a single responsible manager. This is the norm, rather than the exception. It is really no surprise. Corporate electronic publishing is usually fragmented across functions such as office systems, engineering and technical, typesetting, and printing. The arrival of desktop publishing is exacerbating rather than alleviating the situation.

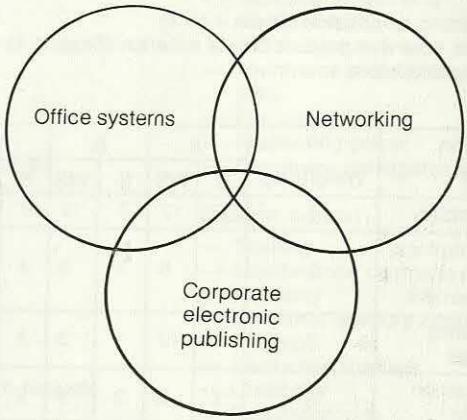
In a survey of 247 of the US Fortune 1000 companies conducted by InterConsult in association with Electronic Business, 17 per cent of respondents admitted to having no manager in place with authority to buy corporate electronic publishing equipment, and a further 25 per cent admitted to having no budget. Yet there is a growing consensus that there will be a manager of corporate electronic publishing, just as there is a manager of information systems in virtually every organisation of any size. Some of the responsibilities of such a manager are set out in Figure 5.13. IBM, for one, has no doubts about the need for a single manager. It expects to assist customers, if necessary, to designate the organisational focus of electronic publishing through a single individual.

The question of the identity of the corporate electronic publishing manager is growing in importance. The survey we mentioned in the preceding paragraph revealed a surprising range of views: 28 per cent of respondents thought that the MIS or office systems manager would take responsibility; 18 per cent administrative services; 17 per cent marketing; 14 per cent the engineering department; and 20 per cent were unable to point to a department.

In fact, there is no shortage of candidates for the job of managing corporate electronic publishing (see Figure 5.14). The best choice of manager is the candidate whose skills most nearly match the responsibilities listed earlier in Figure 5.13. Sometimes — especially in big corporations — the role is best divided, much as it often is with office systems. The MIS manager should take responsibility for technical planning and equipment selection (as suggested by Figure 5.12); and an Office Systems Manager (or equivalent) for operations.

Figure 5.13: Management responsibilities

The manager of corporate electronic publishing has a number of responsibilities. The primary concern is to integrate office systems, networking and corporate electronic publishings:



Specific responsibilities are to:

- Oversee the total corporate electronic publishing activity
- Make recommendations to top management on opportunities, priorities and investment
- Ensure the availability of sufficient trained staff
- Set, control and monitor standards to ensure consistency of style and format
- Oversee equipment purchasing and installation
- Set and meet budgets.

Figure 5.14: Candidates for manager of corporate electronic publishing

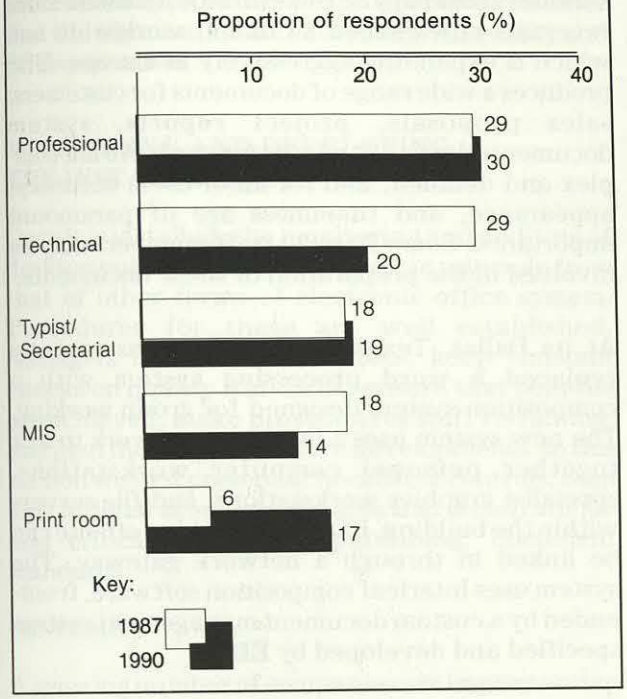
Creative Services Manager
Office Systems Manager
Graphics Production Manager
Reprographics Printshop Manager
Word Processing/Typesetting Department Supervisor
Director of Document Services
MIS Director
Head of Product Management

STAFF SELECTION AND TRAINING

It is rare to find a published document that is the product of one individual. Usually, document preparation involves a disparate community of workers: writers, editors, proofreaders, production keyboarders, illustrators, and designers. In our survey, we asked respondents to identify the main users of desktop publishing in their organisation. The results are set out in Figure 5.15. The bar chart emphasises the wide spread of users. Not much change is expected within the next three years, with the exception of print-room staff who will become a good deal more heavily involved.

Figure 5.15: Main users of desktop publishing

Our respondents cited the following main users.



Desktop publishing brings this community of users closer together. But their skills remain distinct. Just because word processor operators and artists work in closer concert does not mean that they are interchangeable. In an ideal world, the desktop publishing professional would be able to type, be computer-literate, be able to design, be conversant with telecommunications, be skilled in graphic art techniques, be knowledgeable about publishing production and layout, and be an excellent record keeper. In practice, the challenge is to select staff able to demonstrate a level of ability in more than one of these skills, perhaps several of them. Staff with the necessary attributes are likely to be drawn from all of the departments that corporate publishing spans.

Whatever the source of staff, training to achieve desktop publishing proficiency will be a requirement. Figure 5.16 provides a checklist of points to consider in drawing up training plans.

Depending on circumstances, some element of formal training (as well as informal, on-the-job training) is virtually certain to be needed.

Fortunately, there is a growing source of formal training programmes. Suppliers' own training programmes are one source, though they have been criticised for placing too much emphasis on gloss and too little on substance. Alternatives are in-house training programmes, external courses arranged by specialist training companies often in association with desktop publishing service bureaus, and courses arranged by colleges and universities.

Once staff have been selected and trained, a danger to watch out for is that of job enlargement. Desktop publishing is simply a means to an end, not an end in itself. Some professional staff find the creative aspect of desktop publishing irresistible, relishing a sense of achievement even when performing as second-rate keyboard operators and document designers. The syndrome is bad for the individuals concerned, and bad for business.

GROUP WORKING

A trend that is widely predicted for desktop publishing is that of group working, in which staff having different skills work together on parts of the same document. Group members' workstations are networked to each other and to a common filing system. Group members can access and work on different parts of the same document, sometimes even the same page.

Group working is already occurring in office systems, and it is for this reason that it will also occur in desktop publishing. The trend is already apparent. Recently, technical publishing specialists such as Interleaf, Xionics and NBI, have announced products that can support group working. In desktop publishing, however, it is still rare. Our belief is borne out by our survey. When we asked our survey respondents about group working, 62 per cent said that their current desktop publishing usage involved individuals working in isolation. However, 90 per cent expect to see work groups linking 2 to 10 individuals by 1989. The trend has important implications for desktop publishing staffing and management.

Figure 5.16: Training requirements checklist

- What range of training is required? How many need to be trained? When must training be completed?
- What user manuals and training documents exist? How much customisation of supplier manuals is required?
- Are in-house standards agreed, unambiguous and adequately documented for inclusion in the training package?
- What will be the division of training between formal in-class and on-the-job? Has allowance been made for experienced users to train newcomers?
- Who will conduct the formal in-class training?
- How will day-to-day advisory support be provided once formal training is completed?
- How will training of backup and replacement staff be managed?

According to recent research, group working does more than enable different specialist skills to be brought to bear on a problem. It has a synergistic effect on productivity and creativity. This effect has been noticed in a wide range of working environments, going far beyond desktop publishing. It is widely held, for instance, that electronic mail and conferencing systems help to build horizontal links between staff sharing similar interests but working in different departments and even different businesses. The phenomenon was first reported by researchers of the electronic mail network of the US Forest Service for the Rand Corporation. The study revealed that staff established their own informal contacts outside the hierarchy that was officially permitted, and that these informal contacts were a means of propagating new ideas. A number of research groups are now active in this field, endeavouring to advance the theoretical understanding of how people work together.

In the meantime, it is the practical benefits of improved productivity and reduced waiting time that are encouraging pioneers to introduce group working into desktop publishing. The UK's Midland Bank plc, for instance, is spending £10 million ($16 million) annually on what it calls working group automation, including word processing, electronic mail, and desktop publishing. There are three kinds of working group. Small groups with specialised tasks use IBM PCs linked through a local area network. Wider group systems use clustered PCs with a gateway to remote services. Large groups solving complex tasks use workstations linked to a minicomputer.

One organisation that is currently looking to expand its existing desktop publishing installation for group working is Perkin Elmer, the US-based electronic equipment supplier and manufacturer of semiconductors. At present, the Data Services Support and Administration (DSSA) Group based in Wilton, Connecticut, provides a corporate electronic publishing service to Semiconductor Equipment staff located both in California and on the East Coast. The key applications are customer proposals, engineering reports, and product manuals. Currently a mix of equipment is in use at Wilton. As well as Xerox dedicated workstations, IBM PCs are used for word processing, and four Macintoshes run PageMaker for desktop publishing. Looking to the future, the DSSA manager Bernard Klaus has a clear vision of which direction he will take. He envisages a dedicated local area network supporting 10 workstations with a large (600 to 900 megabyte) file server, graphic scanner with its own storage and a high-quality, high-volume laser printer linked to photo-typesetting.

One organisation that has already implemented successful group working is Electronic Data Systems (EDS). EDS is the software and computer services subsidiary of General Motors whose sales revenues now exceed $4 billion worldwide and which is expanding aggressively in Europe. EDS produces a wide range of documents for customers: sales proposals, project reports, system documentation, and training manuals. All are complex and detailed, and for all of them accuracy, appearance, and timeliness are of paramount importance. Some 20 to 30 staff members may be involved in the preparation of these documents.

At its Dallas, Texas facility, EDS has recently replaced a word processing system with a composition system designed for group working. The new system uses a local area network to link together personal computer workstations, specialist graphics workstations, and file servers within the building. EDS staff working off-site can be linked in through a network gateway. The system uses Interleaf composition software, front-ended by a custom document management system specified and developed by EDS.

The document production process begins with the project manager identifying to the system the staff who will be involved, and assigning responsibilities for sections of a document. The next step is document creation. This entails assembling text and graphic inputs in the form of boilerplate, newly keyed text, imported text from other documents, scanned input, and so forth. Finally, the document is merged, composed, and passed to printing. The system has four major features. It permits authors and editors to append comments and messages to portions of a document, and to edit the document remotely as well as locally. It provides the project manager with extensive information on demand about progress against time and cost plans. It provides a built-in chain of authorisation that links writers, editors, proofreaders, and the project manager in a controlled-access hierarchy.

According to Victor Vlad, Product Planning Manager at EDS, the new integrated system delivers several major benefits compared with what went before. Productivity of writers, editors, and managers has all increased, largely because of significantly reduced waiting time. Manual drafting has been eliminated. Management control has vastly improved. The cost of bringing specialist staff in from remote locations has also been dramatically reduced. The quantities of paper representing various draft stages in the production process have been eliminated. In summary, production costs and turnaround time are both improved. Document quality has improved as well.

"Professional looking documents make a statement about an organisation," says Vlad. "When a proposal to a potential customer is created professionally, it shows the prospective customer that the organisation is concerned with quality and professionalism."

MONITORING AND DEVELOPING THE INSTALLATION

Once it is installed, the monitoring and auditing of desktop publishing is no different in principle from that of other forms of electronic office system. Procedures for these are well established. Managers need to watch costs, keep constant checks on quality standards, ensure that benefits are achieved, make provision for staff retraining, and plan the course of future developments. In this section we first present a checklist of controls, then look in detail at one specific area that is both unique and critical to desktop publishing: document standards.

CONTROLS

A growing number of companies are implementing formal management control of office system activities to help ensure that their investments are effective and to highlight lessons for the future. These controls fall mainly into four broad categories: quality control, policies and procedures, budgetary control, and benefit assessment.

Quality control provides a check on output, either on a continuous or (more often) on a sampling basis. Policies and procedures cover aspects such as approved supplier lists, purchasing procedures, documentation, training, and staff grading. Budgetary control emphasises costs rather than results. Benefit assessment covers a range of controls, including formal performance measurement, periodic satisfaction surveys, work measurement exercises, and so forth.

All of these controls can be applied to desktop publishing, either as a unique exercise or as a component of a wider office system programme. Management controls themselves cost money to implement. Too much control is actually counterproductive. What matters is to select from the range of possibilities the elements that really need controlling, then to implement controls at the right level.

Figure 5.17 presents a list of controls, to help managers select those best suited to their own circumstances. The focus is on operating control following installation, rather than pre-installation controls. Most importantly, the list ignores one area that is bound to be high on the agenda of most managers responsible for running desktop publishing, and that is development for the future. We address this topic in the next chapter.

SETTING DOCUMENT STANDARDS

One control that is almost unique to desktop publishing is that of standards for document design. As we explain in Chapter 2, document design presents tremendous challenges and opportunities. The goal of document design is to help readers understand your message. A variety of tools is available to help. Desktop publishing makes these tools available to people who frequently lack a background in document design and graphic arts. Figure 5.18 overleaf illustrates just how badly things can go wrong, by comparing documents that have been well and badly designed.

The challenge of document design is to apply constraints without stifling creativity. The solution lies in corporate standards for document design that go far enough yet not too far. The dividing line is not easy to define. How to set and control

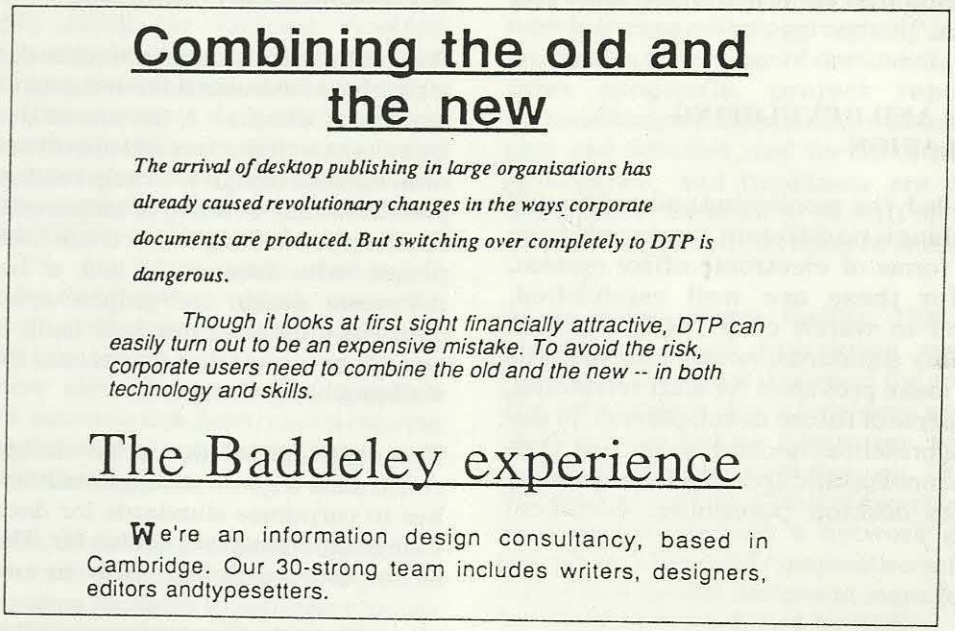
Figure 5.17: Management controls

The table shows a selection of postinstallation management controls under three headings: procedures and standards (that are set out in document manuals, reviewed, and updated from time to time); benefits (that typically are assessed by surveys and spot checks); and costs (that are recorded by item on a regular, usually monthly basis and compared against plans). The management controls affect three broad areas, as shown: people, equipment, and output.

Management controls	People	Equipment	Output
Procedures and standards			
System documentation		✓	
Training manuals	✓		
Document design standards			✓
Error rates	✓		
Backup and security procedures		✓	
Benefits			
Throughput volumes			✓
Value of improved appearance			✓
Turnaround time achieved			✓
Cost savings achieved			✓
Payback			✓
Costs			
Equipment		✓	
Staff	✓		
Training	✓		
Downtime		✓	
Maintenance/service		✓	
Consumables		✓	

Figure 5.18: Bad and good design

It is easy to use the power of desktop publishing to the disadvantage of document appearance — making it harder rather than easier to read and understand.



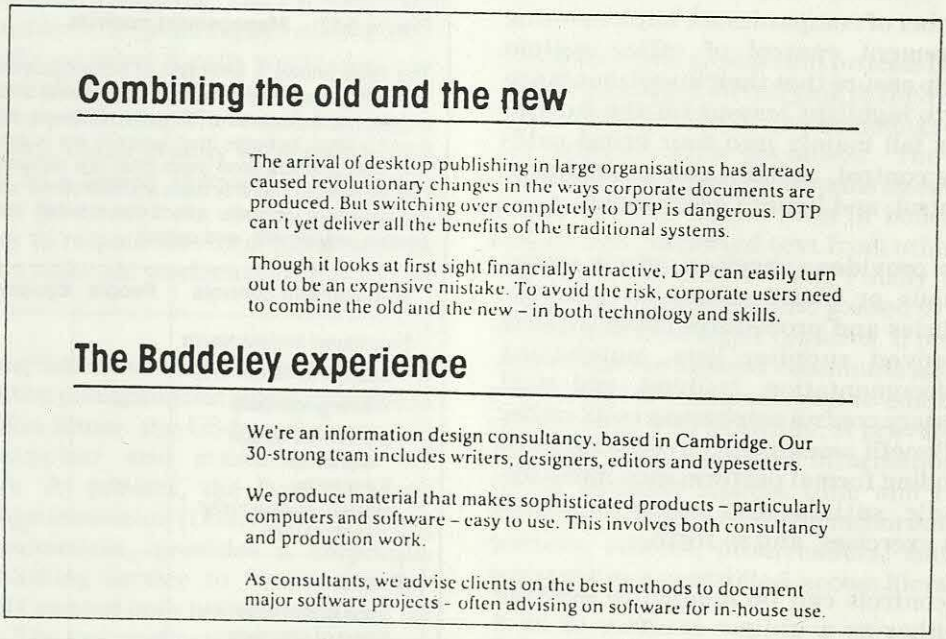
Combining the old and the new

The arrival of desktop publishing in large organisations has already caused revolutionary changes in the ways corporate documents are produced. But switching over completely to DTP is dangerous.

