

EUR 8001

Commission of the
European
Communities

Electronic Document Delivery — III

**Electronic Publishing
Trends in the United
States and Europe**

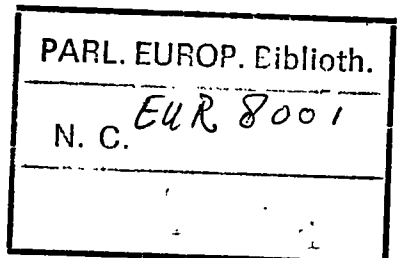
*A report prepared by Information Management Associates for the
Directorate-General Information Market and Innovation, Commission
of the European Communities*



Learned Information
Oxford and New Jersey

..

Electronic Document Delivery — III
Electronic Publishing Trends in the
United States and Europe



The views expressed in this publication are the responsibility of Information Management Associates and do not necessarily represent those of the Commission of the European Communities.

COMMISSION OF THE EUROPEAN COMMUNITIES

Electronic Document Delivery — III

Electronic Publishing Trends in the United States and Europe

John Gurnsey
Information Management Associates



Learned Information 1982 Oxford and New Jersey

PARL. EUR. COMM.
D.C.1 8001
CI

Published by

**Learned Information (Europe) Ltd.
Besselsleigh Road
Abingdon
Oxford OX13 6LG
England**

**Learned Information Inc.
The Anderson House
Stokes Road
Medford, N.J. 08055
U.S.A.**

ISBN 0 904933 34 2

**Publication arranged by:
Commission of the European Communities,
Directorate-General Information Market and Innovation,
Luxembourg**

EUR 8001

© ECSC, EEC, EAEC, Brussels and Luxembourg, 1982

LEGAL NOTICE

Neither the Commission of the European Communities nor any person acting on behalf of the Communities is responsible for the use which might be made of the following information.

Table of Contents

<i>Section</i>	<i>Paragraphs</i>
The publishing industry in Europe and the USA	1–11
Economic factors affecting the publishing industry	12–24
Electronic publishing technology	25–36
Recent developments in electronic publishing in the USA	37–46
Review of electronic publishing technologies in Europe and the USA	47–54
Online information retrieval services	55–62
Videotex	63
Teletext	64–65
Viewdata	66–71
Video and optical discs	72–78
Cable tv	79–81
Direct broadcast satellites	82–84
The electronic journal	85–89
Document delivery	90–100
Electronic mail	101
Legal, social and other issues	102–110
Conclusions	111–122
Appendix 1: Some electronic publishing services in the USA	A1–A6
Appendix 2: Sales figures for leading US and European publishers	A7
Appendix 3: Coverage of NEXIS	A8
Bibliography	page 52

Preface

Following the launch of Euronet, the Commission of the European Communities was urged by user representatives to complement access to bibliographic references with access to full text documents. Consequently, the Commission launched a study, 'Electronic Document Delivery: the ARTEMIS concept for document digitalisation and teletransmission', followed by a workshop, 'Electronic Document Delivery II: Proceedings of a workshop and exhibition', both published by Learned Information Ltd.

The workshop confirmed the technical feasibility of electronic document delivery and recommended pilot experiments for testing user acceptance and economic viability. As a consequence, an Action Programme for Electronic Publishing and Document Delivery was prepared consisting of pilot experiments and complementary studies with a proposed budget of 2.2 million European Accounting Units (about 2.2 million US Dollars). The Action Programme, an outline of which was presented at the 5th International Online Information Meeting, London, 8–10 December 1981 (pages 351–360 of the Conference papers), is a part of the Commission's third three-year Action Plan for Information and Documentation.

A number of studies in the framework of the Action Programme have already been launched. The publication of a call for proposals is being considered for the pilot experiments. Many organisations have already shown interest in participating in the pilot experiments.

It seems that instead of a few hundred experts, a few thousand people will soon be confronted with the Commission's document delivery actions. It would therefore seem timely to provide some background information on electronic publishing and document delivery including the assessment of trends and impacts, the theme of the present report.

Carlo Vernimb
Commission of the European Communities
DG XIII, Luxembourg

Introduction

'Electronic publishing trends in the United States and Europe' constitutes the final report prepared by Information Management Associates as part of the DOCDELTREND contract. The report is based on discussions with industry experts in Europe and the USA, supplemented by desk research. It was compiled in the period September to October 1981 as an overview of the electronic publishing situation at that time.

This report is not a detailed examination of the technology, but highlights key features of the European and North American publishing industries. Some of the technologies associated with electronic publishing have been reviewed. Where terminology has not been standardised, definitions have been included in the appropriate section.

Emphasis has been placed on those countries within the European Community with a high publishing output. Trends in these and other Community countries have been analysed and related to activities in the United States.

For convenience all revenues and market sizes are quoted in US dollars at current exchange rates.

Information Management Associates
20 Uxendon Hill
Wembley
Middx HA9 9RX
UK

November 1981

Executive Summary

An assessment is made of the current status of the publishing industry in Europe and the USA, with special reference to the impact that electronic publishing technologies will have on the structure and future prosperity of the industry. These technologies are reviewed, including videotex, on-line information retrieval, cable television, direct broadcast satellites and videodisc systems. Special attention is given to document delivery services. The legal, social and economic issues arising from the adoption of electronic publishing techniques are briefly discussed.

The Publishing Industry in Europe and the USA

- 1 Europe has a diverse and active publishing industry, which consists of probably between 8,000 and 10,000 commercial publishers: There are also many publishing operations associated with universities and learned societies. Total industry revenues in 1980 exceeded \$20 billion. Despite the number of publishers, much of this revenue is generated by a comparatively few major companies, such as the Bertelsmann group in West Germany and VNU in the Netherlands. The structure of the Dutch publishing industry is particularly interesting since 60% of publishing revenues are generated by 3% of the publishers.
- 2 US publishing revenues exceeded \$33 billion in 1980, of which newspaper production accounted for \$19 billion. There are about 2,000 commercial publishers, though a further 11,000 were listed by R R Bowker as publishing on an irregular basis.
- 3 For historical, social and linguistic reasons the European publishing industry has evolved on a largely nationalistic market basis. Reading habits differ widely, with the result that there is a much higher readership of newspapers in Germany and Denmark than in France, for example. Weekly news magazines are popular in France, the Netherlands and West Germany, whereas a recent attempt to establish the news magazine *Now* in the UK ended in failure. The existence of a strong public library network in parts of Europe also has an influence on readership and purchasing trends.
- 4 Virtually all European publishers have continued to use conventional distribution channels, such as bookshops, book clubs and newspaper distributors. These distribution channels are not owned by the publishers, who thus have little control over marketing, and no contact with the end user (reader) of their publications.
- 5 Bookshops, and other retail outlets such as department stores, have been slow to integrate the sale of video cassettes and personal

computer products with book displays. Video cassettes tend to be sold in record shops and departments.