Though it looks at first sight financially attractive, DTP can easily turn out to be an expensive mistake. To avoid the risk, corporate users need to combine the old and the new -- in both technology and skills.

The Baddeley experience

We're an information design consultancy, based in Cambridge. Our 30-strong team includes writers, designers, editors andtypesetters.



Combining the old and the new

The arrival of desktop publishing in large organisations has already caused revolutionary changes in the ways corporate documents are produced. But switching over completely to DTP is dangerous. DTP can't yet deliver all the benefits of the traditional systems.

Though it looks at first sight financially attractive, DTP can easily turn out to be an expensive mistake. To avoid the risk, corporate users need to combine the old and the new – in both technology and skills.

The Baddeley experience

We're an information design consultancy, based in Cambridge. Our 30-strong team includes writers, designers, editors and typesetters.

We produce material that makes sophisticated products – particularly computers and software – easy to use. This involves both consultancy and production work.

As consultants, we advise clients on the best methods to document major software projects - often advising on software for in-house use.

standards for document design is a problem confronting a growing number of organisations.

The experience of Warwickshire County Council's Planning and Transportation Department is typical. Its Graphic Design Group provides an internal service for departments requiring publications such as promotional literature, leaflets, and forms. The Group's work has been transformed by the installation of a network of Apple Macintoshes, which all seven designers use for preparing graphics for publications, using programs like CricketDraw, SuperPaint, and PageMaker. The Council's policy favours IBM PCs, but the Deputy Group Manager of the Design Group, Gillian Dunkerley, says "We chose the Mac because of its clear advantages for the type of work we do," and feels that they are now able to offer their clients an improved, quicker service. The Macintoshes are connected through AppleTalk to a LaserWriter, used for drafting, and through a dial-up link to a phototypesetting bureau for quality hard-copy output.

Currently Gillian Dunkerley keeps a tight control on graphic and composition standards. But she is concerned about the maintenance of graphic design standards should departmental staff start to forgo the Group's services in favour of creating designs for themselves. She has no desire to restrict the growth of design talent at departmental level, but fears that one consequence of desktop publishing being introduced outside her department could be a general lowering of standards. Gillian feels that there is a challenge for her Group to show clients that the best results are produced when new technology is coupled with traditional design skills, and she is confident that the designers in her department will rise to meet this challenge.

Because there are no universal rules for graphic design (as we mentioned on page 17), setting standards is bound to be contentious. However, there are guidelines that can be adapted to most situations. These guidelines identify the main variables, and say something about the constraints that apply to each one. The main design variables are summarised in Figures 5.19, 5.20 and 5.21. They are based on the booklet *The Aldus Guide to Basic Design* written by Roger C Parker for Aldus Corporation, the developers of PageMaker desktop publishing software.

Document design variables fall into three categories: hierarchical structure, format, and finish. Figure 5.19 identifies the main design aids for making a hierarchical structure clear. Figure 5.20 summarises the most important page format parameters. Figure 5.21 does the same for techniques that help to give a page design professionalism.

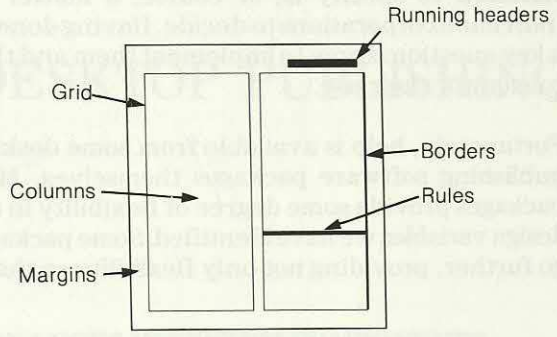
A full corporate standard for desktop publishing identifies and defines design variables in these three categories, and provides explicit guidance

Figure 5.19: Document design: hierarchical structure

Design standards for hierarchical structure should cover:

- Structural levels, which define the logical breakdown of the document — chapters, sections, subsections.
- Titles, headlines and subheads, which identify the hierarchical levels, determine appearance, act as signposts delivering a message, and lead readers through blocks of text.
- Text blocks, which are manageable chunks of text under headings.
- Hierarchical techniques for identifying elements within a section or a subsection — for example, indention, style, weight and size of typeface, bullet points and numbers, and rules.
- Layering, making for easy skimming by using for instance symbols, signs, bulleted or numbered lists, icons to indicate warnings or procedural steps.

Figure 5.20: Document design: format



Design standards should cover:

- Grid: a series of nonprinting horizontal and vertical lines, defining the placement of text and graphic elements
- Columns: match page and type size, splitting the page into two or more. Column widths need not be the same, nor need columns be right-justified.
- Margins: indent titles, headlines, text and page numbers consistently from top, bottom and sides of the paper page.
- Borders and boxes: frame the whole page (borders) or part page (boxes) to strengthen it and provide visual identity.
- Rules: help organise the page and make its structure apparent.
- Running headers and footers: help readers locate specific information and monitor their progress.
- Graphics: communicate important ideas at a glance, adding visual variety.
- Typeface, size, and style: reflect the importance of different blocks of text.
- White space: removes clutter and busyness, and helps emphasise whatever it surrounds.
- Captions: support graphics and illustrations, and are widely read because many readers go to the illustrations first.

Figure 5.21: Document design: finish

Standards for the following help to ensure design professionalism:

- Leading is the vertical space between lines of type.
- A widow is a paragraph ending of less than full measure occurring as the first line of a page column.
- An orphan is the first line of a paragraph occurring at the foot of a page or column; it is also a heading that falls at the foot of a page or column with no text, or only one line of text, following it.
- Letterspacing means adding space between characteristics in a line to solve fitting problems.
- Kerning refers to the elimination of unnaturally large spaces that often occur between certain letter pairs, such as an uppercase T or Y next to a lowercase a, i, or u.
- Hyphenation is the process of splitting words at the end of a line, to reduce unacceptably large spaces that would otherwise occur within lines.
- Punctuation is more sophisticated with typesetting than with typing or word processing — curved (rather than straight) apostrophes and quotation marks, and dashes of variable length are available, for example.

on what is and is not permitted. What specific standard to specify is, of course, a matter for individual corporations to decide. Having done so, a key question is how to implement them and then to monitor their use.

Fortunately, help is available from some desktop publishing software packages themselves. Most packages provide some degree of flexibility in the design variables we have identified. Some packages go further, providing not only flexibility so that a unique corporate design style can first be created, but also a means of setting the style so that it can be imposed. This is most apparent at the format level. Ventura is a case in point (see page 42). Ventura enables grids, columns, and margins to be specified through the use of master style sheets. Elements such as running heads can be similarly identified by named tags that can later be invoked when documents are being prepared. Software packages will get cleverer at providing help of this sort in the future, as we explain in the next chapter.

Chapter 6

THE OUTLOOK FOR DESKTOP PUBLISHING

Desktop publishing is evolving so fast that it is difficult enough for managers to keep abreast of it, let alone look into the future. Yet a clear vision of the shape of the industry is what is needed, to provide a framework for today's decisions. To make objective short-term choices, it helps to know where you want to be in three to four years' time.

In this chapter, we begin by examining advances in system components. We show that, by 1990, desktop computers will deliver far more performance than today's equivalents, measured in just about every way. Advances in networking will parallel those at the component level. As well as for use on their own, desktop computers will be designed for use in conjunction with other workstations, sharing files, printers, and scanners on a network that will be able to communicate with computers that are both local and remote.

As desktop publishing systems get cleverer, they will begin to merge with other kinds of information system. Four converging strands will be discernible: desktop publishing with graphics and CAD/CAM; with fax, image processing, and office copying; with electronic mail and document distribution; and with distributed office systems.

Suppliers are already anticipating this convergence, as we show next in this chapter. Those that succeed will be the ones that best exploit convergence to their advantage. IBM will enter the desktop publishing market late, then proceed to dominate it. The market will, we believe, continue to grow rapidly in the next few years. The primary reason for this will not be supplier push, but user demand. The attraction of desktop publishing is clear: it brings real advantages, is comparatively inexpensive, and can be installed without much delay.

Finally, we complete this chapter with a section that draws out the implications and key issues for user managers.

ADVANCES IN SYSTEM COMPONENTS

The typical desktop workstation of the early 1990s will offer far more performance than today's personal computer of the same price. It will feature a high-resolution bit-mapped screen, able to show a full A-4 page display of text or graphics with a level of precision and clarity approaching that of a printed page. The keyboard and mouse pointer will occasionally be supplemented by an optional microphone for inputting comments and amendments by voice. Graphics and composition software will be clever enough to go some way towards assisting users who lack creative skills. Input scanners will be in wide use, often in the form of hybrids with printers, copiers, and fax machines. Laser printers will be faster, more durable, and of higher quality, with a print resolution of 400-600 dots per inch the norm. Low-cost colour printers will be popular — not for printing colour photographs and complex illustrations, but to add visual appeal through the spot colouring of features such as headlines, rules, and bar charts.

To understand how this will come about, we briefly describe advances in workstations, input devices, and printers.

WORKSTATIONS

In terms of appearance and size, the workstation of the early 1990s will look much as now. The dominant features will be the screen, keyboard, and box to house the processor, memory, and storage. Compared with its counterpart of today, however, it will offer much more performance for the price, and a lot more flexibility.

Figure 6.1 overleaf illustrates the improvement in workstation price/performance that has occurred since the 1960s, when the first screen-based terminals were introduced. There is plenty of scope left yet for component price reductions and performance increases, and so every reason to expect the trend to continue. The first consequence is that workstations will become a commodity, like the telephone: more and more office workers will

Figure 6.1: Workstation price/performance

The improvement in workstation price/performance, apparent since the 1960s, will continue into the 1990s.

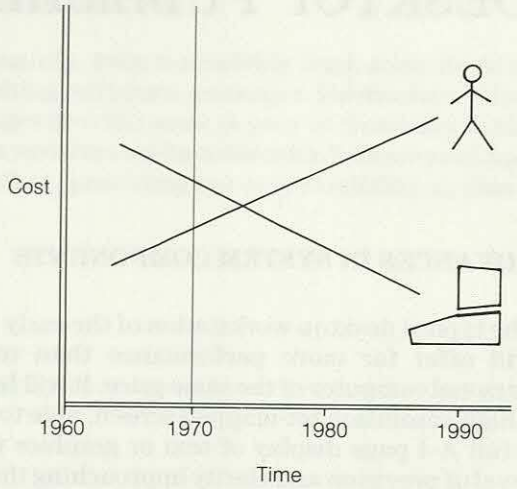


Figure 6.2: Future workstation characteristics

The trend will be towards general-purpose workstations of modular design that can be readily adapted to suit particular applications and needs. The general-purpose workstation will be able to support:

- Multiple information types
  - — Text.
  - — Data.
  - — Graphics.
  - — Image.
  - — Voice annotation.
- Input flexibility
  - — Tablets.
  - — Mice.
  - — Keyboards.
  - — Plotters.
  - — Printers.
  - — Workstation controllers.
  - — Scanners.
- Levels of processing
  - — Host-dependent only.
  - — Fully programmable.
- Screen flexibility
  - — Size.
  - — Monochrome/colour.
  - — Resolution.
- Connectivity
  - — Multiple protocols.
  - — Local and wide area networks.

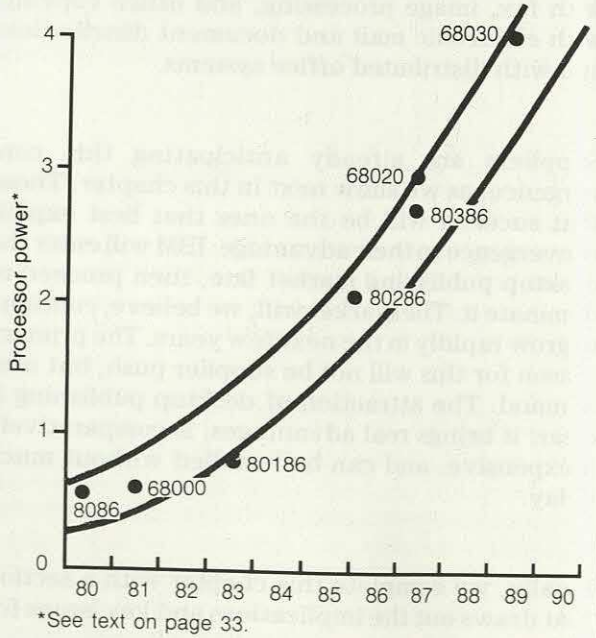
use one as a personal work tool, to support a wide range of activities. The second consequence is that, although specialist workstations will exist, the majority will be general-purpose. Today's distinction between character and graphics workstations, for instance, will disappear (see Figure 6.2).

Although new display technology has been in the laboratories for years, we believe that the price/performance advantage of conventional raster technology will continue for the next several years. Screens will typically be 15-inch, sufficient to show a whole A4 page without reduction. Smaller screens, costing less and taking up less space, will remain popular, despite the need for vertical scrolling. Larger screens, up to 19-inch diagonal, will be used for multipage displays. At up to 125 dots per inch, screen resolution will be higher than that of today. Grey shading and colour will be commonplace. This will entail 8, or even 16, bits to each pixel. A screen with an area of 110 square inches (15 inch diagonal), 125 dots per inch and 8 bits per pixel will require a memory of just under 16 megabits. Fortunately, single-chip RAMs of 16 megabits will become commonly available at around $20 each for volume runs.

To handle the manipulation of complex graphics and print images, workstation processors will be significantly faster than today's (see Figure 6.3). This will be achieved by arranging the hardware to execute tasks in parallel. Purpose-designed subprocessors will look after complex tasks, such as graphics handling, window-handling and page composition, offloading the main processor and eliminating bottlenecks. They will plug into a common bus connecting to the main processor. The screen graphics subprocessor and printer RIP may be integrated in a single chip.

Figure 6.3: Trends in processor power

The past trend of increasing processor power (see Figure 4.4 on page 33) will continue into the future.



*See text on page 33.

Conventional disc storage systems will be unable to keep pace with these high-speed bus-based processors. To solve the problem, discs will be complemented by high-speed cache memories using RAM chips. Files that are frequently accessed will be held in the cache; other files in the higher-capacity but slower disc store. Economics will dictate the media used at each level in these multiple-level file stores. The highest level in the hierarchy will be formed from single chip RAMs with up to 16 megabytes of capacity. At the level below will be magnetic disc memories similar to today's hard discs, but with capacities of up to 200 megabytes.

Large-scale archival storage will be provided by optical disc storage. Derived from audio compact discs, they will store a thousand megabytes and upwards on a single disc in the form of tiny pits burned into the disc surface by a laser. CD-ROMs (compact disc, read-only memories) will come with information already recorded on them, such as clip art. CD-WORMs (compact disc, write-once read many times) will be for archival storage. Unlike magnetic discs, CD-WORMs are non-erasable. But their low cost will make them competitive with magnetic discs for bulk storage. File access and retrieval software will develop in parallel with advances in storage media.

Figure 6.4: Image scanner features

Tomorrow's office image scanners will offer a wide choice of features such as the following (in order of increasing sophistication):

— Higher resolution — 400-600 dots per inch.

— Grey scale (say 64 scales).

— Colour.

— Optical character recognition (OCR) by pattern matching.

— Data compression, which saves storage space by reducing redundant data.

— Real-time image capture by array scanning, so that scenes (for example the factory floor) can be scanned directly into storage.

— Intelligent scanning, that is simultaneously coding recognised text and digitising line art by automatically detecting the boundaries between the two.

— Intelligent character recognition (ICR), in which the scanner trains itself to recognise unfamiliar founts.

— Page recognition, in which an ICR scanner also recognises and records page-format information, differentiating between text and images.

INPUT DEVICES

Keyboards will continue to be the dominant form of input during the next few years. Already a mature technology, keyboard design will make little further progress. The familiar assembly of alphabetic, numeric, and function keys will persist, with the mouse the preferred means of screen pointing. But alternative forms of input will grow in popularity to complement the keyboard. Image scanning will be much the most important of these alternatives. The price of a basic desktop image scanner will fall to less than $1,000 by 1990. Beyond these, there will be a wide range of more sophisticated scanners. They will offer higher resolution (400 dots per inch rather than 200-300 dots per inch), grey scale, and improved zooming (from 50 to 200 per cent). Others will offer features such as colour, intelligent character recognition, and page recognition (see Figure 6.4 for some detail).

Business demand will be mainly for low-cost scanners of low functionality, for use in offices. Because these scanners will share much of their technology with office fax machines and office copiers, we can expect to see office scanning-copiers becoming commonplace (we have more to say about this on page 68). Another form of input will be clip art, prerecorded on CD-ROMs. Available from specialist libraries, they will deliver a sort of electronic Letraset of images in wide use, such as building components to help architects make up drawings.

Voice recognition will be on the verge of becoming an office tool by 1990. Systems in the laboratory today can accurately translate 90 per cent or more of the words spoken to them in continuous sentences — so long as the vocabulary is restricted (to a few thousand words, so that uncommon words are avoided) and speech takes place at the pace of slow dictation. What is more, they can translate sentences with a delay of no more than a few seconds. The complex pattern matching and extensive software needed to achieve this requires very large memories and very high-speed processing. But as the price of hardware continues inexorably to fall, systems of this sophistication will become cost-effective for office use in the 1990s.

OUTPUT DEVICES

The laser printer will continue as the dominant output device in desktop publishing. The next several years will see several major developments, however: higher resolution, faster printing speeds, ability to cope with larger page sizes, and the emergence of colour.

Today's desktop laser printers are limited to a resolution of 300-400 dots per inch and a printing speed of about 10 pages per minute at best. The main constraint at present is the processing speed of the RIP. As we explain in Chapter 4, the RIP interprets PDL instructions to build a bit-mapped

image of the page. Most PDLs make no distinction between graphics and text, describing them both in terms of vector primitives such as points, arcs, and fill instructions. To print a page, the RIP has first to generate a set of master text characters in raster form from its ROM-stored fount descriptions, then to interpret the PDLs to generate and transfer the bit-mapped data at megabits per second to the bit-mapped memory.

Low-cost laser printers use standard chips (such as the Motorola 68000) as RIPs, so processing speed is relatively slow. By 1990, however, laser printers able to run at 50 pages per minute will be available at the same price as today's printers that do eight pages per minute. They will use RIP chips able to execute six times faster than now. There will be plenty of potential to advance beyond even that, using parallel-processing RIPs. It is quite likely, too, that the RIP and screen raster controller will be combined into a single unit, resident in the workstation.

The resolution of low-cost laser printers will rise in the next few years, though not spectacularly. The best that can be realistically expected is a doubling of quality, from 400 to 800 dots per inch. Doubling resolution will require quadrupling the bit-mapped memory. It will also mean pushing the opto-electronic components of the print engine towards their limit.

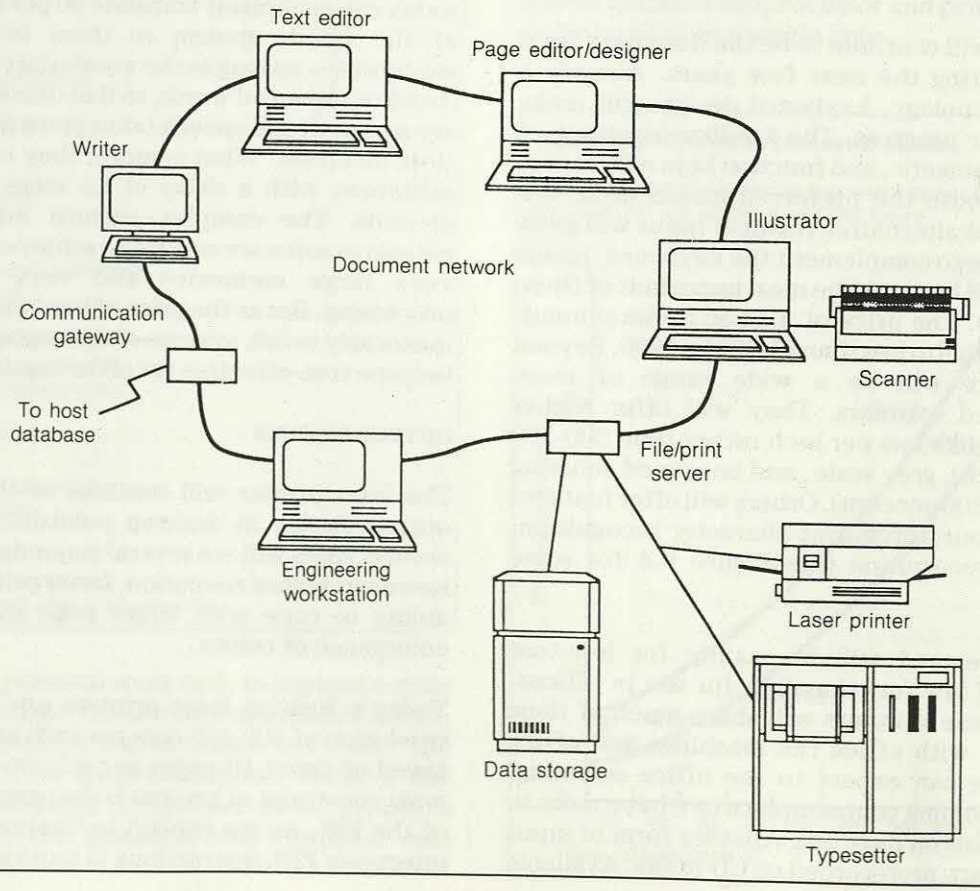
Colour printing by low-cost laser printers can be fairly readily accomplished. Each different colour requires a separate pass through the printer, with a differently coloured toner — not too hard to do, but slow. We believe that most desktop publishing installations in business will offer a small range of colours for spot printing, rather than for printing pictures as in a colour photograph.

As well as printed documents, desktop publishing will be used to output visuals for presentations (see page 23). By 1990, a choice of devices will be available for this, able to produce an intermediate 35-mm or A4-sized transparency, for projecting conventionally or alternatively for projecting directly using a hard-wired display-generating box for mounting on a projector or connecting directly to a television.

SYSTEMS INTEGRATION AND NETWORKING

The advances in system components that we have described are already leading to a convergence between desktop publishing and other information

Figure 6.5: Documentation network
The trend is from individual to group working.



systems that today are still distinct. A fundamental element in the trend toward integration is networking. In this section we first describe networking, then integration, and finally trends in software development.

Trends in networking

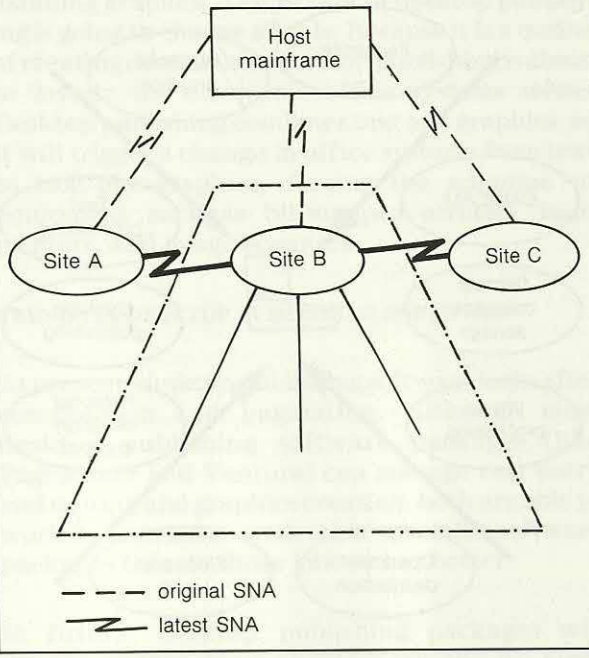
Networks allow information systems to interwork and share resources. The blueprint that specifies what devices can be attached to a network and how they may work together is called the network architecture. Networks and network architectures are becoming more important to desktop publishing as it moves from an individual activity to a group working activity, and as the need grows to connect devices from different suppliers (see Figure 6.5).

Network architectures have been developed over years as proprietary products by the leading computer suppliers. These proprietary products work to different specifications, so that interconnecting computers from different suppliers is always difficult. By far the most successful product is IBM's SNA (Systems Network Architecture). To survive in an IBM-dominated world, other computer suppliers have had to adapt their own network architectures to interface with SNA as best they can. A major international standards initiative has led to a specification for a common network architecture called OSI (the Open System Interconnection specification). OSI has been specified in the form of a seven-layer reference model. OSI has met with wide support from suppliers, but the specification is still incomplete.

IBM conceived SNA as a mainframe-centered architecture for wide-area networking before the advent of OSI. IBM has adapted SNA over the years. It now supports distributed processing and even works on local area networks as well (see Figure 6.6). IBM's Token Ring local area network now encompasses the bottom two layers of the OSI reference model. Netbios for MS-DOS computers adds a further two layers. Two programs can both be Netbios-compatible, however, and still not be able to work together because of incompatibility in the upper layers.

This presents a problem for interworking personal computer products from different suppliers on the same network. In the search for solutions, Apple again is making much of the running. Its AppleTalk network already offers one of the lowest per-node costs of any local area network (about $50 per node) and it has around half-a-million connections in place. Moreover, the AppleShare file-server product is now available to permit very low-cost multi-user networking. AppleShare is a software product priced at a few hundred dollars that runs on a Macintosh. AppleTalk can be connected through a black box to IBM local networks, though the connection introduces limits on performance and functionality. Constraints of this sort, which apply to other non-IBM suppliers as well, are likely to diminish in the future.

Figure 6.6: IBM's SNA
IBMs SNA, which was conceived as a star-configured architecture centralised on a mainframe, is becoming more of a distributed architecture operating at local-site level.



TRENDS TOWARD SYSTEM INTEGRATION

As workstations become more generalised and more flexible, so the distinctions between many of today's office and business systems are eroding (see Figure 6.7 overleaf). Corporate electronic publishing is part of this trend. The strands of convergence are particularly visible between desktop publishing and four other system areas: CAD/CAM and graphics, fax and image processing, electronic mail and document distribution, and distributed office systems.

CAD/CAM and graphics

During the 1980s, CAD/CAM systems have come into wide use in the manufacturing industry. Using workstations from specialist suppliers such as Sun, Apollo, and Digital, they feature the Unix operating system, fast-processors, and high-resolution screens. Because of their ancestry (in scientific and graphics mainframe-computer-based systems in the 1960s), today's CAD/CAM workstation software incorporates sophisticated features for creating and manipulating graphic designs. The software is relatively less well developed for

Figure 6.7: Converging systems

Today's distinction between different forms of office systems is eroding as they converge around the personal workstation.

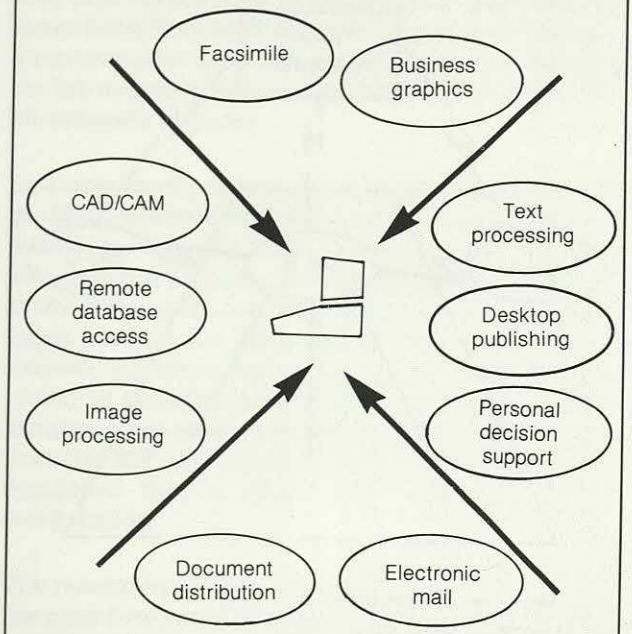
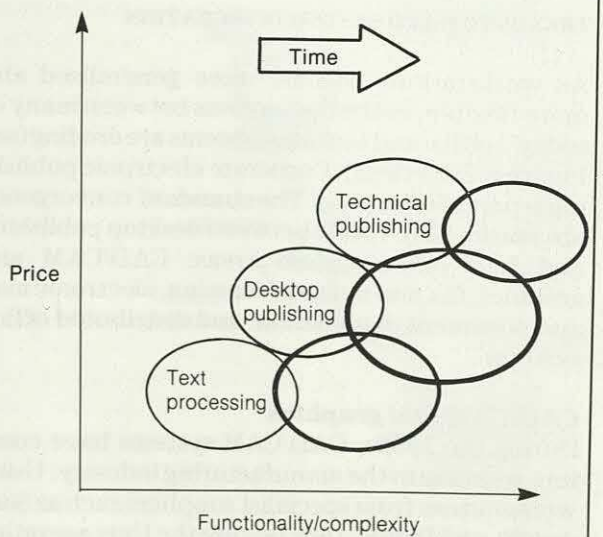


Figure 6.8: Improvement in workstation price/performance

The chart illustrates the trend toward improved price performance. At the same time, there will be a growing overlap between desktop publishing and both text processing and technical publishing.



handling text, even though text processing is an important function of CAD/CAM workstations for technical publishing. In contrast, desktop publishing software has its roots in text processing, and graphics handling is relatively less sophisticated. At present there are few systems which can bridge the gap between desktop publishing and technical publishing on CAD/CAM workstations. We believe this will change. Figure 6.8 illustrates improving price/performance across the board, and at the same time a growing overlap between technical and desktop publishing.

Fax and image processing

The installed base of fax machines has shot up recently — by 700 per cent in the past five years to 300,000 in Europe alone. The latest office fax machines are small enough to fit on a desk, and are quiet and easy to use. They can transmit an A4 page in 20 seconds and cost around $2,500. A fax machine can both scan a document, digitise it, and transmit it in the form of a bit stream, and reverse the process to assemble an image from an incoming stream of bits.

Much of the technology of fax machines is the same as that of image scanners (as we describe on page 39), so some are being made to perform both roles.

Most fax machines use flimsy, light-sensitive paper that is specially treated to reproduce the transmitted images. The latest machines use a laser printing process and ordinary plain paper. The technology is similar to that of compact desktop laser printers, and has further similarities with the latest plain-paper office copiers. Within the next year or two, we expect to see commercial products that put fax, image scanning, laser printing, and plain-paper copying together into one box (see Figure 6.9).

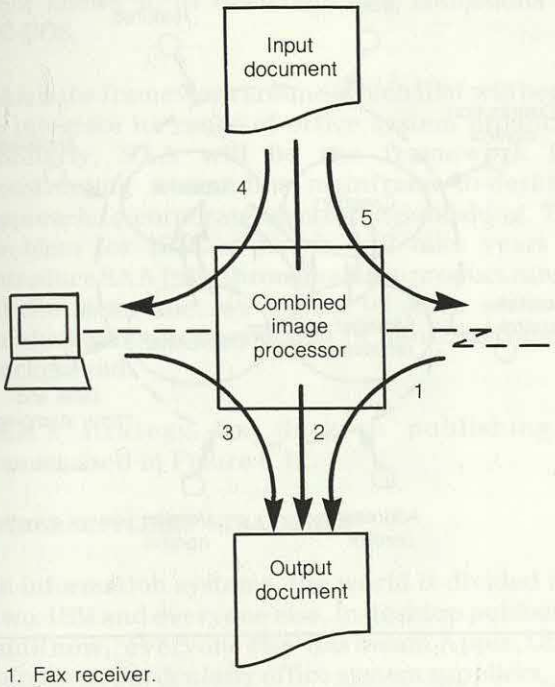
Electronic mail and document distribution

Electronic mail (sometimes called electronic messaging) is widely used by businesses as a means of quickly distributing text-only messages and short documents in order to save time. Senders' messages are stored in an intermediate electronic mailbox from which they are selected by recipients through their terminals.

Document distribution is not the same as electronic mail. It is for office documents, including long and complex ones, and is often designed to work end to end, with no intermediate mail box storage point. Document distribution is not in widespread use, however, because of lack of standards and high storage and line costs. Those systems that do exist are mainly for intracompany rather than intercompany use. The leading proprietary products are incorporated within IBM's DISOSS and PROFS, and Digital's All in One. In practice they are used more for electronic mail than for document distribution.

Figure 6.9: Combined image processor

The combined image processor puts fax transceiver, copier, laser printer, and image scanner into a single box to cut costs and save desktop space.



1. Fax receiver.
2. Copier.
3. PC printer.
4. Input scanner.
5. Fax transmitter.

Figure 6.10: Desktop publishing software advances

Advances will occur at three levels:

- Composition and pagination.
  - — Fuller range of typographic features
  - — Integrated text and graphics processing.
  - — Layout aids.
  - — Built-in standards.
- Document architecture/hypertext.
  - — Structuring aids.
  - — Semantics.
- Document management systems.
  - — Access authorisation.
  - — Update, release, distribution controls.
  - — Version management.
  - — Security and backup.
  - — Production budgetting and scheduling.
  - — Management reports.
  - — Index and content-addressable retrieval.
  - — Time and date control.

International standards for document distribution will arrive eventually, but probably not before the 1990s. The key standard will be a form of CCITT's X.400 able to handle compound documents. To minimise transmission volumes, document images will probably be transmitted encoded in PDL formats.

Distributed office systems

Forward-looking businesses the world over are investing in electronic office systems. Most are text-based, with only a rudimentary capacity for handling graphics. The advent of desktop publishing is going to change all this. Because it is a means of creating documents, desktop publishing is about to invade the electronic office systems scene. Desktop publishing combines text and graphics, so it will trigger a change in office systems from text to text-plus-graphics, forcing the adoption of equipment such as bit-mapped screens, laser printers, and image scanners.

TRENDS IN DESKTOP PUBLISHING SOFTWARE

At present, desktop publishing software looks after composition and pagination. Although most desktop publishing software packages (like PageMaker and Ventura) can manage text entry and editing and graphics creation, both are able to work in association with other specialist software packages that do those jobs rather better.