- 6 In the USA, vertical and horizontal integration and an entrepreneurial approach to new product development are regarded as essential components in the strategic plans of companies wishing to succeed in a multi-media society. In the past, mergers taking place within the US publishing industry were aimed at either gaining greater efficiency through economies of scale, or as attempts to move into unrelated, yet profitable, industry sectors (such as the unsuccessful attempt by American Express to acquire McGraw-Hill). Now many of the mergers are attempts to broaden a distribution base, as typified by the acquisition by the CBS broadcasting network of two major book publishers, Fawcett and Holt, and Rinehart and Winton.
- 7 The ability of broadcasting organizations such as CBS to build up extensive electronic publishing interests is a feature of the deregulated broadcasting and telecommunications environment in the USA. In Europe both broadcasting and telecommunications are directly or indirectly managed by government departments. These monopolies are being increasingly challenged, and Italy, the first EEC country to abolish state monopoly of broadcasting, now has 200 private television stations. Many European broadcasting organizations have extensive book publishing and video cassette ventures, but are not able to acquire private sector companies.
- 8 The extent to which vertical integration has taken place in the USA is well illustrated by Time Inc, which has revenues of \$3 billion, making it the largest US publishing company. Among the products and services available from Time Inc are:

— periodicals	<i>Time, Fortune, Life</i>
— books	Time Life Books, Little, Brown & Co
— book clubs	Book of the Month Club
— television	WOTV, Michigan
— pay-tv	Home Box Office
— film/video	Time Life Films
— newspapers	<i>Washington Star</i> and 30 others
— services	Selling Areas Marketing Inc

A third of Time Inc revenues comes from books and periodicals, of which \$500 million are generated by overseas sales.

- 9 The only European publishing company to rank with Time Inc is the Bertelsman Corporation. About 90% of this organization's revenue of \$2.1 billion comes from conventional printed products, compared with only 40% for Time Inc. An analysis of the contribution of the various business interests to the total revenues of Bertelsman shows that 32% comes from book and record clubs, 30% from periodicals (Gruner and Jahr), 16% from printing, 12% from music, film and television and 10% from other publishing activities. Around 50% of revenues came from outside West Germany, and recent acquisitions (such as Arista Records and the Brown Printing Co in the USA) indicate both product diversification and a determined move away from the company's West German base.
- 10 Another major diversified publishing company is VNU (Verenigde Nederlandse Uitgeversbedrijven), based in Amsterdam, with 1980 revenues of \$626 million. Over 60% of this revenue came from newspapers, periodical subscriptions and advertising. The company is actively diversifying, including a business information online database run on its own computer, and a consumer magazine based on video cassettes. VNU has also begun to acquire companies elsewhere in Europe, such as parts of the Haymarket Press in the UK.
- 11 Such transnational links have been very unusual in Europe, and even joint ventures and distribution agreements seem to be regarded with some suspicion. One transnational venture that has proved technically (but not economically) feasible is the production of the *Financial Times* in both London and Frankfurt, using facsimile transmission, a technique already used by the *Wall Street Journal* and the *International Herald Tribune*.

Economic Factors Affecting the Publishing Industry

- 12 Following a period of sustained growth throughout the 1970s when publishing revenues grew (in real terms) at an average approaching 3 per cent per year, much of the European publishing industry is now experiencing a period of recession. On the book front this has seen books hit critical price levels and sales of individual titles drop drastically. Many publishers have sought to counter this trend with an increase in individual titles. As a result sales margins have dropped, in the United Kingdom from 11.6% (1977) to 6.6% (1980), and many publishers are operating at a loss.
- 13 The situation is particularly bleak for some sectors of the European newspaper industry. As paper and distribution costs rise, the position of several major national dailies appears increasingly untenable. This is particularly true of the United Kingdom where restrictive trade union practices over a number of years have prevented both the introduction of new equipment and the rationalization of manning levels. The effects of this can be seen in a comparison of the British and West German newspaper industries. Though generating the same tonnage of newsprint, the UK industry uses 152,000 staff, West Germany only some 69,000. Similarly, as distribution costs rise those industries emphasizing regional, rather than national papers have a clear advantage. Again such a trend tends to weigh against the UK industry with its heavy bias towards national newspapers.
- 14 Despite the cushion of a massive home market, similar economic pressures are being experienced by American publishing houses. Such a trend is also confused by the fact that much of the profitable book publishing sector is now falling to the conglomerates rather than the specialist publisher. As a result some companies (including RCA, who have sold off their subsidiary, Random House) are leaving the publishing business whilst others (including McGraw-Hill, who have dropped out of the trade books market), are seeking

to cultivate specialist markets. As with European publishers, some book publishers are seeking to make gains by increasing the number of titles handled. Such a practice seems of limited success as it is estimated that only 20% of US books currently published are financially successful.

- 15 Although the growth potential of much of the European publishing industry is limited by constraints of language, several European countries including France, the UK, West Germany and the Netherlands have substantial export industries. The publishing industry in the UK in particular is heavily dependent on overseas sales, largely to the countries of the British Commonwealth. The fact that such sales are dropping steadily, from 47% of the total in 1969 to 33% in 1980, is a matter for substantial concern. Exact reasons for this trend are difficult to isolate but include: the growth of indigenous industries, the strength of Sterling and the poor marketing practices of much of British industry.
- 16 In the Netherlands the pattern is somewhat different. Here constraints of language limit the growth of Dutch exports. In the Science and Technology area, however, largely publishing in English, the Dutch are major competitors in world markets, exporting some 95% of production. Similarly many European publishers, including Pergamon, Elsevier and Blackwells, are highly successful in world, and particularly American, markets.
- 17 In the past the size of the US market combined with a strong customer supplier orientated relationship has tended to lead the US publishing industry to focus its marketing activity inwards. This is changing. At present US exports of published products are surprisingly low at around 2.5% of production, viz.

	<i>US Production</i> <i>\$ billion</i>	<i>US Exports</i> <i>\$ million</i>	<i>% of Total</i>
Books	6.68	511.6	7.7
Newspapers	17.75	10.1	0.06
Periodicals	9.23	312.0	3.4
TOTAL	33.66	833.7	2.5

- 18 Growth in export markets now exceeds growth in home markets by more than 2% as publishers seek to find new outlets for production. Traditionally Canada, with over 40%, has been the United States' key market but European penetration is growing steadily with 12% to the United Kingdom and some 3% to West Germany.
- 19 Falling sales and rising costs pose a major threat to publishing industries both in Europe and the United States. A further threat comes in the changing pattern of allocating advertising revenues. In both sectors advertising underwrites a substantial proportion of periodical newspaper costs; with the American newspaper industry this is as high as 70%. A drift away from print to new electronic media could prove disastrous for the publishing industry. That this is recognized can already be seen by the American Newspaper Publishers Association's strong adverse reaction to AT&T's proposal to deliver its Yellow Pages electronically.
- 20 Differing European attitudes to television advertising have in the past cushioned European publishers from the full impact of this media. Only in Greece, Ireland and, more lately, Italy is broadcast advertising time freely available. In other countries there are strict controls, either by price or time, or air time may even be totally absent. This has tended to push an ever greater percentage of advertising towards the print media.

Media used in consumer advertising 1979: Percentage

	<i>Print</i>	<i>Television</i>	<i>Radio</i>	<i>Cinema</i>	<i>Outdoor</i>
West Germany	79	11	4	1	4
United Kingdom	66	27	2	*	4
France	55	17	12	2	15
Netherlands	84	7	1	*	8
Italy	60	21	8	3	8
Belgium	72	9	*	1	17

*Less than 1 per cent.

- 21 When expressed as a percentage of the GNP, advertising revenues within a country tend to remain surprisingly constant. As a result any movement by advertisers towards the new media must draw revenue from conventional sources. A further expansion of air time

made possible by satellite or cable television could prove disastrous for the publishing industry.

- 22 Conservatism also poses a major threat to European publishers. In the past where most companies pursued and accepted the limitations of national markets this was understandable. Now with increased market penetration from outside and the risk of reduced advertising income, companies must diversify, or at best seek specialist market sectors, to survive. European companies which from fear, indifference or lack of investment capital fail to adopt new technologies run the risk of excluding themselves from major new markets.
- 23 In Europe, as in the United States, the 1970s were already a period of heavy investment for the publishing and printing industries, with the switch from letterpress to offset lithography. In the United Kingdom alone the cost of new plant and equipment purchased in the period 1973–81 is estimated to approach \$700 million. In the light of such investment commitments the arrival of such new technologies as videotex delivery systems presented further difficulties. As a result many publishers were cautious in approaching such systems and Prestel, the British viewdata system, draws only some 50% of Information Providers from the conventional publishing sector. Lacking investment capital in times of recession and economic hardship, many publishers now face the situation of being financially excluded from the technologies that could be their salvation.
- 24 Despite the economic pressures felt by many of the larger companies, publishing remains an easy entry industry and total numbers of publishers in the EEC are rising steadily. Indeed there is some evidence that small companies appreciate the benefits of new technologies like viewdata and can survive well if they select and cultivate a specialist market sector. But problems remain, particularly if the American publishing industry is, as expected, to adopt a more export orientated approach. Language problems have prevented the emergence of a homogeneous European market. Export orientated publishing nations, like Germany, the Netherlands and the United Kingdom are increasingly forced to seek markets outside Europe. In such areas US firms, made efficient by high technology equipment and good labour relations, are likely to prove major competitors.

Electronic Publishing Technology

- 25 Electronic publishing falls into two clear divisions:
1. The use of computers to facilitate the production of a conventional product;
 2. The use of computers and telecommunications systems to distribute data electronically.
- 26 Though essentially separate, these two divisions do inter-relate as with the use of magnetic tape to produce journals and to provide on-line services. Though use of the computer to assist conventional publishers is discussed elsewhere, the major emphasis of this study is on the use of computers and telecommunications networks to distribute data.
- 27 The growth of electronic publishing is the result of a number of diverse factors. Amongst these are the decrease in cost of computer memory devices, the decrease in telecommunications costs, rises in labour costs, a lack of skilled employees, a steady growth in the output of published material and increases in marketing and distribution costs. Most important is the need to improve revenues and profits by improved production methods, generation of new products, and the servicing of new markets.
- 28 To succeed in this form of electronic publishing a company must have five key strategic resources. These are:
- (i) information (often referred to in the US as 'software');
 - (ii) appropriate data-processing facilities;
 - (iii) communications channels;
 - (iv) enough financial support to overcome initial low rates of return on investment;
 - (v) a clear appreciation of market/user needs.

- 29 These resources can then be used to generate four main product/service categories:
1. broadcast, non-interactive services (e.g. teletext and cable tv);
 2. interactive services (e.g. viewdata and online database services);
 3. stand-alone products (e.g. videocassettes, personal computer software);
 4. the electronic journal.
- 30 As companies recognize the elements essential to a successful electronic publishing programme, merger and takeover activities increase. The need to acquire complementary skills accounts to a large part for the American Express/Mitchell Beazley and Pergamon/Infoline acquisitions. Some experts see a threat to database integrity from the arrival of major business interests in the information arena, but whilst such concerns should be recognized, their importance should not be over-exaggerated. Conversely, it is entirely possible that electronic publishing may secure the future of some publications no longer viable in conventional formats.
- 31 Though spectacular in concept and operation it should be stressed that most electronic publishing methods are still in their infancy. Just as bibliographic online services evolved from a passive reference delivery service to a value added and interactive mode, so other electronic delivery methods may be expected to change and evolve. It should be recognized that most electronic publishing systems are a long way from gaining user acceptance. The absence of user studies or a clear market demand in many areas should be a matter for concern. Certainly where such studies exist, as with the recent agricultural videotex study, the findings have been encouraging though not necessarily what had been anticipated.
- 32 The transition from conventional to electronic publishing is presenting publishers with some major financial problems. The new technologies require long-term capital investment and may have very different cash flow patterns from conventional printed products. Indeed the whole revenue base of electronic publishing has yet to be established. This is true even of bibliographic online services where the correct balance between printed and online charges has yet to be determined. Neither is the situation helped by over-ambitious market predictions. The early, optimistic predictions for Prestel in the United Kingdom have left many Information Providers ur-

comfortably committed to a system that shows little sign of growth. That most have remained is surprising, though the recent defection of Extel, more as a result of a change in marketing targets than lack of growth, must be a major blow to British Telecom. As yet nobody, either Information Provider or common carrier, is making money out of viewdata. It is possible that gateway facilities, teleshopping and electronic funds transfer may give the system the usage boost from which economic viability may be achieved.

- 33 Like any new technology, electronic publishing suffers from a plethora of misinformation and false claims. The correct balance between technical feasibility and user requirement is not yet clear. What is emerging is that for the foreseeable future electronic publishing is a complementary, not replacement, technology. Whilst electronic publishing may become the dominant source of certain types of information, in most areas printed products and electronic services will co-exist. Electronic products provide 'value added' capability not possible in conventional forms and success will fall to those companies able to combine the correct choice of subject discipline with the appropriate extras.
- 34 As electronic publishing spreads, so the function of the secondary publisher will change. We do not believe that electronic publishing will eliminate the need for the secondary service. Whilst full text delivery services such as ADONIS will place pressure on abstract services the development of value added services including document delivery should ensure their continuation. Similarly bibliographic control of electronic media must be instituted if much of the value is not to be lost. Also to be resolved are retrospective availability and archival storage of electronic products together with the introduction of safeguards to secure information should an electronic publisher or common carrier cease trading.
- 35 One major threat to the widespread acceptance of electronic publishing lies in the absence of proper guidelines and standards. This serves as a disincentive both to investors and potential users. Users faced with a proliferation of services each requiring different equipment will tend to opt for none, making it difficult for any to gain acceptance. In the same way companies new to electronic publishing are faced with a multitude of systems from which to choose, will be apprehensive and unwilling to make large scale

investment in the absence of proper standards. The rapid growth of the computer industry owes much to the establishment of *de facto* standards by IBM.

- 36 Electronic publishing is a new and dynamic area with many of the questions still to be asked and resolved. Technological advances have been rapid, overtaking the normal legislative and standardization procedures. Many of the new media have the capability of changing the normal relationship between an author and a publisher and many publishers are understandably concerned. At a time of economic difficulty the investment demands of electronic publishing are high with little guarantee of returns. Whilst many of the technological questions surrounding electronic publishing have been answered, some of the marketing and user problems remain. Neither, in the present economic climate, is the decision to invest necessarily reversible. The more a publisher spends, the more he is committed to a particular technology. There are some parallels between electronic publishing and microform publishing, since it is not the publisher or the systems designer who will determine the success or failure of the project, but the end user.

Recent Developments in Electronic Publishing in the USA

- 37 There is a general acceptance by the US information industry that the adoption of electronic collection, organization, formatting and distribution of information will be the growth sector of the industry for the next decade. The US economy is moving into a period of recession, and electronic publishing is being adopted as a way of maintaining revenues and profits even if capital is involved. The performances of US quoted companies are evaluated largely on the basis of quarterly earnings, and earnings per share. To maintain earnings companies are seeking new distribution channels for their products, and companies owning the means to distribute information consequently benefit from the increase in traffic.
- 38 The development of electronic publishing is entirely a private sector initiative. The involvement by the US government extends to some areas of communications regulation, but the chain from information collection to receipt by the user is entirely in the domain of private companies.
- 39 Some of the leaders in electronic publishing are industry leaders, such as Dow Jones, CBS etc. However there is considerable activity amongst smaller companies, often with only a limited geographic market. An important feature of all the companies currently entering the electronic publishing arena is that they are partially or totally integrated. Where there is only a partial integration joint ventures are common. It is seen as a primary requirement that all stages of the publishing operation are under the control of the participants. In this way the costs can be allocated in the most appropriate way, and the overall management of the venture is greatly facilitated.
- 40 Because of the diversity of US publishing companies it is not easy to provide mutually exclusive categories of participants in electronic

publishing. However the four major groupings are:

- database producers (New York Times, Mead Data Central)
- publishers of business information (Dow Jones, McGraw-Hill)
- distributors (Sammos Cable, CBS)
- publishers of consumer information (Minneapolis Star, Aretê)

41 The rate of growth of the industry is partially a result of the electronic distribution infrastructures in the USA. For example there are over 100 television stations, 4,370 cable operators and nearly 10,000 radio stations.