In future, desktop publishing packages will advance in three main ways (see Figure 6.10). First, they will get better at doing what they do already. Their text and graphics handling will improve to the point where separate specialist programs may no longer be necessary. Their composition and pagination features will be improved. Layout aids will be included that will use artificial intelligence techniques to help with document design, within the constraints of corporate formats and conventions. Positioning illustrations on a page and deciding whether and how to split a table across multiple pages, are two examples of ways the software will help. A further important advance in software will be to enable groups of people to work on the same document simultaneously.

A second way in which desktop publishing software will advance is in the area of document architectures. Such architectures describe the way in which the elements of a document are specified, such as the use of headers, section numbering, margin indents, and so forth. Using standards for structuring helps to ensure conformity with standards, makes database storage easier, and improves document transferability between different authors. Document architectures can be embedded in software, which then does the work of document structuring. IBM's DCA (Document Content Architecture) goes some way towards this, but its typographic features are limited. ODA (Office Document Architecture) is the ISO equivalent to DCA, but it has yet to be widely recognised. The ISO is also endorsing a high-level markup language called SGML (Standard

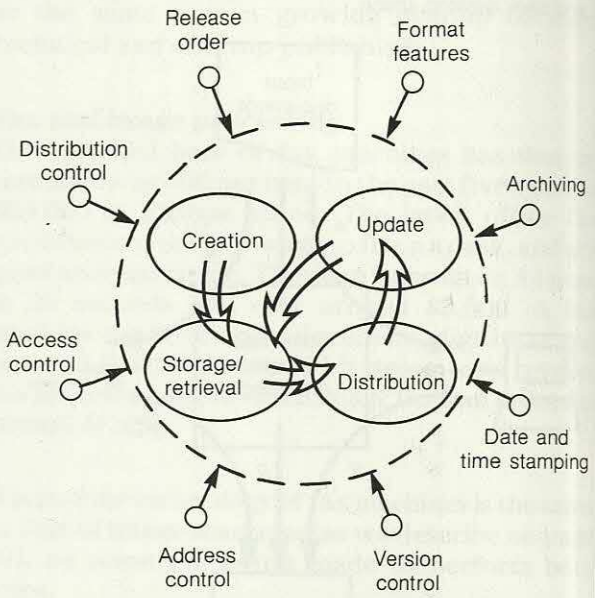
Generalised Mark-up Language) from which document structures may be generated. SGML may one day become important, but not before the 1990s.

Even further off as a practical aid is hypertext, which is a software technique for helping to organise elements of a document according to their meaning rather than their positioning within a document.

The third way in which desktop publishing software will advance is in the area of document management systems. Document management systems are concerned not merely with document content, but with the control of document creation in a work group environment: accessing, updating, releasing, distributing, and so forth (see Figure 6.11). These are primary areas of interest to document database management systems.

Figure 6.11: Document management systems

Group working and document control.



SUPPLIERS' STRATEGIES

IBM will enter the market late, then proceed to shape it from a position of dominance as it did the personal computing market. Other suppliers will be forced to respond.

IBM'S STRATEGY

IBM's strategy for corporate electronic publishing will play a major role in shaping the desktop publishing market. There is no question that IBM is seeking to dominate the market for corporate electronic publishing. The company rarely initiates new markets. Instead, it lets others pioneer, then leaps in when the opportunities seem sufficiently attractive and rewarding. The best illustration of this is probably the PC itself, a product that IBM launched into an already-emerging marketplace with spectacular success.

At the time of writing in mid-1987, IBM was involved with corporate electronic publishing at three overlapping levels: mainframe systems for large, complex documents; distributed systems for departmental publishing; and PC workstations for personal desktop publishing. IBM offered no turnkey desktop publishing product, though the ubiquitous PC was the basis for a growing range of third-party-provided software. But the company had already begun to unfold its strategy for publishing, against a complex background. Essentially, there will be wider choice and greater integration.

IBM's mainframes will continue to anchor corporate-wide publishing systems. "The host-based systems will interact with corporate databases, allowing corporations to enforce corporate publishing standards," according to Jeff Mason, General Manager of the Publishing Systems Business Unit established in 1986 to bring some coherence to IBM's corporate electronic publishing activities. The 9370 departmental computer will support networked workstations. There will be a turnkey desktop publishing system based on the PS/2, by 1988 if not sooner. IBM will support PostScript, and is planning to make utility programs available to convert between its Advanced Function Printing (AFP) software at the mainframe level, and PostScript. The company will also support SGML, and has plans (yet to be revealed) to align its current document architectures, DIA and DCA, more closely with SGML.

IBM's office systems strategy is itself confused. Its wide range of product offerings at the personal, departmental, and corporate-wide levels, are centred on different computer systems and run different levels of software, so interworking is difficult despite DIA and DCA. In early 1987, IBM announced its Systems Application Architecture (SAA), a common framework of conventions that aims to bring order to the muddle. And also in early 1987, IBM announced its second generation of personal computers, the PS/2.

We believe that the PS/2 and SAA hold the key to IBM's strategy for desktop publishing. The PS/2 is the forerunner of a new, generalised series of workstations having the characteristics that we

outline in Figure 6.2 on page 64. Rather than build separate, independent publishing products, IBM will exploit these workstations for desktop publishing. IBM will begin in earnest in 1988, when the availability of the OS/2 operating system on the PS/2 allows it to overcome the limitations of PC-DOS.

SAA is the framework around which IBM will begin to integrate its range of office system products. Similarly, SAA will be the framework for constructing a seamless mainframe-to-desktop approach to corporate electronic publishing. The problem for IBM is that it will take years to introduce SAA fully throughout the product range. In the meantime, we expect to see a series of product announcements that fit into this strategic background.

IBM's strategy for desktop publishing is summarised in Figure 6.12.

Figure 6.12: IBM's strategy

IBM's strategy for desktop publishing will crystallise within a wider strategy for corporate electronic publishing.

- General strategy: IBM will:
  - — Integrate corporate mainframe, departmental (for example the VM-supporting 9370 departmental mini) and workstation-based publishing systems.
  - — Migrate SNA from a hierarchical, centralised, mainframe-based architecture towards more emphasis on distributed operating.
  - — Use SAA as the basis of a common framework of application conventions across the main hardware ranges.
  - — Migrate office system software products such as DIA, DCA, and DISOSS together with corporate electronic products into a more coherent SAA-based product line called SolutionPac.
  - — Align DIA and DCA more closely with SGML, and enable conversion to take place between AFP and PostScript.
- Workstation strategy: IBM will:
  - — Move towards generalised workstations (see Figure 6.2).
  - — Build on existing workstation products (PC and PS/2).
  - — Conform to standards, including PostScript, PC-DOS and Windows.
- Marketing strategy: IBM will:
  - — Utilise branch office sales forces.
  - — Complement salesforces with publications specialists.
  - — Open customer briefing centres for publications.
  - — Within customer organisations, designate an organisational focus to help ensure internal consistency.

OTHER SUPPLIERS' STRATEGIES

In information systems, the world is divided into two: IBM and everyone else. In desktop publishing until now, 'everyone else' has meant Apple. Other suppliers, particularly office system suppliers, will gain in significance, however. Digital and Xerox are two of them.

Apple's starting position is completely different from IBM's. The Macintosh was first on the market for desktop publishing, and is far better adapted to it than IBM's first-generation PC. Desktop publishing has been the driving application behind the Macintosh's recent sales surge. The Macintosh has succeeded in the educational and small-office markets where retail selling rather than direct salesforce selling is important. But in the corporate environment, IBM's traditional stronghold, the Macintosh has been very much an also-ran.

To stay alive in the desktop publishing market, Apple has to retain its existing small-enterprise market base, and move upwards into corporate businesses where 90 per cent of all personal computers are IBMs or compatibles. The Macintosh's design advantages are already beginning to fade as the PC becomes more Macintosh-like, and they will disappear as the PS/2 reaches the market in large quantities. Apple's only recourse will be to retain a price/performance edge, and to adapt its products so that they too can operate in an IBM environment. This is the philosophy that lies behind the Macintosh SE, the AppleTalk network, and Apple's flagship product of the future, the Macintosh II (see page 44). To help it in this endeavour, Apple will continue to work closely with external suppliers (such as Adobe).

Digital's strategy for desktop publishing is to exploit its undoubted strength in distributed processing. Like IBM, Digital plans an integrated range of products at three levels, for central production, departmental working, and individual desktop publishing. Its leading workstation product is the AT-compatible VaxMate. It can be linked into the All-in-One office system, which already offers electronic filing and document distribution, along with document management under the VMS distributed operating system. Digital will form strategic alliances with other suppliers to offer a complete range of equipment and software. Conceivably, one of these alliances could be with Apple.

Xerox finds itself with virtually no presence in corporate distributed data processing, and it is withdrawing from the personal computing market. On the other hand, Xerox is a technically innovative company, traditionally with great strengths in office copying and publishing systems. Despite their undoubted merit, its publishing systems are not easily integrated into corporate data processing, because they use their own networking standards. Connecting them up to other suppliers'

systems, notably IBM's, is hard. Xerox sells its publishing products through its copier salesforce. Its strategy is to improve its systems' ability to interwork and to target niche markets where its technical strengths make its products most attractive.

IMPLICATIONS OF SUPPLIERS' STRATEGIES

The rapid growth of desktop publishing has caused a rush of suppliers to enter the market with hardware, software, and anciliary systems of every sort. The result is a classic supply-side squeeze, with margins remaining tight, weaker suppliers being squeezed out, and the market boundaries moving sideways into traditional text processing on the one hand and technical publishing on the other. This sideways movement will blur the boundary between word processing and desktop publishing: each will take on characteristics of the other. Desktop publishing software will feature more and more text-processing capabilities. Word processing will enable users to import spreadsheets, charts, and scanned images, and to print multiple columns.

The same sideways movement will also bring desktop publishing into closer proximity to technical publishing. The newest business personal computers, such as Apple's Macintosh II and the high-end IBM PS/2 models, have the raw power of a microcomputer-based engineering workstation. To preserve the performance gap, Sun and Apollo workstations will themselves move upwards in both price and performance. When IBM enters desktop publishing in earnest with turnkey products, the squeeze will be intensified and a shakeout will occur. Suppliers other than the majors will seek to differentiate themselves in order to survive, both by product innovation in specialist areas and by establishing themselves in market segments with specialist needs (see Figure 6.13).

Figure 6.13: Supply-side consolidation

Today's scramble will be followed by consolidation and shakeout. The period will be characterised by:

— Continuing tight margins.

— Product consolidation and expansion by IBM.

— Product expansion by Apple.

— Supplier shakeout.

— Strategic alliances.

— Product integration.

— Product differentiation/innovation.

— Niche market occupancy.

— Turnkey systems.

— New distribution channels.

Figure 6.14: Adoption of desktop publishing

The chart shows our survey respondents' current level of adoption of desktop publishing, and their expectations, by sector and size of business.

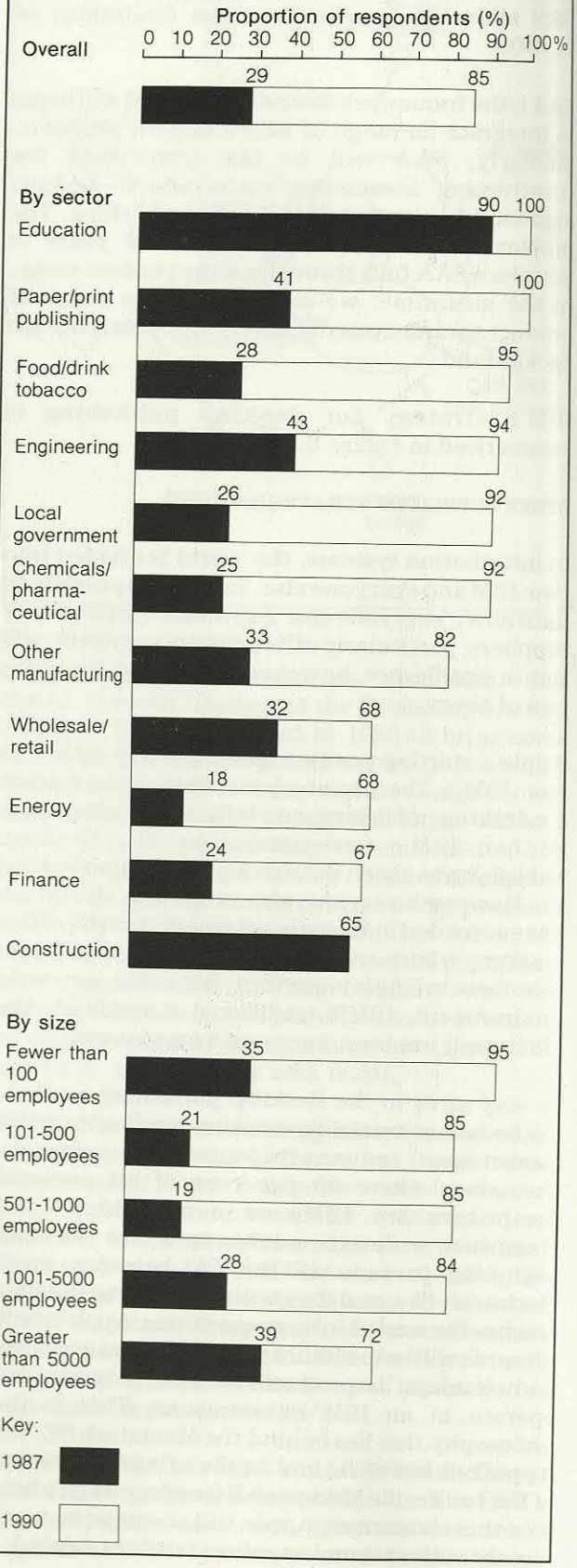
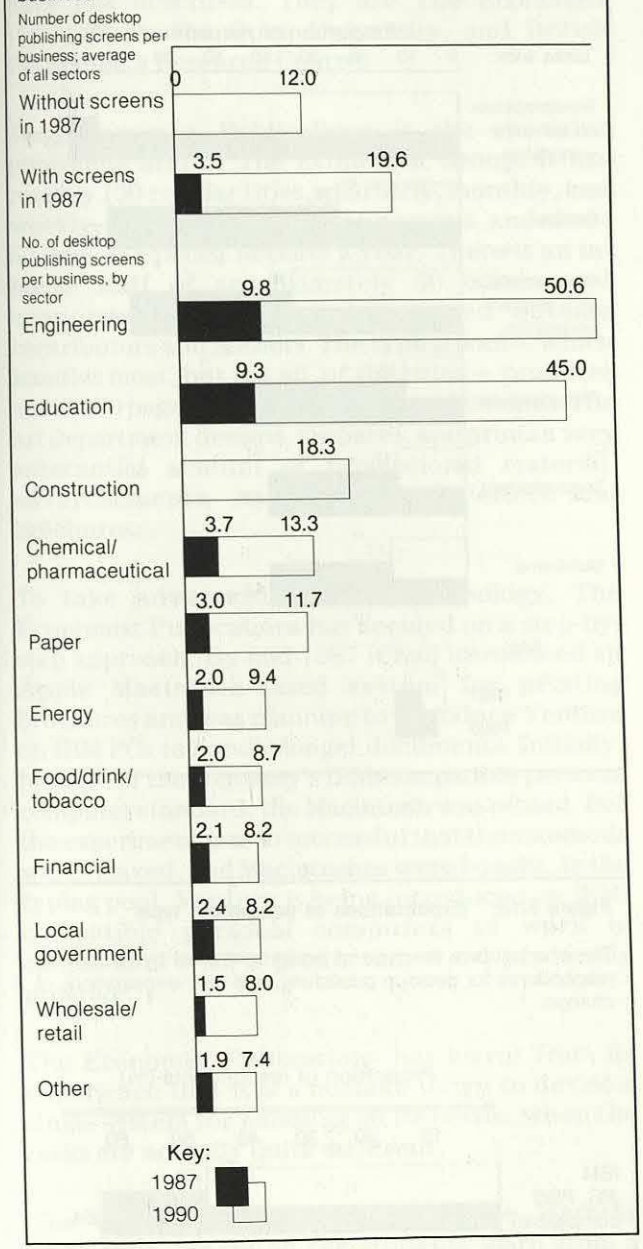


Figure 6.15: Growth in number of desktop publishing screens

The chart shows our survey respondents' expectations of the growth in number of desktop publishing screens in the average business



DEMAND TRENDS

User demand for desktop publishing will continue to grow rapidly, we believe, during the next few years. Demand will be driven by the benefits to be obtained. It will be further encouraged by pressure from the suppliers. IBM's PS/2 will prove to be an important factor here. What will deter customers will be a combination of concerns, the most significant of which will be uncertainty about standards and about where responsibility for desktop publishing in the organisation should be.

USER EXPECTATIONS

Our survey respondents were virtually unanimous in their enthusiasm for desktop publishing. Although less than one third (29 per cent) had adopted desktop publishing at the time of our survey, 85 per cent say they expect to adopt it by 1990 (see Figure 6.14).