42 Besides the categorization given above there are also some overall industry structures emerging which parallel conventional publishing operations. These are:

- a dominant national information provider and a number of local information providers (cf. CBS/NBC/ABC);
- a dominant local information provider operating with some support from subordinate national information providers (cf. Associated Press/United Press International);
- a dominant national conduit with both national and local information providers (cf. US telephone network);
- a dominant local conduit with both national and local information providers (cf. cable tv distribution).

43 The diversity of distributor channels in the USA is indicated by the following table:

<i>Segment</i>	<i>1981</i>	<i>Penetration* (%)</i>
TV sets in use	161 million	
Homes passed by cable	39 million	49
Basic cable subscribers	17.5 million	22
Pay cable subscribers	10.1 million	13
Subscription TV subscribers	1.3 million	1.6
VCR unit sales (cumulative)	3.2 million	4
Video disc units (cumulative)	70,000	—
Two-way cable	62,000	—
Commercial teletext or viewdata	1,500	—

*Based on 79 million TV homes.

- 44 US publishers see electronic publishing as a major market opportunity, though probably not for another two to three years. Many companies are in the process of carrying out trials using different systems, making significant capital investment or making sure they are suitably integrated by the selective acquisition of companies. (Profiles of some US companies involved in electronic publishing are included in Appendix One.)
- 45 On the job front the only area where significant displacement seems likely is at the conversion of information into print stage (i.e. computer photo-composition). In fact a significant demand for skilled staff is reported. Electronic publishing requires specialized marketing, and sales support staff, and produces a very different producer-client relationship from the conventional area. In electronic publishing the customer is often paying on continuing subscription basis, products and services are often complex to use, and close liaison between the producer and user is often essential if the client is to achieve the maximum benefit from a subscription.
- 46 It is too early to analyze pricing strategies closely but, in general, these seem to be based on the medium term market, i.e. if the initial, small market is charged high fees there will be considerable user resistance. By keeping fees low, where possible going for unlimited usage, vendors hope to stimulate the market.

Review of Electronic Publishing Technologies in Europe and the USA

- 47 Though much of the attention in the electronic publishing field has concentrated on the distribution of electronically encoded information, electronic technology has revolutionized the production of conventional printed products. Computers, lasers, the digitization of information, and screen-based technologies now play a major role in the printing and publishing industries.
- 48 Despite efforts to find alternative methods it seems likely in the short-term that keyboards will remain the principle means of data capture. Experiments in voice input, though now well advanced, offer little hope for the introduction of major systems before the 1990s. Typical systems currently under test recognize less than 100 words and the most sophisticated so far designed only around 1,000.
- 49 OCR (Optical Character Recognition) is already widely used both in Europe and the US and offers greater possibilities although both costs and technology have improved far more slowly than had been anticipated. Advantages lie in the rapid transfer of text into machine readable form. Problems remain, particularly in the detection and correction of errors. This has resulted in some sectors of the American newspaper industry turning away from its use. Technical advances may solve some of the problems but until then usage seems likely to be confined to specialist areas.
- 50 Computer photocomposition is gaining widespread adoption in both the United States and Europe especially now that word processing equipment can be linked (on either a local or remote basis). Third generation machines use internal logic to generate characters via a cathode ray tube. Electronic character generation also replaces the mechanical optical systems which in earlier machines controlled the character size and placement.

- 51 Text to be phototypeset is normally input, along with format instructions, at a separate editing terminal. The machine thus receives its instructions by floppy disk, paper or magnetic tape, on-line link or via a telephone modem. Patterns of the characters required are called out of memory and are imaged on the CRT at the desired size and position on the line or page. The entire line (or in some cases page) is almost simultaneously beamed through an enlarging lens or fibre optic face plate directly onto the photographic paper or film. This medium is then moved in preparation for the next line or page.
- 52 The photocomposition industry has been energetic in adapting developments in electronics to its own needs. Already lasers are being used to provide the light source in sophisticated phototypesetters and other trends include:
- the move towards more complex multi-terminal systems;
 - improved storage and the ability to operate in foreground-background modes;
 - direct platemaking via laser.
- 53 Ink jet printing utilizes the output from digitally stored information to determine the positioning of the ink-jet. Printing occurs when ink is forced through a small nozzle under pressure. Vibrations of suitable frequency break up the droplets ensuring a uniform size and positioning. A charge electrode placed near the point at which droplets break from the jet issues each droplet with an appropriate charge which determines finally where each droplet is placed on the substrate. Unlike traditional printing processes ink jet printing allows each copy to be different. As such it is ideally suited to personally addressed items and mailshots. Some ink jet printers use a single jet, others an array, and printing speeds up to 600 m have been achieved. The Mead LEXIS/NEXIS terminal uses an ink-jet printer.
- 54 Recent developments include high speed electrophotographic and electrostatic printers capable of operating at 20,000 lines per minute. Working from digitized information they use laser imaging techniques and printing is achieved either electrophotographically or electrostatically. Further developments seem likely to allow the inclusion of line drawings and even illustrations.

Online Information Retrieval Services



- 55 Online computer based information services were first commercially introduced in the United States, and despite considerable efforts within Western Europe, the US online industry is still the dominant participant. Commercial services in the USA evolved out of public sector funding associated with aerospace and medical research in the late 1960s. The Lockheed DIALOG and System Development Corporation ORBIT services became publicly accessible in 1972, offering a limited range of databases. These databases were the result of the rapid adoption of computer-assisted photo-composition equipment. The increasing size of secondary services such as Chemical Abstracts was forcing publishers to look into new publishing technologies. In the early 1970s photocomposition units were unable to offer much variety in typefaces etc, nor were the increases in productivity dramatic. The attraction to the publisher was the generation of a digitally encoded computer-readable magnetic tape as a by-product of the publishing process. The costs of producing the tape were minimal. There were a number of other technical developments which were also of basic importance in making online services feasible, including magnetic disk packs, remote access time-sharing database management systems, the introduction of good telecommunications networks and the availability of low-cost terminals
- 56 By 1980 revenues generated by online database services amounted to \$632 million, and the market is forecast to grow at 38 per cent per annum compounded, giving revenues of \$3 billion in 1985.
- 57 This market consists of three sectors. The first is the bibliographic database sector, which accounts for 10 per cent of the market. This sector is dominated by Lockheed (26 per cent share), SDC (17 per cent), BRS (10 per cent) and OCLC (29 per cent) offering some 200

databases. Bibliographic databases represent one of the earliest forms of electronic publishing. Although the majority of databases are of US origin (including 15 per cent from US government sources) there are many databases of European origin, such as the files produced by the Institution of Electrical Engineers, Derwent Publications Ltd, the Commonwealth Agricultural Bureaux and the Rubber and Plastics Research Association. It should be noted that these are UK-based organizations and with a few minor exceptions there are no databases from other EEC member states available from US host services. Despite the activities of the European Space Agency, access to US services has been largely responsible for the initial development of bibliographic database usage in Europe.