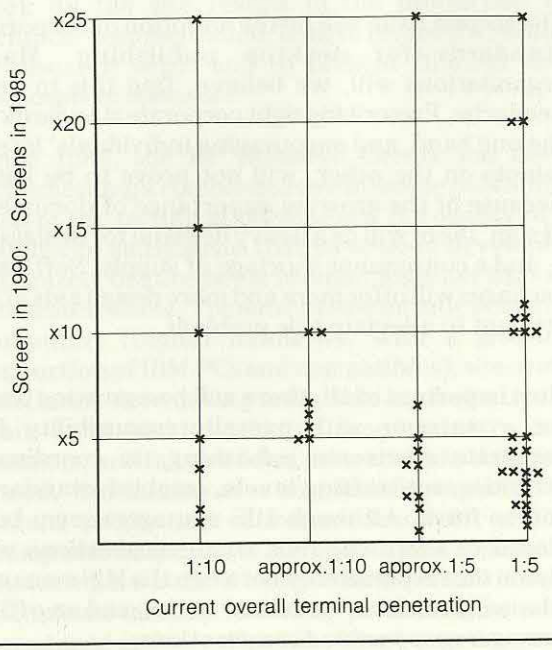
In two sectors, education, and print and publishing, desktop publishing will be adopted universally. In every sector, it will be adopted by at least two out of every three businesses. Desktop publishing will be adopted most widely in small businesses, but even amongst large businesses three out of every four will be users by 1990.

Figure 6.15 shows our survey respondents' expectations of the growth in numbers of desktop publishing screens. Current users of desktop publishing expect to see an average fivefold increase in screens by 1990, up from 3.5 to almost 20 across all sectors and sizes of business. For those yet to adopt desktop publishing, the equivalent expectation is for 12 screens. The sector expecting the largest number of screens on average by 1990 is engineering, followed by education and construction.

Figure 6.16 illustrates how our survey revealed no correlation between the growth in desktop

Figure 6.16 Desktop publishing growth and terminal penetration

Our survey revealed no correlation between respondents' expected increase in desktop publishing screens between 1987 and 1990, and the current overall penetration of all types of terminals



publishing screens expected by individual respondents, and their current sophistication when measured in terms of existing terminal penetration. Figure 6.16 shows most respondents expecting to see an increase in screens between two and tenfold, but there is no significant distinction on the basis of current penetration of terminals.

Figure 6.17 shows our respondents' views about system integration. There will be a particularly strong trend towards linking desktop publishing with image scanners and phototypesetting.

IBM and compatible suppliers will strengthen their hold on the market, according to our survey respondents (see Figure 6.18).

TRENDS IN ORGANISATION AND CONTROL

We believe that three main issues will predominate in the next few years.

The first will be that of group working. In the future there will be both personal desktop publishing and departmental and corporate-wide solutions. The trend will be towards a growing proportion of interconnected workstations and shared resources enabling groups of people to work together on the same documents. Evidence for this trend is implied by our survey respondents' expectations for system linking, as shown already in Figure 6.17. It is confirmed by a further finding: 62 per cent of respondents said that their current desktop publishing usage involves individuals working in isolation. However, 90 per cent expect to see work groups of two to ten people by 1990.

The second issue will be the adoption of corporate standards for desktop publishing. Many organisations will, we believe, find this to be a headache. Prescribing tight corporate standards on the one hand, and encouraging individuals' latent talents on the other, will not prove to be easy. Because of the growing importance of document design, there will be a heavy demand for designers — and a consequent shortage of supply. Software packages will offer more and more design aids in an attempt to alleviate this problem.

Most important of all, there will be a growing need for a manager with overall responsibility for corporate electronic publishing, to coordinate activities, set staffing levels, establish standards and so forth. Although MIS managers seem best placed to adopt the role, some corporations will divide the responsibility between the MIS manager who will look after technical issues, and an office manager responsible for operations.

Figure 6.17: Trends to system integration

There will be a strong trend towards integrating desktop publishing with other systems, according to our survey respondents.

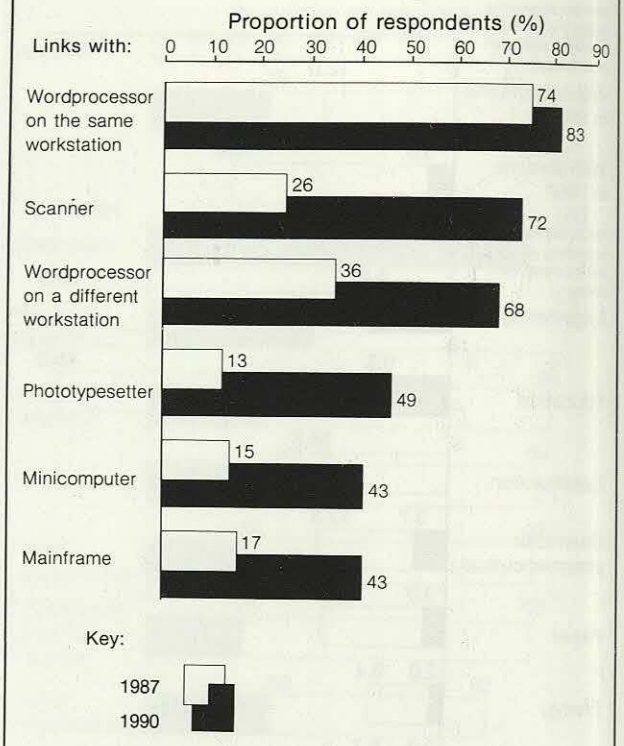
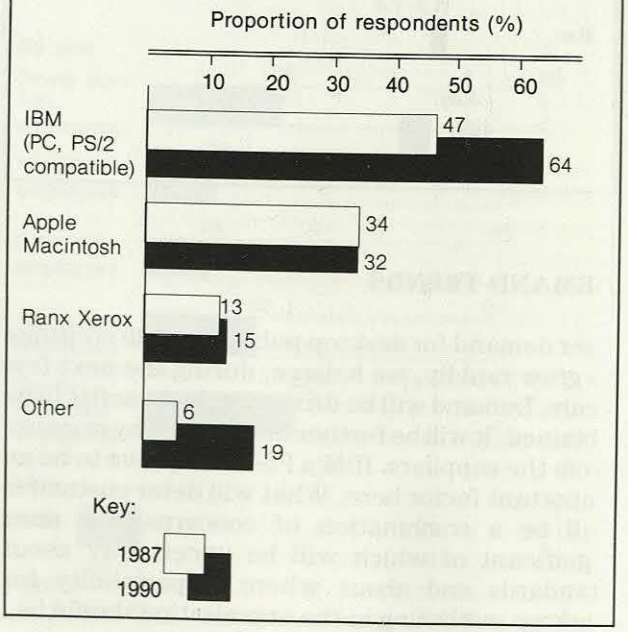


Figure 6.18: Expectations of equipment type

The chart shows the type of equipment used by our survey respondents for desktop publishing, and their expectations of change.



USER TRENDS: CASE HISTORIES

Three case histories are interesting because they illustrate the implications of the four issues that we have just described. They are The Economist Publications, the Open University, and British Petroleum's Research Centre.

The Economist Publications is the specialist publishing arm of The Economist Group. It has roughly 130 regular titles, quarterly, monthly, and weekly. It also publishes many annuals, and about 60 one-off Special Reports a year. There is an in-house staff of approximately 50 editors and economists, and several hundred outside contributors and authors. The typing pool — which handles most, but not all, of the titles — produces about 200 pages of camera-ready copy a month. The art department designs, prepares, and prints a very substantial amount of promotional material, advertisements, and direct mail letters and brochures.

To take advantage of new technology, The Economist Publications has decided on a step-by-step approach. By mid-1987 it had introduced an Apple Macintosh-based system for printing brochures and was planning to introduce Ventura on IBM PCs to handle longer documents. Initially, because of the company's IBM-compatible personal computer standard, the Macintosh was rented. But the experiment was so successful that the standards were relaxed, and Macintoshes were bought. In the typing pool, Ventura is being introduced on IBM-compatible personal computers to work in conjunction with a production word processing program.

The Economist Publications has learnt from its experience that it is a mistake to try to devise a single system for handling all its needs, when the tasks are actually quite different.

The Open University is a distance learning university, where all the students learn from a combination of published course units, contact with tutors, and radio and television programmes. At present there are about 70,000 undergraduate students working for degrees in arts, education, social sciences, maths, technology, and science. In addition, there are thousands of students following continuing education courses in a vast range of subjects. As in a conventional university, the courses are prepared and written by lecturers working on a campus. At present, some 600 academics produce about 30,000 pages of course units each year. In addition to this, there are many thousands of pages of academic publications, student newspapers, and magazines. The vast majority of all printed work is sent out to outside contractors for typesetting and printing in the conventional way. The aim is to bring the typesetting work in-house, and reap the benefits of electronic publishing.

To do this, the Open University is planning a comprehensive local area network that links workstations, storage, and output devices. There is also a management function that holds the whole system together. For its workstations, the Open University has standardised on IBM PCs and compatibles, and Apple Macintoshes. Each department has to choose which type it wants, based on staff preference and previous experience. There are a total of several hundred workstations on site, and the aim is to maintain an equal balance between the two system types. The text-editing software, now standardised, is Microsoft Word. Some of the workstations are equipped, however, for desktop publishing, using both PageMaker and Ventura. The large-scale network system is, in effect, a post-desktop publishing implementation. It is proving to be the vehicle through which standards and control can be introduced. Technical publishing workstations will also be connected into the network.

British Petroleum is an energy and earth resources organisation consisting of 1,900 subsidiary and related companies. BP has 122,000 staff working in over 70 countries on six continents. The Research Centre in the United Kingdom is the Group's primary R&D facility, with more than 2,000 staff on site. The staff is organised into technical divisions, which in turn are subdivided into specialist branches and research project teams. About 90 project teams operate simultaneously. Much of the work on the site results in the production of technical documentation, both to record the results of research work and to present findings and proposals to sponsors.

Since 1984, the BP Research Centre has been implementing a comprehensive in-house publishing system for technical documents. It consists of a number of subsystems that have been developed separately but are being brought together into an integrated whole. The subsystems include personal computers (Digital Rainbows, with a growing proportion of IBM PCs and compatibles); site-wide local area networking with Vax mail electronic mail; local and distributed laser printers and scanners; and fax and telex network links. Looking ahead, the intention is to partially replace the manual production of microfiches with a COM (Computer Output onto Microfilm) unit capable of producing the bulk of compound (text and image) documents directly. Desktop publishing is being introduced at the workstation level, together with

desktop scanners and laser printers. Voice annotation of documents is being actively considered to assist with the editing of documents in work-group situations.

MARKET FORECASTS

Having discussed the supply side and demand side of the market, we are now in a position to set out a market prediction.

Our belief is that the market for desktop publishing in the United States will grow from around $200 million in 1986 to $1.6 billion in 1990. The market will also grow rapidly in Europe, from $14 million in 1986 to around $1 billion in 1990. (These numbers are in constant 1987 dollars.)

These estimates are extremely tentative. They represent Butler Cox's informed opinion, rather than the end product of rigorous research. They are provided here to illustrate the order of magnitude of the market opportunity, rather than as a basis for planning.

FORECASTING DIFFICULTIES

There is no shortage of market forecasts for desktop publishing in the USA (there are fewer forecasts for Europe).

Corporate publishing is a big market by any standards. Some estimates put the corporate electronic publishing market in the United States at around $5 billion by 1990. CAP International Inc, of Marchfield, Massachusetts, estimates it at more than $4 billion, not including output devices; $7 to $8 billion is the range quoted by InterConsult Inc of Cambridge, Massachusetts, inclusive of high-volume and departmental laser printers, low-volume laser printers and personal workstations, local area networks, and technical illustrating systems.

Desktop publishing represents only a small proportion of corporate electronic publishing. In 1986, some 50,000 desktop publishing software packages were shipped in the United States. This figure could leap up by 1990, however. Already more than 10 million personal computers are in place in the United States, and shipments are running at more than 2 million a year. On the other hand, no-one knows what proportion of personal computers desktop publishing will eventually run on, or how fast the take up will be. The issue is clouded by the many forces that will act both to drive and impede the market (see Figure 6.19).

Estimating the value of a desktop publishing unit shipment presents a further problem. Most early users purchased the PageMaker software package to run on a Macintosh, and many bought a laser printer as well. Is the value of the desktop publishing sale equal to the value of the system, or merely the software? It is these two conundrums — market takeup rate and the value of desktop publishing's contribution to revenue — that underlie the difficulty in making market predictions (see Figure 6.20).

Figure 6.19: Forces affecting the market

Desktop publishing market growth will be determined by the relative strength of driving and impeding forces.

Driving forces

- Pent-up demand from installed base of millions of PCs.
- Huge existing market for corporate paper production.
- Potential for further penetration by corporate electronic publishing.
- Rapid payback of desktop publishing.
- Supplier pressure.

Impeding forces

- Confusion of products.
- Corporate resistance to the Macintosh.
- Difficulties of adopting the PC.
- Lack of IBM turnkey products.
- Rapid product improvement encouraging a 'wait and see' attitude.
- Lack of a corporate executive with budget responsibility.
- Concern about staff training and standards for document design.

Figure 6.20: US market forecasts

Source of forecast	Forecast sales 1987 $bn	Forecast sales 1990 $bn
Dataquest	0.01	1.9
CAPesko	1.3	4.0
Creative Strategies	0.3	4.6
Summit Strategies	0.4	4.7
InterConsult	0.7	1.9

Source: InterConsult, Inc.

MARKET ESTIMATE

Our own estimate for the United States is set out in Figure 6.21. It shows unit shipments by year for the period 1985-1990. Yearly industry revenue estimates are also shown, based on unit shipments and the average value of a unit (equipment and software) in the year. Our estimate for 1990 is $1.6 billion, which is rather lower than the projections shown in Figure 6.20.

Europe will, we believe, lag behind the United States. It is a smaller market in terms of personal computer shipments, and is less advanced in terms

Figure 6.21: Butler Cox estimate of US market

Our estimate shows unit shipments rising from 25,000 in 1985 to 600,000 in 1990, worth $1.6 billion (in 1987 dollars). Unit values fall during the period, as desktop publishing increasingly becomes merely a purchase of software or enhancements (eg scanner) to existing equipment.

Year	Unit shipments 000s	Unit value $000	Shipment value $m
1985	25	4.0	100
1986	50	4.0	200
1987	150	3.5	525
1988	250	3.3	825
1989	400	3.0	1200
1990	600	2.7	1620

Figure 6.22: Butler Cox estimate of European market

Our estimate shows unit shipments rising from practically zero in 1985 to 350,000 in 1990, worth rather more than $1 billion (in 1987 dollars).

Year	Unit shipments 000s	Unit value $000	Shipment value $m
1985	0.5	4.5	2
1986	3	4.5	14
1987	35	4.0	140
1988	100	3.7	370
1989	200	3.4	680
1990	350	3.0	1050

of desktop publishing. Our estimate of the European market growth is shown in Figure 6.22. Shipment values will reach rather more than $1 billion by 1990, about two-thirds that of the US figure.

IMPLICATIONS AND KEY ISSUES FOR USER MANAGERS

It must be clear that desktop publishing poses a number of questions for user managers. They have been raised throughout our report. In this final section we bring together the key management issues.

- Desktop publishing is primarily about improving the effectiveness of paper-based communications. It is part of a trend towards business documents that are more professional, more expressive, and more differentiated. Contrary to some past predictions, paper usage in business will grow, not decline, in the foreseeable future.

- The benefits of desktop publishing are real. Producing better-looking documents is a benefit that is immediately visible, obvious, and inescapable. Desktop publishing is giving back to documents some of the quality that computers have taken away. It can cut costs and reduce turnaround time as well. Because document production often comes at the end of the production cycle, reducing document turnaround time can be very advantageous.

- Desktop publishing is fundamentally changing the economics of publishing. Implementing it is relatively inexpensive: for those already equipped with enough of the right sort of personal computer it costs little more than the price of software packages and staff training. Desktop publishing lends itself to conventional cost-justification. Payback can be very swift: a matter of weeks in the experience of some fortunate pioneers, though more likely to be in the 18- to 24-months range, according to our survey. Rapid payback argues in favour of implementation with minimum delay.

- Desktop publishing is not appropriate, however, to every corporate publishing activity. It suits some applications, but not others. Suitable applications have to be selected. Documents of medium size and complexity are best, particularly those reaching outside suppliers and customers.

- Desktop publishing is a powerful personal work tool. Implementing it needs to be carefully controlled. In the right hands, it can help amateurs to produce professional results rapidly. In the wrong hands, it enables amateurs to produce documents that look worse, not better, than before. Staff training and document design standards are both essential ingredients of success.

- Desktop publishing makes possible new departures in document design that most corporations have not considered before. So the steps in implementing standards are first to overhaul the corporation's ideas about document design, then to lay down standards, and finally to train staff accordingly. Expert systems that use techniques of artificial intelligence will appear to help with the first two of these steps, but they are not available yet.

- Learning how to 'publish' at the desktop is not particularly difficult (as we indicate in Chapter 2) but learning how to do it well is a different matter. The skills can be acquired, up to a point, by training. It is a mistake to overlook training, both on the job and in the classroom.

- Compatibility and system integration are further thorny problems. Desktop publishing is changing rapidly from individual to group working and from standalone workstations to integrated systems. Respondents in our survey expect to forge links not only between workstations but with other equipment as well, such as scanners, phototypesetters, and departmental and mainframe computers.

- Today's personal computers are barely powerful enough for desktop publishing. But these performance limitations will soon disappear. Second-generation publishing software will quickly arrive to take advantage of the new freedom, making life easier for users.

- Desktop publishing is part of the office systems scene. Both share the personal computer as the central component. Every aspect of office systems' text processing — even electronic mail — will be affected by the advances made possible by desktop publishing techniques. It was this convergence that prompted Steve Jobs, one of Apple's founders, to comment at the end of 1986 that "in two years' time it won't be a market" — meaning that desktop publishing will become ubiquitous.

- Corporations already have their hands full getting their office equipment to work together with their computer networks. Desktop publishing should fit into these plans, not cut across them. Corporations that have a strategy for office systems should include publishing as part of the strategy.

- Ensuring the achievement of standards and compatibility can be a big enough issue to require a single manager with corporate responsibility. The same person could look after other issues such as staff selection and training, application and equipment selection, and quality and budgetary control. Ideally, the same individual should champion the cause of desktop publishing. To be really effective, he or she needs a broad remit, covering office systems and corporate publications.

- Most corporations have no single individual with such a brief. Indeed, corporations having an individual with clear responsibility for publishing are in the minority. Mostly, publishing is a highly fragmented and undermanaged activity. Of the candidates who could fill the role, the MIS manager is often best placed because he or she has the knowledge of how office systems and networking fit together.

- An alternative approach is to divide responsibilities between two heads, with the MIS manager looking after technical policy and equipment purchasing, and the office manager responsible for operations.

- More than ever, MIS managers want technical solutions that are future-proof — that give them freedom of choice to respond rapidly to user requirements across a broad front. So MIS managers are looking for open architectures to avoid supplier lock-in. The suppliers know this, and are placing more emphasis on products that correspond. Open architectures are important to the suppliers in any case, to enable them to offer a full range of interworking office and publishing products. Waiting for suppliers to get better at this is an argument in favour of delaying the adoption of networked desktop publishing systems.

- One consequence of improved interworking of suppliers' products is that office systems policies need not be so rigidly enforced. Products from Apple, Digital, and IBM will find it easier to coexist. Production selection will be made more on the basis of merit, and less on conformity with corporate policy.

- In the months ahead, there is no doubt that suppliers will be applying increasing pressure on users to adopt desktop publishing. It is through desktop publishing that the major suppliers of computing equipment will launch their plans to dominate corporate publishing. After a late start, IBM will displace Apple as the market leader. The specialist suppliers of technical and professional publishing systems will be forced into defensive niche positions.

- As awareness of desktop publishing spreads, peer pressure for its adoption will grow from within the organisation. More than three-quarters of our survey respondents expect to implement desktop publishing within three years. This is an across-industry phenomenon. The danger for corporations that resist is that they will soon find themselves in the minority, and unable to reap the benefits.

APPENDIX 1

PRODUCT PROFILES

In this appendix we tabulate basic information about three product classes: desktop publishing software, laser printers, and scanners. Our purpose is to guide managers who need to make a choice. Because desktop publishing products are being continually announced and enhanced by suppliers, information about them rapidly goes out of date. For this reason, our tabulations are not detailed. Buyers are advised to seek details of current specifications and new products directly from suppliers.

DESKTOP PUBLISHING SOFTWARE

The tabulation in Figure A1.1 compares the main features of a selection of leading products for the Apple Macintosh.

Figure A1.2 compares similar features for a selection of leading products for the IBM PC and its compatible counterparts.

LASER PRINTERS

Figure A1.3 compares the main features of a selection of laser printers, showing which ones can be connected to the Apple Macintosh, and which to the IBM PC and its compatible counterparts.

SCANNERS

Figure A1.4 compares the main features of a selection of low-cost scanners, showing which ones are compatible with the Apple Macintosh and which with the IBM PC and its compatible counterparts.

Figure A1.1 Desktop publishing software for the Apple Macintosh

Model and supplier	Page-Maker 2.0 Aldus Corp-oration	RSG3 Letraset	Ragtime Brüning & Everth & Partner	Xpress Qark	Fullwrite Professional Ann Arbor Softworks	Scoop Target Software	Word 3 Microsoft	Writenow Datacopy	Mac-Author Icon Tech-nology
List price $	720	470	480	695	295			95	312
Wysiwig	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WIMPS	Mac	Mac	Mac	Mac	Mac	Mac	Mac	Mac	Mac
Text editing and pagination (note 1)	*	**	**	**	****	**	***	**	***
Math symbols and spacing	No	No	No	No	No	Limited	Yes	No	Yes
Graphics editing (simple or comprehensive)	Comp	Simple	Simple	Comp	Comp	Comp	Simple	Simple	Simple
Typographic power (extent of composition and pagination features, see note 2)	***	**	**	***	***	***	**	**	**
Scope (inclusion of tools for creating graphics, spreadsheet and database)	No	No	Spreadsheet	No	No	Graphics	No	No	No
Multi user support in group networking	No	No	No	No	No	No	No	No	No
PDL support	PostScript	PostScript	PostScript	PostScript	PostScript	PostScript	PostScript	PostScript	PostScript

Notes:

1. * Basic insert, delete, replace.
   ** Global search and replace.
   *** Spelling checker and thesaurus.
   **** Revision controls, automatic indexing, automatic foot noting, etc.
2. * Only basic features, eg multi column, selection of typeface and size,control over leading and graphics placement, headline centring.
   ** Hyphenation and justification, kerning, boxing, ruling, automatic indexing.
   *** Text scaling, stretching and run arounds.
   **** Equivalent to professional typesetting standards.

Figure A1.2 Desktop publishing software for the IBM PC and compatible counterparts

	Ventura Publisher	PageMaker	Harvard Professional Publisher	First Impressions	Fleet Street Editor	Deskset	Lasermaker	Manuscript
Model and supplier	Xerox Corp	Aldus Corp	Software Publishing Corp	Megahaus	Clickart	Compu-graphic	Lasermaker	Lotus
List Price $	560	960	950	1280	240	1600	1590	500
Wysiwyg	Yes	Yes	Yes	Yes	Yes	Preview	Preview	Preview
WIMPS	GEM	Windows	Own	Own	Own	Own	None	None
Text editing and pagination (note 1)	**	*	*	**	*	**	**	***
Math symbols and spacing	No	No	No	No	No	NO	No	Yes
Graphics editing (Simple or comprehensive)	Simple	Simple	Simple	Comp	Simple	Simple	Simple	Simple
Typographic power (extent of composition and pagination feature, see note 2)	***	***	**	**	*	****	****	*
Scope (inclusive of tools for creating graphics, spreadsheet and database)	Integrates with DB3	No	No	Graphics 'open access'	No	No	No	No
Multiuser support in group networking	No	No	No	No	No	No	Yes	No
PDL support	PostScript	PostScript Interpress	PostScript DDL	PostScript?	Option for PCL PostScript	PostScript	PostScript	PostScript

Notes:

1. * Basic insert, delete, replace.
   ** Global search and replace.
   *** Spelling checker and thesaurus.
   **** Revision controls, automatic indexing, automatic foot noting, etc.
2. * Only basic features, eg multi column, selection of typeface and size,control over leading and graphics placement, headline centring.
   ** Hyphenation and justification, kerning, boxing, ruling, automatic indexing.
   *** Text scaling, stretching and run arounds.
   **** Equivalent to professional typesetting standards.

Figure A1.3 Laser printers

Model and supplier	LaserWriter Plus Apple	LaserJet 2 Hewlett-Packard	4045 Xerox Corp	LZR-2665 Data Products	4216 PS IBM	P400 PS Agfa	VT600 Varityper
List price $	9000	4200	8000	24000	4049 including controller	28000	18750
Mac and/or PC compatibility	Mac	PC	Xerox/PC	Mac, PC	PC	Mac, PC	Mac, PC
Print area	A4	B4	A4	A3	A4	A4	B4
Print both sides	No	No	No	No	No	No	No
Resolution (dpi)	300	300	300	300	300	406	600
Speed (pages/min)	8	8	10	18-26	6	18	10
PDL support	PostScript	PCL	Interpress	PostScript	PostScript	PostScript	PostScript
Rated duty cycle (pages/month)	5000	6000	10000	80000	3000	High	3000
Manufacturers' rated life (pages)	100,000	300,000					
RIP location	Inbuilt	Inbuilt	Inbuilt	Inbuilt	PC card	Inbuilt	Inbuilt
Processor	68000		—	68000	68000	68020	68020
Memory size	1.5Mb	2Mb to 4.5Mb	128K to 512K	2Mb	2.5Mb	2.5Mb	
Scale/bitmap founts	Scale	Bitmap	Bitmap	Scale	Scale	Scale	Scale
Font location	ROM & download	Cartridge & download	ROM, card & download	ROM & download	PC chester disc	Inbuilt Win-download	ROM &
Graphics size at full resolution	Full page	Full page	Memory dependent	Full page	Full page	Full page	Full page
Interfaces	RS212C Appletalk	RS232C Centronics	RS232C Centronics	RS232C Centronics Appletalk	Own video	RS232C Centronics	RS232C Centronics
Print engine	Canon — CX	Canon — SX	Own	Toshiba	Ricoh	Own	Panasonic

Figure A1.4 Scanners

Model and supplier	S200 Agfa	IX-12 Canon	730 Datacopy	Scan Plus Dest	MS-300A Microtek	Thunderscan Thunderware	ScanJet Hewlett-Packard
List price $	6900	2400 (incl OCR s/w)	3800	4600 (scanner only)	3400	300	3200
Configuration	Flatbed	Sheetfeed	Flatbed	Edgefeed	Edgefeed	On carriage of Image Writer II printer	Flatbed
Software compatibility	Mac & PC	PC	Mac & PC	Mac & PC	Mac & PC		PC
Character recognition	No	Yes	Yes	Yes (25 fonts)	Yes	No	No
Scan area	A4	A4	A4	8.5" x 14"	8.5"x 14"	8.5" x 15"	A4
Resolution dpi	480	300	300	300	300	75	300
Scan speed secs/page	60	12	30 on Mac 22 on PC	1.3 in/sec 10			20
Format of data file output (TIFF is tag image file format)	TIFF	Own or TIFF	TIFF	TIFF	TIFF		TIFF
Software control (package names)	Image only (Macpaint, MacScan)	Text/graphics (Iedit)	Text/graphics (MacImag, WHIPS)	Extensive text and graphics (Publish Pac)	Limited text (Versascan)	Paint and graphics (Own)	Graphics (HP Scanning)
Grey scales detected	64	0		32	0	64	16
Grey scale enhancement by dithering		Yes		Yes	Yes	No	Yes
Engine supplier	Ricoh	Canon	Ricoh	Dest	Microtek		Canon

APPENDIX 2

TYPOGRAPHY AND DESKTOP PUBLISHING TERMS

The following terms are in common use in typography and desktop publishing. Most of the terms have been condensed from a wider glossary printed in the newsletter **Desktop Publisher**. We acknowledge the permission of the publishers, The Desktop Publishing Company Ltd, to reproduce the excerpts.

Airbrush — A mechanical painting tool producing an adjustable spray of paint driven by compressed air. Used in illustration design and photographic retouching.

Align — To line up typeset or other graphic material as specified, using a base or vertical line as the reference point.

Alphabet (length or width) — The measurement of a complete set of lowercase alphabet characters in a given type size expressed in points or picas.

Alphanumeric — A full set of letters and numbers, usually taken to include punctuation marks and other symbols.

Apex — The point of a character where two lines meet at the top. An example of this is the point on the letter A.

AppleTalk — The Apple local area network which connects computers and printers.

Area composition — The fitting of the individual units of text and graphics onto a screen page. The representation of the units on the screen depends on the limitations of the system and the screen resolution. The equivalent of this stage using conventional graphics art methods would be 'pasteup'.

Art paper — A smooth-coated paper obtained by applying a coating of china clay compound to one or both sides of the paper.

Ascender — Any part of a lowercase letter extending above the x-height. For example, the upper half of the vertical in the letters b or h.

ASCII — American Standard Code for Information Interchange: a binary code used to represent letters and numbers.

Banner — A large headline or title extending across the full page width.

Base artwork — Artwork requiring additional components such as halftones or line drawings to be added before the reproduction stage.

Baseline — The line on which the bases of capital letters sit.

Bit — A single BInary digiT. Can only be 0 or 1.

Bit-mapped graphics — A method by which each pixel of a display seen on a screen is controlled by a corresponding area of computer memory. The memory acts as a map of the screen display.

APPENDIX 2 TYPOGRAPHIC AND DESKTOP PUBLISHING TERMS

Bleed — An illustration that runs off the edge of the paper after trim.

Blowup — An enlargement, most frequently of a graphic image or photograph.

Body size — The height of the type measured from the top of the tallest ascender to the bottom of the lowest descender. Normally given in points, the standard unit of type size.

Body type — The type used for the main text of a work. See Display type.

Boilerplate — Sections of standard text stored in memory for use in documents when word processing.

Bold type — Type with a heavier, darker appearance. Most typefaces have a boldface. **This is Century bold.**

Bond — A sized finished paper of 50 gsm or more.

Border — A continuous decorative design or rule surrounding the matter on the page.

Box — A section of text marked off by rules and presented separately from the main text and illustrations. Longer boxed sections in magazines are sometimes referred to as sidebars.

Bullet — A centred dot • used as an ornament before a paragraph to add emphasis.

Bus — A network of connections between various parts of a computer system along which data is transmitted.

Byte — A group of eight binary digits making up a single character.

CAD — Computer-aided design.

CAM — Computer-aided manufacturing.

Camera ready — Material that is ready to be photographed for platemaking. By extension, material that is ready for reproduction by other means.

Cap line — An imaginary line across the top of capital letters. The distance from the the cap line to the baseline is the cap size.

Caps — An abbreviation for capital letters.

Caption — The line or lines of text identifying and explaining a picture or illustration.

Cartridge — A thick general-purpose paper used for printing, drawing, and wrapping.

Cast off — A calculation of how much space copy will take up when typeset.

Character recognition — The identification of characters by automatic means, eg optical character recognition.

Character code — A means of representing characters held in a computer system. The two most common codes used are ASCII and EBCDIC.

Character count — The number of characters — that is, letters, figures, signs, or spaces — in a piece of copy, line or paragraph used as a first stage in type calculations.

Clip-Art — A collection of illustrations held on disc which can be incorporated into a desktop-published document. Usually produced as bit-mapped graphics, they do not enlarge or reduce well.

Collate — To check that separate sections or leaves of a book have been gathered together in the correct order for binding. (See Gathering.)

Colour Graphics Adaptor (CGA) — A screen display for use with graphics rather than text. Provides a two-colour display at 640 x 200 pixels or a four-

colour display at 320 x 200 pixels.

Colour separations — The division of a multicoloured photograph or line copy into the basic (or primary) process colours of yellow, magenta, cyan, and black. These should not be confused with the optical primaries red, yellow, and blue.

Column rule — A light vertical rule used to separate columns of type.

Column inch — A measure of area used in newspapers and magazines to calculate the cost of display advertising. A column inch is one column wide by one inch deep.

Command (code) driven — A typesetting language employing embedded command codes for the control and setting of type.

Composition — Transformation of copy into a form suitable for printing or making printing plates.

Compositor — Person who undertakes composition.

Condensed — Typeface in which the characters are narrower than normal.

Continuous tone — An image in which the subject has continuous shades of colour or grey without being broken up by dots. Continuous tones cannot be reproduced in that form for printing but must be screened to translate the image into dots.

Contrast — The degree of tones in a photograph ranging from highlight to shadow.

Cropping — The elimination of parts of a photograph or other original that are not required to be printed. Cropping allows the remaining parts of the image to be enlarged to fill the space.

Cursive — Used to describe typefaces that resemble written script.

DDL (Document Design Language) — An alternative 'page' description language. More suitable for the production of longer technical and scientific publications, where a complete document is looked at rather than pages. Designed by Imagen, who were also responsible for Impress, and supported by Hewlett-Packard.

Descender — Any part of a lowercase letter that extends below the baseline, as in the case of y and j.

Desktop publishing — The production of near typeset-quality print from computers on the desktop.

Digitiser — A device for scanning artwork which can convert and store an electronic equivalent of the drawing in the computer's memory for future use.

Disc — A magnetic disc enclosed within a protective jacket. Floppy discs come in many sizes, the most common of which are 8″, 5.25″ and 3.5″. Typical capacities range from 100 KB to 1.2 MB. Hard discs are rigid and are sealed within an airtight drive mechanism. Typical capacities range from 10 MB to 80 MB with larger and larger models being constantly introduced. Hard discs are also referred to as Winchester discs.

Disc operating — Software for computer systems with disc drives which supervises system (DOS) and controls the running of programs. The operating system is 'booted' into the computer from disc by a small program which permanently resides in the memory. Common operating systems include MS-DOS, PC-DOS (IBM's version of MS-DOS), CP/M (an operating system for older, 8-bit computers), Unix, and BOS.

APPENDIX 2 TYPOGRAPHICAL AND DESKTOP PUBLISHING TERMS

Display type — Larger type used for headings. Normally about 18 point or larger.

Dot-matrix printer — A printer in which each character is formed from a matrix of dots. They are normally impact systems, that is, a wire is fired at a ribbon in order to leave an inked dot on the page, but thermal and electro-erosion systems are also used.

Double-page spread — Two facing pages of newspaper or magazine where the textual material on the left-hand side continues across to the right-hand side. Abbreviated to DPS.

Downloadable founts — Typefaces which can be stored on a disc and then downloaded to the printer when required for printing. These are, by definition, bit-mapped founts and are therefore fixed in size and style.

DPI (dots per inch) — The measurement of resolution for page printers, phototypesetting machines, and graphics screens. Currently graphics screens reproduce 60 to 100 dpi, most page printers work at 300 dpi, and typesetting systems operate at 1,000 dpi and above.

Drawing program — A program that creates drawings from a portfolio of basic mathematical shapes.

Drop cap — A large initial letter at the start of the text that drops into the line or lines of text below.

EGA (Enhanced Graphics Adaptor) — A graphics standard for the PC which can be added or built into a system to give sharper characters and improved colour with the correct display device. Standard EGA resolution is 640 x 350 dots in any 16 out of 64 colours.