- 58 The second sector is that of databanks, mainly containing numeric information, and often referred to as source databanks. Access to these databanks, and their associated software, generated revenues of \$500 million in 1980, of which about 90 per cent was from the use of business and economic databanks. However, much of this revenue was from credit reporting and stock quotation services. This market sector will grow at over 40 per cent per year over the next five years. This sector consists of two main types of services. The first, typified by Data Resources Inc (a McGraw-Hill subsidiary) collects and collates data and provides subscribers with access via DRI's own computers. The other services are those provided by ADP, IP Sharp, CDC and General Electric, for example, in which the service only provides access (and specialized software packages) to databanks compiled by other organizations. Some of the major databanks including the IMF and OECD databanks, are the equivalent of printed handbooks and statistics series. Others, such as the Country Assessment Service of Business International do not have a hard copy format. All the major time-share services (such as ADP) operate throughout the world, but are currently making special efforts to develop the European market. Some Euronet-DIANE hosts, such as CISI, do provide access to databanks but it is the US companies who seem to be taking a more aggressive approach. ADP already has access to Euronet-DIANE, and companies such as CDC are evaluating various network/marketing strategies. Their aim is not just to provide European business and economic information to European users, but to satisfy the demand for such information in North America and Japan.

- 59 The third sector of the US online service industry is that of full text services. The market leader is Mead Data Central, a subsidiary of Mead Paper Co. Mead Data Central (MDC) offers two related databases. LEXIS, inaugurated in 1972, provides the full text of US legislation and court proceedings, and also includes UK and European material. NEXIS is a news database which started in 1979 though its coverage extends back to 1975 in many cases. The newspapers and other information sources available on NEXIS are given in Appendix Three. It is estimated that Mead spent over \$30 million on developing these services, but the customer base is still quite small, with perhaps only 2000–3000 customers.
- 60 In an effort to broaden the customer base, an agreement has been signed with McGraw-Hill which will make many of McGraw-Hill's business and technological periodicals available, in some cases retrospectively. There have recently been some major management changes within MDC, which could be the prelude to a change in strategy for LEXIS and NEXIS.
- 61 Other full text services include those offered by New York Times (which has the American Academic Encyclopedia available), Comuserve and Westlaw.
- 62 No European host services currently offer full text services. Apart from the limited market for each language, few European newspapers are printed using computer photocomposition, and so no computer-readable tape is available for conversion into a database.

Videotex

- 63 Videotex is the generic description for computer based information services using a standard television set as the display terminal. The signal conveying digital information can either be broadcast (teletext) or transmitted through the public telephone network. This latter technique is often designated 'viewdata', or interactive videotex.

Teletext

- 64 The broadcast teletext signal is carried on five 'blank' lines at the start of each television frame. It was developed in the UK by the British Broadcasting Corporation and the Independent Broadcasting Authority and, under the respective trade names Ceefax and Oracle, teletext services can be received by 210,000 domestic users. For technical reasons each library of about 200 pages is continuously cycled, and an integrated circuit decoder can display specified pages, update pages on a regular basis, or overlay information onto another programme. This latter facility is currently being used to provide subtitles for deaf viewers. As with all television based services there are severe restrictions on the number of characters that can be displayed, and on the quality of the graphic displays. Until recently such services were regarded as being mainly useful for distributing information of general interest, such as news items, weather forecasts, recipes and traffic information. However cable distribution of television programmes also enables a considerable increase in the number of pages that can be transmitted, stored and displayed, especially if the memory device is incorporated in the television set.
- 65 The investment required to establish a teletext service is low, and the decoder chips are now available for PAL, SECAM and NSTC standards. One problem has recently arisen, and this relates to the ownership of the blanking interval. When a tv signal carrying teletext is broadcast using a satellite or cable distribution systems owned

by a third party, can the teletext signal be stripped off and replaced by new teletext signals? A test case is currently underway in Chicago to resolve this issue. Though usually non-interactive, developments in the French DIODE system combine wideband channels (database to user) and narrowband (user to database) to allow a degree of interaction.

Viewdata

- 66 Viewdata was also developed in the UK largely by the British Post Office and was first publicly demonstrated in 1977. By 1979 a pilot trial of the Prestel public service was underway. Viewdata services were seen as a way of giving a greater traffic flow on domestic telephone lines as the television set is connected to a computer using a telephone circuit. Information is stored on the computer in frames, with one or more frames making a page of information. The computers are run by the Post Office (for the UK Prestel service) and information is loaded on these computers by Information Providers (IPs). A charge is made for each frame, and there is also a telephone call charge. The database is searched using a numeric control pad, involving a hierarchical search routine, with the ability to go direct to frames identified by prior use of a printed index.
- 67 The early days of Prestel, and viewdata in general, were a marketing fiasco. It was assumed that the major market would be the domestic sector. However the cost of adapted tv sets was very high, and people were unaccustomed to paying for information. IPs provided databases of games, restaurants, book lists and travel information, and found virtually no usage. The business sector, often using small monochrome sets rather than large colour sets, soon realized the value of getting up-to-date information on train times, stand-by airline seat availability and other related information. By the end of 1981 there will be about 13,000 Prestel sets in use. IPs providing textual information services have been particularly disappointed with Prestel. For example the Institute of Scientific Information has now ceased to make its SCITECH database available. The character range of a tv set makes the reading of quantities of text laborious and slow, impacting on the use of the set for other, more 'attractive' uses such as programme viewing and video recording.

- 68 The French PTT also developed a viewdata service at around the same time, using a display standard which gives higher quality graphic images but with no major increase in the 960 character limitation of the tv set. Télétel, the French viewdata service, is also compatible with Antiope the French teletext delivery system. In Canada a rather different approach to viewdata technology was adopted by Telidon, giving still better graphics but again no increase in the character count. The question of standards is a major factor in the future development of viewdata services. Agreement has been reached on a common European standard, but now the USA company AT & T is attempting to establish a US standard using the best features of all of the systems.
- 69 In the USA there are many trials of viewdata services taking place, of which the best known are the US Department of Agriculture's Green Thumb service for farmers, and the Knight-Ridder Viewtron service. With no national PTT in the USA it has been left to the private sector companies to evolve viewdata type services. So far, only the services run by The Source (a Readers Digest subsidiary), CompuServe (a subsidiary of H & R Block) and the Sears/NCI captioning project are in even a pilot operating state. A feature of the CompuServe service is that it provides access to a range of newspapers.

- 70 A summary of videotex operations is given below:
(source: *Electronics Weekly*, 14 October 1981, p. 10)

<i>Country</i>	<i>Service suppliers</i>	<i>Participants</i>
United States	The Source	11,340
	CompuServe	14,200
	Viewtron	260
	Project Green Thumb	200
	Dow Jones Info Retrieval	22,000
	Sear/NCI Captioning	44,000
	Keyfax-WFLD Chicago	100
	WETA Washington DC	60
	KCET/KNXT Los Angeles	20
	Atari QUBE Columbus	20
	SSS Cable Text	80
	BISON (Belo Dallas)	60
Canada	ISTA Bell Canada	491
	Project ELIE	150
	Project IDA	37
	Project Grassroots	48
	Alberta Govt Telephone	12
	Project Mercury	20
	British Columbia Telephone	20
	Ontario Educational Communications Authority	55
	Telecable-Videotron	250
TeleGlobe	50	
United Kingdom	Prestel	12,591
	Teletext	210,000
France	Téléétel (Vélizy)	900
	Electronic Directory	1,500
	Antiope Bourse (teletext)	100
West Germany	Bildschirmtext	6,000
Japan	Captains	1,000
Venezuela	OECD 1	25
Sweden	TextTV (teletext)	40,000
	DataVision	80
Norway	Teledata (videotex)	60
Belgium	Operation Percival (teletext)	80,000
The Netherlands	Viditel (videotex)	3,000

Trials are also planned for Spain, South Africa and Hungary in 1982–83.

- 71 Though growth in the use of viewdata systems has generally been disappointingly low, two new developments seem likely to boost usage. The first of these is the arrival of Gateway capabilities pioneered by Bildschirmtext and rapidly becoming a requirement for all videotext systems. Gateway allows access to external databases whilst maintaining the user friendly protocols developed for viewdata systems. Currently 30 computers are connected to Bildschirmtext via Gateways and the capability is expected to be introduced into the United Kingdom's Prestel service during 1982. The second sector is the growth of private and limited access viewdata systems. Such systems as TOPIC, the UK's Stock Exchange service, allow access to information continuously updated in real time and covering prices and trends, company information, exchange rates and commodity prices. A similar service covering stock exchange information is operated in Holland by Tijn Media.

Video and Optical Discs

- 72 The idea of storing video signals on a rotating disc dates back to the mid 1930s but video recording did not become a practical proposition until Ampex introduced a video tape recorder in 1957. In order to record and reconstitute the video image it was necessary to use very high tape speeds, and for nearly two decades video recording was solely used for professional/broadcasting use. The development of a helical-scan recording head enabled tape speeds to be much reduced, and this opened up the consumer market.
- 73 The subsequent development of the market has been hampered by the existence of a number of incompatible tape formats. At present there are three such formats, the Sony Betamax, the JVC VHS and the Philips V 2000. In Europe, Sony and JVC (and other companies holding licenses) have about 35 per cent of the market each, but in North America and Japan, Philips hold a very small share of the market. Video recorders are used for four major applications. The first of these is to replay commercially recorded feature films. Related to this application are training and educational films. The third major use and currently the subject of a court case in the USA, is as a 'time shift' device, i.e. recording tv programmes for viewing at a more convenient time. Finally there is the very new application of electronic cinematography, in which a video camera and recorder take the place of the conventional camera and projector.
- 74 A similar problem over formats is also a factor in the slow development of video discs. A video disc stores a video signal in a frequency modulated form, which can then be replayed to give a video image. The disc must rotate at high speeds. Four companies have developed video disc products all using slightly different technologies. The first to launch a commercial video disc unit was Magnavox (North American Philips) in 1978. In the Philips system a laser beam tracks across a grooveless disc. The light beam is reflected by pits arranged in circular tracks, and is modulated to give an FM signal. Slow motion, reverse motion and freeze frame effects can be obtained, with the playing times of between 30 minutes and 60 minutes per side. In 1981 RCA launched its Selectavision player, in which a

stylus tracks grooves in a disc. At present none of the special effects can be obtained and there is mechanical contact and hence wear, between the stylus and the disc. The third commercial system (though not due to become available until 1982) is the JVC VHD system, in which a capacitive transducer tracks across a grooveless disc controlled by a servo drive. The question as to whether the effects such as slow motion will be available on the commercial product is still open to doubt. Finally there is the Thomson-CSF system, which uses a transmitted laser beam (rather than the reflected beam used by Philips). Despite a joint venture agreement with Xerox in the USA, this system now seems to have been discontinued.

- 75 The lead manufacturers of each system (Philips, JVC and RCA) have had three major preoccupations over the last few years. The first has been to develop a reliable player and high quality disc replication procedures. Secondly they have been trying to set up a network of licences around the world, since a world market is essential to recover the \$100 million each company has spent on video disc development. Finally there has been the quest for 'software', primarily feature films. However, indications from the USA are that the consumer market is not growing at the required rate, a situation similar to viewdata. Some leading electronics companies such as Sony doubt whether video discs will survive. The two main factors inhibiting sales seem to be cost, and the inability to record onto the disc. Sound and vision quality are virtually identical between video disc and video tape. Some publishers regard the lack of a recording capability on video to be a major advantage as it eliminates illegal duplication of copyright material.
- 76 The market for video discs will probably be in training and education, where the freeze frame, slow motion and reverse motion effects are invaluable. The US army has conducted a wide range of tests which show video discs to be an excellent method of training. Another project of interest is the use, by the giant Sears retail chain of a mail order catalogue on video disc. Also in the USA, the University of Nebraska is a leading proponent of using video disc (until recently the Thomson-CSF system) for educational purposes. In theory, pages of a book can be filmed and reproduced on a tv screen. In practice, it has been found that the most popular discs are those using specially prepared programme material.

- 77 The technology of video discs has been expanded to give optical disc memory devices. Information is stored in a digitized form, and only the Philips and Thomson-CSF system can be used in this way. Each pit represents one bit of information, and thus each disc can store 10^{12} bits, or about 400,000 pages of text. Images can also be digitized. There are still a number of unresolved problems with optical disc storage. The error rate may be too high for optical discs to compete with magnetic discs, though this is far less of a problem with images where a slight error will be ignored by the human eye. The most important problem is how to achieve a disc which can be recorded on, played back, and then re-recorded. Of the various techniques under investigation the Drexler photographic emulsion technology seems the most promising.
- 78 Virtually every US company is engaged on optical disc research, including IBM, which has a direct link with Philips. In Europe the demise of the Thomson-CSF project leaves Philips on its own apart from a disc technology development by Patcentre in the UK. The Philips Megadoc 'juke box' storage device is currently the basis of the ADONIS project, offering storage capacities of up to 4 million pages of text.

Cable TV

79 The use of coaxial cable networks to distribute television programmes is not new, and has been used to provide access to broadcast services in areas with poor reception throughout Europe. The major expansion of cable distribution is taking place in the USA, where cable tv reaches 22 million of the 73 million households with tv, a figure which could reach 40 million within the next five years. There are two basic types of cable service. In most cases the cable company distributes up to 36 channels of broadcast tv programmes to households who pay a monthly access fee. However there are around 5 million subscribers to dedicated pay-tv services such as Home Box Office, which offers a range of current feature films, sports events and magazine programmes. In Europe only about 15 million of the total of 100 million tv sets are currently wired to cable systems though the percentage connected varies widely from country to country.

<i>Country</i>	<i>% of tv homes wired for cable television</i>
Belgium	64
Netherlands	55
Denmark	50
France	37
West Germany	35
Ireland	23
United Kingdom	14
USA	54

80 These cable systems are non-interactive apart from channel selection. The first major interactive cable system was the QUBE service operated by Warner-Amex in Columbus, Ohio. Nearly 15,000 households pay \$11/month for access to 30 channels of television

and 10 channels of local community news. The control pad has response keys which enable subscribers to participate in programmes, and potentially to order goods and services. Similar interactive cable systems are now being introduced elsewhere in the USA, such as the Cox Cable service in San Diego, California, which is linked into The Source and into a home banking service. One problem facing widespread introduction of interactive cable television is that most of the cable currently in place in Europe and the USA is 12 Channel and as such unsuited for use in a two-way mode.

- 81 One factor that needs to be taken into consideration with the wider use of complex interactive systems is the cost of both relaying the multi-channel cable, and the cost faced by the user (or the cable company) of the necessary decoding/keyboard equipment.

Direct Broadcast Satellites

- 82 The combination of Direct Broadcast Satellites (DBS) and cable distribution will have a major impact in both the USA and Europe. Until recently satellites were used solely as alternatives to terrestrial telecommunications networks, and enabling television signals from one country to be transmitted to a central receiver in another country, for re-broadcasting using conventional transmitters. The concept of DBS technology is that a television signal is relayed to a satellite, which re-transmits it to individual ground stations. In theory each house could have its own receiver. However, the present cost of these receivers, and the 90 cm dish receiver involved, will result in ground stations being used as feeders to local cable distribution networks.
- 83 The cost of launching a satellite is considerable, and the only launch facility that Europe has is located in French Guyana. It is anticipated that the US space shuttle programme will significantly reduce the cost of placing satellites in orbit, but for the next few years there is likely to be a significant shortage of satellite capacity, which will effect the development not only of broadcasting services, but also teleconferencing and other telecommunications services. The frequency allocations for European countries have been agreed, but the allocations for the USA will not be finalized until 1982/1983.
- 84 The advent of DBS will present publishing companies with both opportunities and problems. The 'foot print', or coverage of the transmissions from the satellite will overlap country boundaries, enabling programmes, and their advertising content, to be received in countries other than the country transmitting (and controlling the content of) the original broadcast. Advertisers will be keen to use DBS services because they will be able to reach a much wider audience. This may cause a transfer of advertising revenues from newspapers and magazines. These new services would also enable advertisers to circumvent strict controls on advertising content imposed by national authorities.