Electronic publishing — A generic term for the distribution of information which is stored, transmitted, and reproduced electronically.

Em — In printing terms it is a square unit with edges equal in size to the chosen point size. It derives its name from the letter M which originally was as wide as the type size.

En — Half an em.

Ethernet — Form of local area network originally developed by Xerox and now adopted by other suppliers such as Digital.

Exception dictionary — In word processing or desktop publishing this is a store of pre-hyphenated words that do not conform to the usual rules contained in the hyphenation and justification program (H & J). Some programs, PageMaker for example, only use an exception dictionary.

Face — An abbreviation for typeface, referring to a family in a given style.

Floppy disc — See Disc.

Flush left — Copy aligned at the left.

Flush right — Copy aligned at the right .

Flyer — An inexpensively produced circular used for promotional distribution.

Folio — A page number, often placed at the outside of the running head at the top of a page.

Fount (or font) — A complete set of characters in a typeface (of one type size).

Four-colour process — Printing in full colour using four colour-separation negatives — yellow, magenta, cyan, and black.

Galley — The printing term for long metal trays used to hold type after it had been set and before it was made up into pages. Also, short for Galley proof.

Galley proof — Proofs of type before page makeup.

Gateway — A data switch.

Gathering — The operation of arranging the printed pages, sections, or signatures of a book in the correct order for binding.

GEM — Digital Research's Graphics Environment Manager. A graphical interface designed both to make the operation of software simpler for the non-expert and to allow programs to communicate with one another.

Gothic — Typefaces with no serifs and broad even strokes.

Grey scale — A range of luminance values for evaluating shading from white to black. Frequently used in discussions about scanners as a measure of their ability to capture halftone images. Basically, the more levels the better, but these are with correspondingly larger memory requirements.

Grid — Systematic division of a page into areas to enable designers to ensure consistency. The grid acts as a measuring guide and shows text, illustrations, and trim sizes.

Gutter — The central blank area between left and right pages.

Hairline rule — The thinnest rule that can be printed.

Hairlines — The thinnest of the strokes in a typeface.

Halftone — An illustration reproduced by breaking down the original continuous tone into a pattern of dots of varying size. Light areas have small dots or no dots and darker areas or shadows have larger dots.

Handle — Term referring to the points on a graphic by which it can be scaled.

Hard disc — See Disc.

Head — The margin at the top of a page; also a heading or subheading.

Hierarchical file structure (HFS) — Term referring to a common method of organising multiple files for desktop publishing.

Hypertext — A software technique for organising elements of a document according to their meaning.

Icon — Pictorial image used on a display screen to indicate a utility function, file, folder, or applications software. The icons are generally activated by an on-screen pointer controlled by a mouse or trackball.

Imposition — Arrangement of pages in a form so that when the sheet is printed on both sides and folded, the pages will be in their correct order.

imPRESS — A page description language developed by Imagen.

Imprint — The name and location of the publisher and printer often required by law if a document is to be published. Sometimes accompanied by codes indicating the quantity printed, month/year of printing, and an internal control number.

Intelligent character recognition (ICR) — Method of machine-recognising characters by sensing the attributes of their shape (rather than by pattern matching as in OCR).

International paper — The International Standards Organisation (ISO) system of paper sizes is based on a series of three sizes, A, B and C. Series A is used for general printing and stationery, Series B for posters, and Series C for envelopes.

Interpress — Xerox Corporation's page description language.

Italic — Slanting type usually used for emphasis and display. All roman typefaces have italic to match.

APPENDIX 2 TYPOGRAPHICAL AND DESKTOP PUBLISHING TERMS

Justify — To align text along a margin or both margins, achieved by adjusting the spacing between the words and characters and by hyphenating as necessary, so that each line of text is the same length.

KB (kilobyte) — 1024 bytes, a binary 1,000.

Kerning — The adjustment of spacing between certain letter pairs, A and V for example, to obtain a more pleasing appearance. See also Letterspacing.

Keyline — An outline drawn or set on artwork showing the size and position of an illustration or halftone.

Landscape (or Broadside) — Work in which the width used is greater than the height. Also used to indicate the orientation of tables or illustrations which are printed 'sideways'. The left side of a landscape table or illustration should be at the bottom of the page. See Portrait.

Laser printer — A high-quality image printing system using a laser beam to produce an image on a photosensitive drum. The image is transferred on to paper by a conventional xerographic printing process. Currently, most laser printers set at 300 dpi with newer models operating at up to 600 dpi.

Layout — A sketch of a page for printing showing the position of text and illustrations and giving general instructions.

Lead or Leading — Space added between lines of type to improve legibility. Measured in points. Named after the strips of lead which used to be inserted between lines of metal type. The body of this report is set in 10-point Century on an 11.5-point body. In other words, it is leaded 1.5 points.

Legend — Any descriptive matter printed below an illustration, usually now referred to as a caption. Also an explanation of signs or symbols used in an illustration.

Letterpress — Printing from a raised surface. Ink is applied to the raised surface, and paper is pressed against it, producing an impression.

Letterspacing — Addition of space between characters to improve appearance or fitting.

Ligature — Letters which are joined together as a single unit, such as oe and fi.

Lightface — The ordinary variety of roman or italic type, in distinction to bold face.

Lithography — A printing process based on the principle of the natural aversion of water to grease. The photographically prepared printing plate is treated chemically so that the image will accept ink and reject water.

Local area network — Data network that connects workstations, printers, and other devices within a building.

MB (megabyte) — One million bytes.

Makeup — The assembling of all elements to form the image to be printed.

Margins — The nonprinting areas of a page.

Markup — The process of preparing copy for a compositor, setting out in detail all the typesetting instructions.

Measure — Denotes the width of setting expressed in pica ems.

Menu-driven — Programs that allow the user to request functions by choosing from a list of options.

Mockup — The rough visual of a publication or design.

Modem (MOdulator—DEModuator) — A device for converting digital data into audio signals and back again. Primarily used for transmitting data between computers over telephone lines.

Monospace — A fount in which all characters occupy the same amount of horizontal width.

Montage — A single image formed by assembling several images.

OCR (optical character recognition) — A means of machine reading printed characters (by pattern matching) and converting them into digital code for input to a computer.

Offprint — A run-on or reprint of an article first published in a magazine or journal.

Orphan — The first line of a paragraph, or a heading alone or with just one line of text at the bottom of a page.

OSI — Open System Interconnection, the name of the ISO's seven-layer reference model for network architectures.

Overlay — A transparent sheet used in the preparation of multi-colour artwork showing the colour breakdown.

Page description language (PDL) — A method of coding the whole content of a printed page, including individual characters, in terms of mathematical primitives.

Page proofs — Proofs of pages, the stage following galley proofs.

Pagination — The making up and numbering of pages in a multipage document.

Pasteup — The various elements of a layout mounted in position to form camera-ready artwork.

Platform — Alternative term for workstation.

Pica — A printing industry unit of measurement. There are 12 points to a pica, and one pica equals 0.166 in.

Pixel — Picture element: an illuminated dot on the display screen.

Point — The standard unit of type size. There are about 72 point to the inch (1 point = 0.01383 in). Point size is the measured from the top of the ascender to the bottom of the descender.

Portrait — An upright image or page whose height is greater than its width.

Proof — A copy used for checking purposes.

Proof correction marks — A standard set of signs and symbols used in copy preparation and to indicate corrections on proofs.

Proportional spacing — A method of spacing in which each character takes up a varying amount of space, depending on its width, so increasing readability. Typeset material is ordinarily proportionally spaced, while typewritten documents are generally monospaced.

RAM — Random access memory.

Raster input processor (RIP) — The microprocessor that converts PDL code into a page image, for printing.

Ragged right or left — Set with the right-hand (or left-hand) margin unjustified.

Ranged left/right — Successive lines of type which are of unequal length and which are aligned at either the right- or left-hand margin.

Reverse out — To reproduce as a white image on a solid background.

ROM — Read-only memory.

Roman — Type which has vertical stems, as distinct from italics or oblique which are slanted.

Running head (or foot) — A line of type at the top (or foot) of a page which repeats a heading.

Sans serif — A typeface that has no serifs (small strokes at the end of main stroke of the character).

Scaling — Calculating the enlargement or reduction necessary to accommodate a photograph within the area of a design.

Serif — A small cross stroke at the end of the main strokes of a character.

Set solid — Type set without leading (line spacing) between the lines. Type is often set with extra space; eg 9 point set on 10 point.

Soft or discretionary hyphen — A specially coded hyphen which is only displayed when formatting of the hyphenated word puts it at the end of a line.

Stem — The main vertical stroke making up a type character.

Standard Generalised Mark-up Language (SGML) — A high-level language for which document architectures may be created.

Subscript — Small characters set below the normal letters or figures, for example in mathematics or chemistry.

Superscript — Small characters set above the normal letters or figures, for example in footnotes.

Tabular setting — Material set in columns, such as timetables.

Typeface — A named complete set of characters forming type design, such as Century or Times Roman, produced as a complete fount.

Typographer — A specialist in the design of printed matter, and in particular the art of typography.

Typography — The design and planning of printed matter using type.

Widow — A paragraph ending of less than full measure which falls at the top of a page or column.

Window — A small overlay area of a screen, for the temporary display of menu choices, guides, and instructions.

WIMPS — User interface characterised by windows, icons, mice, pull-down menus.

WYSIWIG — What you see is what you get: referring to the reproduction on the printed page of the screen display.

X-height — The height of a letter excluding the ascenders and descenders.

Xerography — The basis of plain-paper copying, in which the image is formed using the electrostatic charge principle. The toner replaces ink and can be dry or liquid. Once formed, the image is sealed by heat.

APPENDIX 3: SURVEY FINDINGS

Our survey was conducted in the early summer of 1987. We sent a postal questionnaire to a sample of businesses in the UK and continental Europe, receiving 215 replies by the cutoff date. Figure A3.1 shows the breakdown of responses by sector.

The questionnaire posed 12 main questions, each designed for quantitative analysis. The findings are presented in 12 figures that appear in the main body of the text, throughout the study. For the convenience of having them altogether in one place, the same 12 figures are reproduced in this appendix.

Figure A3.1: Breakdown of questionnaire responses

A wide range of industry sectors was represented by the questionnaire. 215 responses were received back before the cut off date.

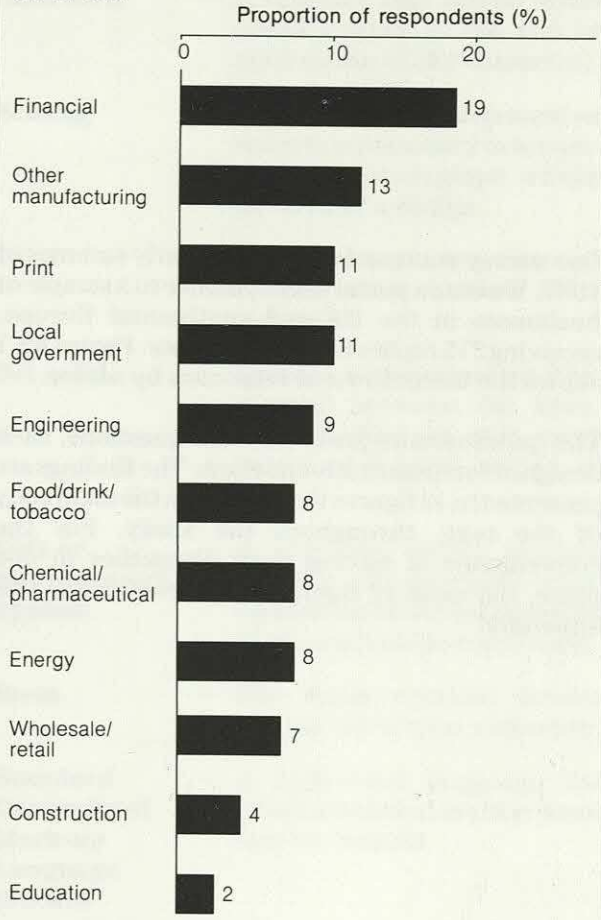


Figure A3.2: Top-rated applications: overall

The chart shows how our survey respondents rated applications in terms of importance.

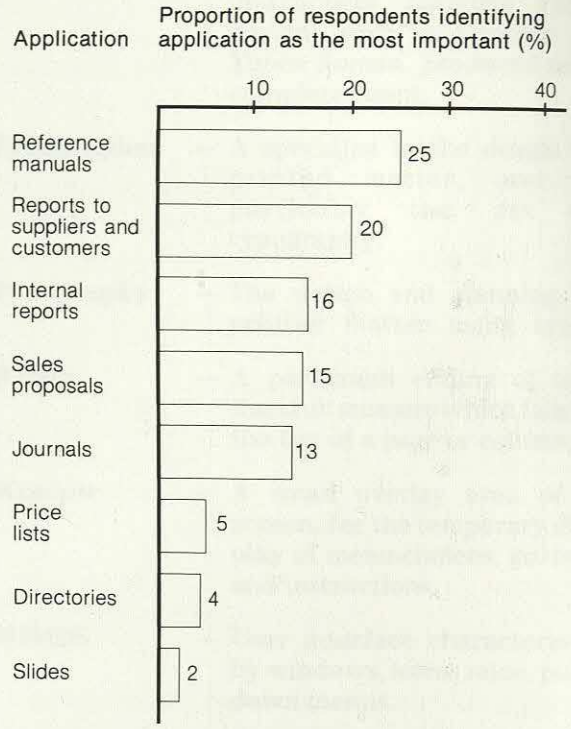


Figure A3.5: Benefits achieved in practice

In our survey, respondents identified benefits currently achieved and expected.

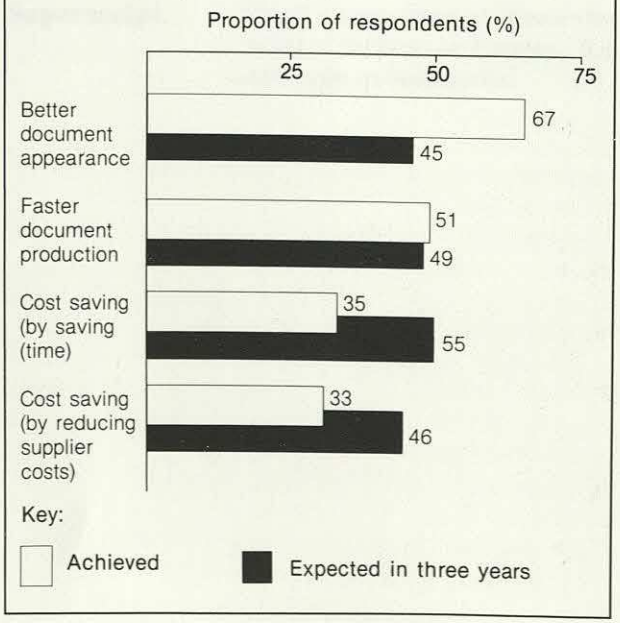


Figure A3.6: Expected payback

Of our survey respondents, 51 per cent had prepared a financial evaluation. Of these, 71 per cent (37 per cent of all respondents) expected a payback in two years or less.

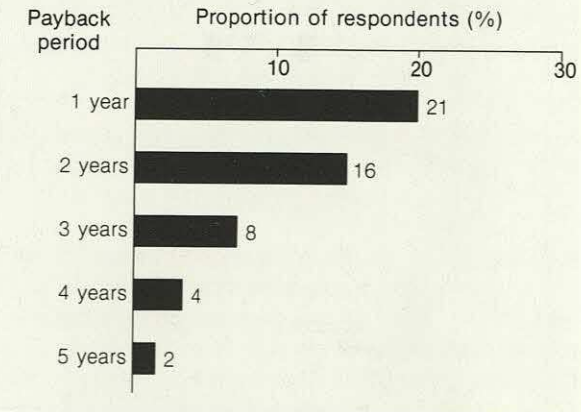


Figure A3.3: Top-rated applications: by sector

The table shows how our survey respondents rated applications in terms of importance by sector. The numbers show the rank ordering.

	Financial	Chemical/pharmaceutical	Paper/print	Engineering	Construction	Food/drink/tobacco	Wholesale/retail	Other manufacturing	Energy	Local government	Education
Reference Directories	4	1	1	1	3	2	1	1	1	5	2
Reports to custs/supps	1	6	8	4	4	3	6	4	4	1	3
Internal reports	3	3	3	3	2	1	2	5	2	2	1
Sales proposals	8	4	6	2	1	8	3	6	6	6	6
Journals	2	2	2	8	7	4	4	8	3	3	5
Price lists	6	5	4	5	5	5	5	2	7	7	7
Directories	7	7	5	7	8	7	7	3	5	4	4
Slides	5	8	7	6	6	6	8	7	8	8	8

Figure A3.4: Use of graphics and photographs

Graphics and photographs were features of the documents prepared by our survey respondents using desktop publishing. Graphics were far more common than photographs.