The Electronic Journal

- 85 The concept of the electronic journal is that the creation, editing, refereeing and distribution of a scientific paper are carried out without any paper intermediaries. Much of the drive for an electronic journal comes from the suggestion that conventional means of publishing have failed to meet the speed of dissemination required by many high technology areas. In addition to a number of commercial publishers who are examining the electronic journal from a largely economic standpoint, two major research projects deserve consideration.
- 86 The first electronic journal project EIES (the Electronic Information Exchange System) ran from October 1978 to March 1980, housed at the New Jersey Institute of Technology. In general, findings were inconclusive, though some problems relating to author attitudes, command structure, the quality and reliability of terminals and system response times were identified. Although the study's main electronic journals were deemed a failure, a weekly 'newsletter' was published successfully. Such a finding, in an area so lacking in real user information, deserves treating with caution, but it may well point the way forward.
- 87 BLEND (the Birmingham and Loughborough Network Development) is an experiment, supported by grants from the British Library, to identify the cost, capabilities and impact of an electronic journal and its associated information network. Begun in January 1981, and due to run for three years, this project is still in its infancy though some preliminary findings have been forthcoming. Although the first journal produced by BLEND was specifically aimed at the computer area (and entitled Computer Human Factors) the study suggests that the need to establish simple, user friendly protocols is paramount. Secondly, access to a terminal, and the need to integrate this in normal routines, is essential if the electronic journal is to gain acceptance.

- 88 Many publishers are concerned that the present interest in the electronic journal comes not from user demands but from a technology push. If this is so, then the experience of the American EIES study, where authors failed to co-operate because of lack of status and prestige, should be a matter of concern, as it suggests that the electronic journal has no clear mandate from either the user or author communities, and could result in the generation of unrefereed material of poor quality. This view would seem to be borne out by the rejection rates of some major journals.

<i>Journal</i>	<i>Papers submitted per year</i>	<i>Percentage rejected</i>
<i>Transactions of the Faraday Society</i>	600	15–20
<i>Journal of Physics</i>	300–450	up to 30
<i>Geophysical Journal</i>	170	25
<i>Biochemical Journal</i>	1000	40
<i>Mathematika</i>	60	50
<i>Journal of Zoology</i>	200–270	50–60
<i>Biometrika</i>	340	60–70
<i>Nature</i>	7000	65
<i>British Medical Journal</i>	4000	80–85
<i>Lancet</i>	3700	83
<i>Economica</i>	300	90
<i>Mind</i>	400	90
<i>Philosophy</i>	300	92

Unfortunately no figures exist to show what percentage of those items rejected eventually achieved publication elsewhere.

- 89 To what extent the electronic journal may become a force is difficult to isolate from the inconclusive studies so far undertaken. Certainly, in the short-term its applications seem destined to be limited and confined almost exclusively to science and technology. Any electronic publishing medium must offer a new dimension over conventional products to have any chance of gaining user acceptance. The only such dimension open to the electronic journal is speed of publication. This, coupled with the success of the EIES newsletter, would seem to suggest that the most likely areas are the

'letters' or 'establishing priorities' type journals. Much more fundamental research into application areas and user attitudes would seem to be needed, together with an examination of the relationship between the electronic journal and developing areas like machine translation. It is also clear that should the electronic journal gain wide acceptance, a new system of bibliographic control would need to be created, as well as a code of practice on retrospective availability and archiving.

Document Delivery

- 90 Bibliographic online services have stimulated the demand for source documents. This presents problems, particularly in areas where inter-library co-operation is poorly developed or access to central services like BLLD or CNRS is difficult. In such cases document delivery may take days, or even weeks and largely obviates the advantages of online access. It was to examine ways of improving access to primary documents that the EEC set up the ARTEMIS and APOLLO studies. A further initiative, ADONIS, largely stimulated by the desire to solve the copyright problem has recently been proposed by a group of European publishers.
- 91 In 1979 the EEC commissioned Arthur D Little (ADL) to undertake a study of the possibility of large scale document delivery and teletransmission. From this initial study the concept ARTEMIS was feasible using existing technology and proposed a network of computers and communications channels by which Information Providers could supply full text on demand. The form of the document provided would be either facsimile or text, i.e. the author's text without preserving the layout, font type or graphics. Though acknowledging the scale of demand such a service might face, ADL did not feel that market demand alone would be sufficient to bring ARTEMIS about. The legal and co-operative implications would also make it unlikely that any single private sector company or consortium would be able to launch an ARTEMIS type project.
- 92 The study determined that in the short-term only facsimile could handle both text and graphics, whilst for text alone document character coding techniques were feasible. In recommending the use of Euronet as the communications medium ADL emphasized that the network had not been designed for electronic document delivery services and that further studies were essential.
- 93 Any electronic document delivery service must match the costs of conventional delivery methods. Whilst users may be willing to pay a premium for a small percentage of documents urgently needed,

services like ARTEMIS will only be economic if a high proportion of current inter-library loan traffic is channelled their way. The suggestion is made in the study that the EEC should approach the PTTs to obtain an overnight file-to-file transfer tariff for Euronet. The limited bandwidth of terrestrial network may not, however, be able to cope with electronic document delivery. These doubts and the emergence of new satellite technology have caused the EEC, in conjunction with the European Space Agency to consider the establishment of APOLLO (Article Procurement with Online Local Ordering) a trial project to investigate the feasibility of a satellite-based system for document delivery and transmission.

- 94 APOLLO is a trial project scheduled to begin at the end of 1982, and has four main objectives:
1. to demonstrate that the use of a satellite link is feasible;
 2. to show a flexible network deployment based upon a small satellite and earth stations;
 3. to explore the satellite link as a document delivery medium;
 4. to test and demonstrate advanced document capture, storage, retrieval, printing and display technologies.
- 95 The initial APOLLO test will cover only a few documents and be linked to the bibliographical index of IRS. Search strategies, document ordering and control processes will be carried out using terrestrial network — like Euronet in conjunction with standard alphanumeric terminals. Using slow speed scanners it is also intended that APOLLO will test feasibility of the digitization of documents on the premises of a supplier.
- 96 Much of the technology involved in APOLLO has already been demonstrated in ESA's STELLA and SPINE activities. Here satellite transmission using small earth stations has already achieved text transfer at high data transmission rates. Apart from the OTS satellite, which has now largely failed, fully operational facilities for APOLLO should become available with the launch of the European Communications Satellite in 1982–83. Even mature document delivery systems are unlikely to generate enough traffic to justify a separate satellite and such services are likely to share a satellite or even a transponder.