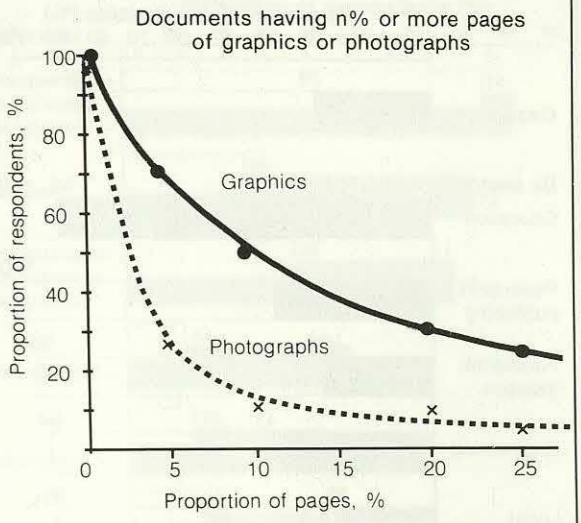


Figure A3.7: Buyers of desktop publishing

Our respondents reported the following buying departments as being responsible for purchasing:

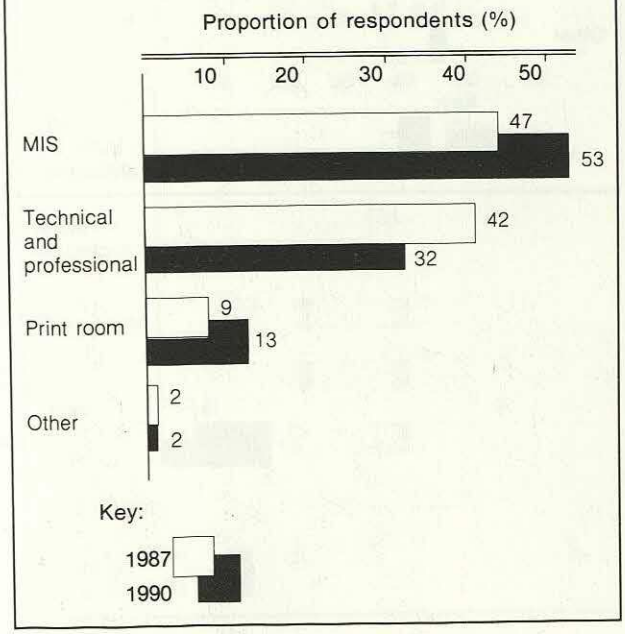


Figure A3.8: Main users of desktop publishing

Our respondents cited the following main users.

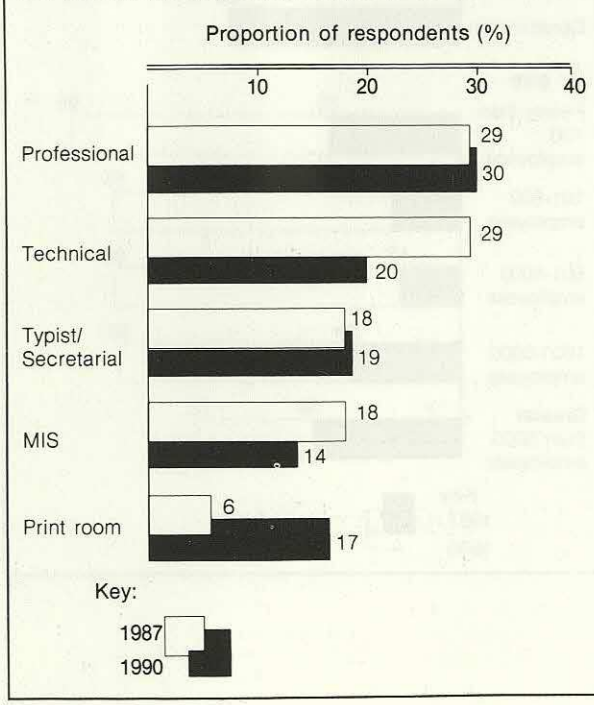


Figure A3.9: Adoption of desktop publishing

The chart shows our survey respondents' current level of adoption of desktop publishing, and their expectations, by sector and size of business.

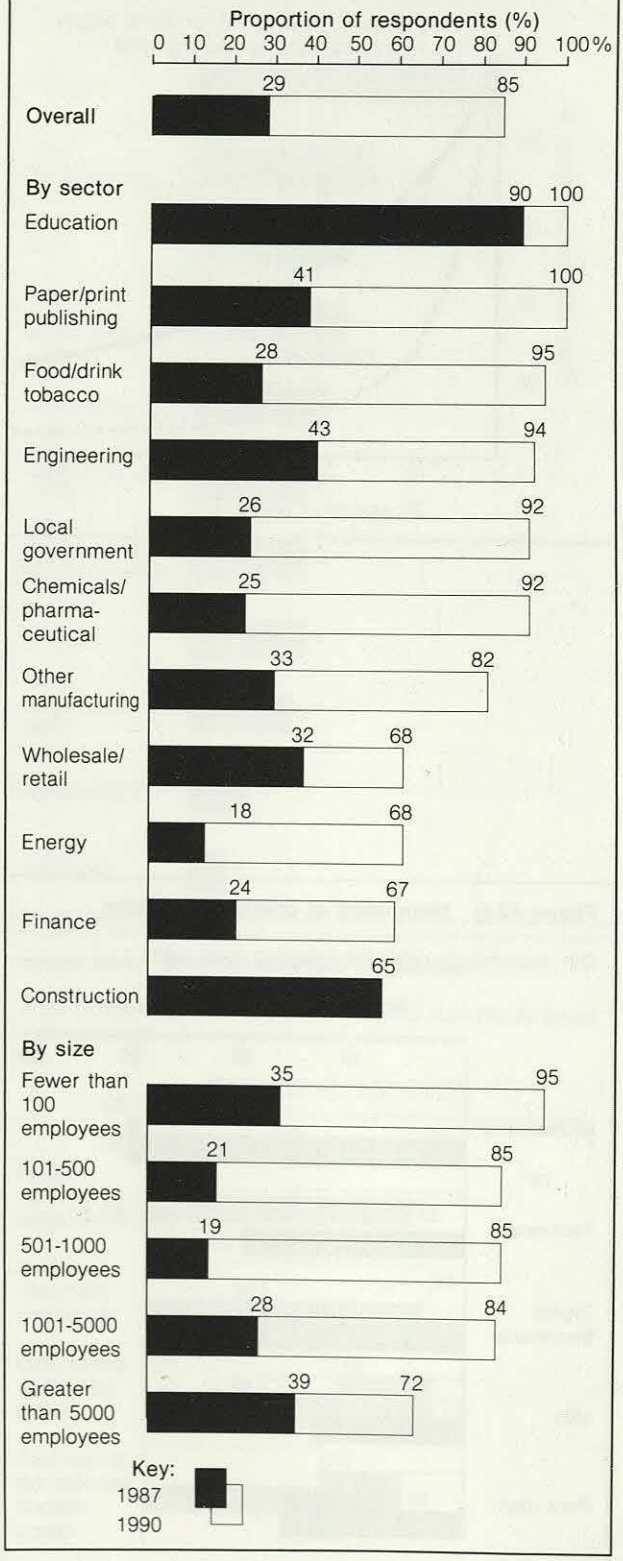


Figure A3.10: Growth in number of desktop publishing screens

The chart shows our survey respondents' expectations of the growth in number of desktop publishing screens in the average business

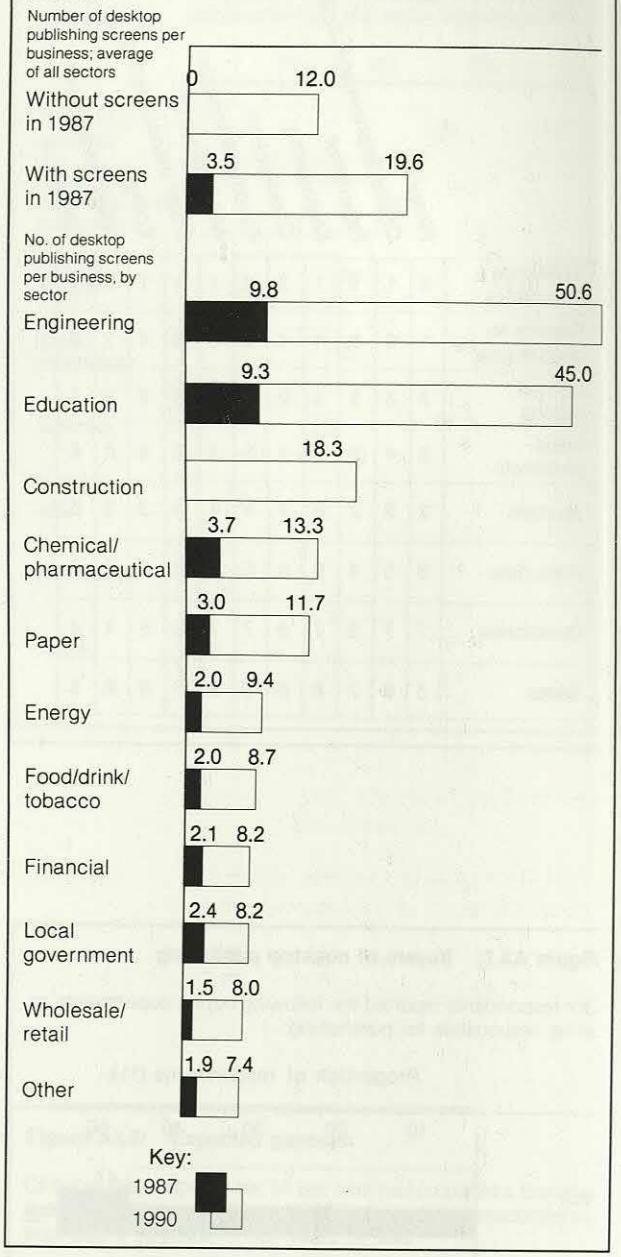


Figure A3.11 Desktop publishing growth and terminal penetration

Our survey revealed no correlation between respondents' expected increase in desktop publishing screens between 1987 and 1990, and the current overall penetration of all types of terminals

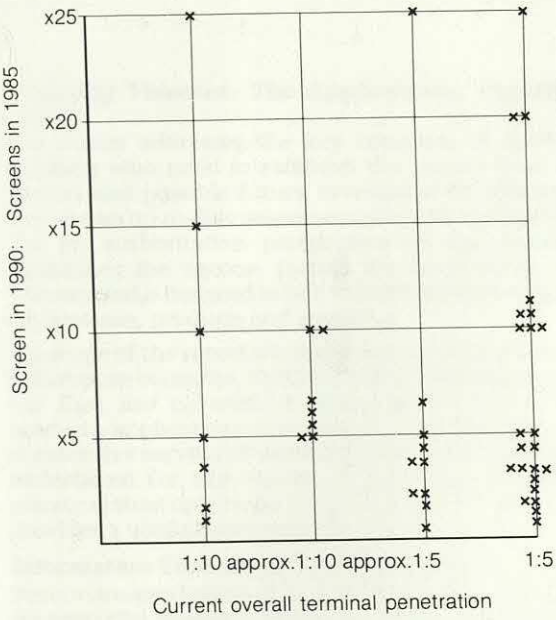


Figure A3.12: Trends to system integration

There will be a strong trend towards integrating desktop publishing with other systems, according to our survey respondents.

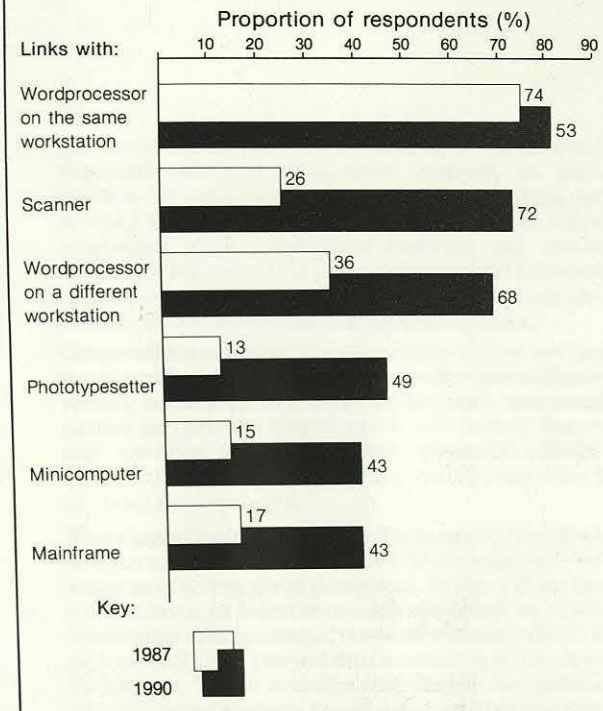
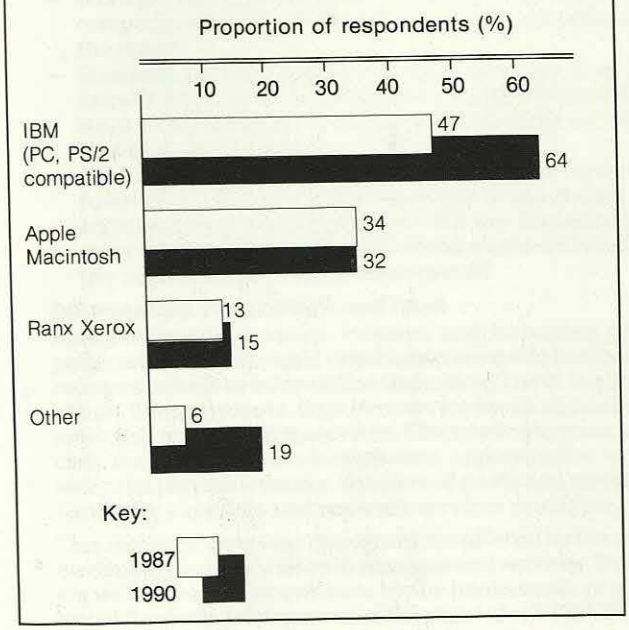


Figure A3.13: Expectations of equipment type

The chart shows the type of equipment used by our survey respondents for desktop publishing, and their expectations of change.



OTHER RECENT REPORTS IN THE BUTLER COX REPORT SERIES

Assessing Videotex: The Applications, Payoff and Trends

This report addresses the key concerns of users and suppliers who need to establish the payoff from their current and possible future investment in videotex. It provides an up-to-date assessment of recent developments and an authoritative perspective on the future. It establishes the success factors for applications using videotex and is designed to be a valuable guide for planning applications, products and markets.

The scope of the report is international and developments in European countries, North America, Australasia and the Far East are covered. It discusses developments in products, applications, and markets, including the results of extensive surveys of users, suppliers and PTTs specially undertaken for this report. A directory of suppliers, private system operators, PTTs and videotex associations provides a useful source of reference.

Information Technology: Value for Money

Some managers believe today that information technology is a powerful weapon in the battle for success. Others still regard it as an unavoidable expenditure to be contained. Both find that information technology is far from easy to manage. Finding the right policy for information technology in the organisation is difficult; implementing that policy may be harder still.

This report is a management guide, clearly written without jargon, encapsulating our consulting and research experience. Some of the key questions addressed include:

- Does expenditure on IT correlate with success? How much do other organisations spend on IT?
- How do senior managers perceive the role of IT in their organisations? What are their views on the performance of their information systems departments?
- What are the opportunities for using IT to improve the competitive position of an organisation? *And* what are the risks?
- Business strategy and IT strategy: How can they be linked? What are the factors to be considered and the steps to be followed to ensure an IT strategy services business objectives?
- How should the role of the information systems function be defined and structured? What should its organisational relationship be with top management and end users? What kind of individual should head up the information systems department?

Information Technology and Cash

Rising costs and payment volumes and increasing competition have encouraged organisations such as banks and retailers to look to information technology to cut the costs of handling payments, improve service levels and deliver new cash management services. Electronic payment and cash management services present opportunities to all potential players — banks, retailers of goods and services, hardware suppliers and network services providers.

This report reviews the opportunities offered by the new electronic payment and cash management services. Retailers will be put under pressure by the banks to adopt electronic funds transfer systems at the point of sale (EFTPOS), but could harness it to cut costs or even diversify into financial services themselves. Indeed, an increasing number of organisations involved in retailing are now moving into the banking services arena, thus effectively competing with established banking and credit card services. Half the retailers we surveyed for this study plan to introduce electronic fund transfer systems at the point of sale (EFTPOS) within the next five years.

Corporations can also take advantage of new cash management services and systems to optimise cash utilisation and reduce borrowing and transaction costs, and small companies and private investors can use online 'home banking' services to manage their financial affairs more efficiently. The report describes and discusses the impact of these new systems.

New Opportunities in Office Systems: A Practical Guide

Advanced office systems have been regarded for many years as offering great potiential. In the 1970s there was a false dawn of interest in such applications, with many forecasters anticipating a 'revolution in the office'. But the office revolution proved much easier to write about than to achieve. Those actually responsible for planning and implementing systems found many obstacles confronting them. Not least of these was the difficulty of building systems that were clearly relevant to the needs of those who would use them and the development of satisfactory criteria for investment.

A decade of experience has now been acquired, sometimes painfully. Throughout Europe and North America, advanced office systems are in use. The opportunities are better understood. A body of expertise has been developed. It is now possible to identify in a *practical* way policies and procedures that lead to successful systems.

This report is a guide to the unfolding opportunities in office systems. It provides a new perspective on the issue of assessing benefits, and supplies detailed guidelines for planning and monitoring office systems. It discusses the impact of office systems on the role of MIS departments. It analyses implications for both users and suppliers and provides a guide to the state-of-the-art of office system technologies and applications.

Information Technology: Its Impact on Marketing and Selling

By 1995, sales and marketing teams will be fighting the competitive battle with new tools. Information technology — using computers, communications and screens — will present the value and utility of products to a wider yet more carefully selected customer base. We face the most important developments in sales and marketing since the advent of TV advertising. Companies who ignore these developments, whose sales and marketing strategies remain embedded in the pre-electronic past, face dwindling market share, rising costs and eventual eclipse. The most knowledgeable companies are planning now, asking themselves this simple but profound question: how do we sell to the institutions and citizens of the information society?

This report examines both current and likely applications for information technology products and services, and identifies the key threats and new business opportunities likely to emerge in the future.

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