- 97 The legal problems associated with document delivery are complex. Control of copyright provided much of the incentive behind the recently announced ADONIS project. A group of European publishers, initially prompted by Elsevier, but now including Blackwells, Springer-Verlag, Pergamon, Wiley and Academic Press, are now assessing the impact of large scale copying. An analysis of a subset of 2.5 million document requests to BLLD showed that some 30 per cent of all requests came from journals published by members of the group, and that most of the documents were less than five years old. A solution suggested by the group is a combination of new technology and the existing administrative infrastructure of the BLLD. No change is proposed in the present request procedures. On arrival at BLLD requests for photocopies from group journals would then be passed to a separate agency run by the group. This would provide copies to the BLLD who would be responsible for their distribution. The publishers would then charge BLLD for each article supplied, including a copyright fee.
- 98 Much of the interest in ADONIS stems from the new technology it proposes to use. This involves digitalization of text and diagrams of all journals published by the consortium. Once digitalized, text will be stored on optical discs. The equipment under examination is the Philips Megadoc 'juke box' disc packages. Each disc has the capacity to store up to 400,000 pages. Retrieval from the disc will be accomplished by equipment which accepts an output of digitally encoded information and produces a hardcopy version matching the best photocopying machines. Some problems remain in interfacing the equipment and will have to be resolved before ADONIS's proposed launch in January 1984.
- 99 Whilst it is too early to assess the full potential of ADONIS and the legal agreements finally setting up the group have yet to be signed, the project could have far reaching implications for the European information industry. It could also seriously impair the economic viability of such ventures as ARTEMIS and APOLLO which need a high traffic level to be feasible. European publishers lack the financial resources of their American counterparts, and only via co-operative links, such as ADONIS, can they hope to reach the level of investment demanded by modern technology. Exact costings to bring ADONIS into operation are not available but are probably not lower than \$5 million. To obtain a level of return on such an invest-

ment ADONIS would have to attract substantial traffic and encourage other publishers to join on a full or associate partner basis. Informal discussions with other publishers about joining ADONIS are already under way and these could number as high as 200 in the short term. The initial emphasis is on major publishers, not necessarily purely commercial ventures, and it is known that some US learned societies have been approached. One problem here is the position of the smaller publisher. It seems likely that to relate to such projects as ADONIS they will need some form of umbrella organization. For this reason the British Publishers Association formed Publishers Databases Limited, an organization available to publishers from within and outside the United Kingdom.

- 100 Access mechanisms to ADONIS have yet to be determined though it does seem likely that this would be in the form of some cheaply produced 'current contents' listing. If this is so, and ADONIS does attract a wide range of publishers, this could have a significant impact on the secondary publishing industry both in Europe and the US. Such a trend would probably push abstract journals initially into production of further value added services. Any major loss of revenue could prove disastrous for many abstract publishers. A labour intensive industry, with limited opportunities for cost curtailment, the secondary publishing sector is particularly vulnerable to an ADONIS type project. Neither can the risk of the failure of any major abstract service be greeted with equanimity by the information profession. At best ADONIS will only cover a large percentage of journal information. Coverage of the remainder, probably the most difficult in terms of bibliographic control, will continue to fall within the remit of the secondary publisher.

Electronic Mail

- 101 **The role of electronic mail in intercorporate communication has been the subject of numerous trials. The widespread availability of electronic mail services is still some way off. There are a number of message services using the concept of electronic mail, such as the SDC Orbit Electronic Maildrop and Lockheed Dialog DialOrder services, and the proposed message facility on several viewdata services. These are non-interactive at present. The impact of electronic mail services directly on electronic publishing is likely to be limited to the facility to order documents using the same terminal used to carry the original search.**

Legal, Social and Other Issues

- 102 The impact of national and Community legislation on electronic publishing is likely to be considerable, including legislation and regulations on information privacy, copyright, censorship, and transborder data flow. Electronic publishing is already generating new legal problems. Who owns the blanking interval on a television broadcast used for a teletext service? Is it the programme originator or the distributor? Newspapers and books are zero rated for Value Added Tax purposes, but if transmitted over a computer-based system become a service, and so liable for a high rate of Value Added Tax. In general, legislation was not specifically drawn for electronic publishing, and the industry must therefore wait for existing legislation to be interpreted in court as the result of the test case. This is time-consuming and expensive.
- 103 Because broadcasting and telecommunications services are in general state monopolies, and the providers of information are usually from the private sector, many electronic publishing projects will be joint ventures. However, the organizations concerned may be so constrained by government investment policies on the one side, or by the reservations of major shareholders on the other, that the commercial development of the project may be jeopardized.
- 104 Related to this problem is the current situation over the use of direct broadcast satellites and cable distribution. The West German government is seriously concerned about such services, and yet the BDZV newspaper group are proposing to use the Radio Tele-Luxembourg (RTL) satellite, and have set up a \$5 million cable tv pilot trial in Ludwigshafen.
- 105 All countries in Europe have controls over the duration and content of tv advertising, especially for products such as alcohol, tobacco and toys. In many countries advertising time is severely limited, as in West Germany. Between 1974 and 1979 advertising revenues in

newspapers and periodicals rose by over 80% and yet television advertising grew by only 40% over the same period. The ability to use satellites to beam advertising into neighbouring countries is obviously attractive to companies, especially those in the consumer products industry. Belgium has already objected to the proposed RTL satellite broadcasting advertisements in the country. Although attempts are being made at an international level, the solution may well have to be a complex array of bilateral agreements. The rapid spread of pirate television stations in Italy and the Netherlands will also need to be considered.

- 106 The extensive use of telecommunications networks will also require a careful study of the impact of tariffs and standards on the growth of electronic publishing. The tariff structure and charges adopted by US telecommunications companies were factors in the rapid development of online retrieval services, and will be of even greater importance as the amount of data transmitted grows exponentially with the arrival of document transmission and electronic mail services. There will thus be a need to set tariffs which are economic for both the PTTs and the publishing industry, and in addition these tariffs should be consistent throughout the EEC, and make international traffic (especially between the EEC and the USA) cost-effective. There is mounting criticism in the USA concerning tariff and non-tariff barriers to trade with the EEC. The danger from the point of view of European publishers is that similar barriers may jeopardize their entry into the fast-maturing US market.
- 107 The problems presented by the lack of standardization in computing and telecommunications are considerable. These problems include differing television line standards, and a divergence of opinion as to whether visual display terminals should provide a dark text on a light screen (West Germany) or a light text on a dark screen (UK). Most of these problems can be overcome, and the CCITT, ITU and ISO are just a few of the organizations working on solutions and standards. In the short term the consumer is faced with (for example), three different video cassette formats, three video disc formats and three different viewdata standards. Even typewriter (and hence computer terminal) keyboards have slightly different keyboard arrangements in European countries. This lack of standardization inhibits the customer from investing in new equipment, and increases manufacturing and distribution costs.

- 108 Copyright issues have always concerned publishers, but especially so with electronic publishing. King Research Associates have suggested that in the USA some 10% of all journal articles circulate in a form other than the journal itself, such as reprints and photocopies. The services offered by CNRS and BLLD in Europe mean that the percentage here is almost certainly higher. One of the key reasons for the ADONIS project was that publishers wished to retain control over the use of their products. Another important copyright issue is the duplication of video cassettes, and the recording of copyright material from television broadcasts. A test case is currently being found in the USA which may well go to the Supreme Court for judgement. An attraction of video discs is that they cannot be duplicated, though they can be recorded onto video cassettes.
- 109 Another area where existing legislation may prove to be inadequate concerns the transmission of obscene or libellous material. Such material could be transmitted by viewdata services, and yet because there is no paper version, the relevant computer file could be erased, leaving no evidence for a subsequent prosecution. Different standards also apply to advertising which is being broadcast publicly compared with material sent through the postal system. It is not yet clear into which category of delivery service interactive information services would fall. The role of the 'common carrier' is also the subject of some contention regarding the extent to which such a carrier is responsible for the transmission of illegal information.
- 110 As far as services such as an electronic journal are concerned, it is important that adequate provision for archival storage and bibliographic control is made.

Conclusions

- 111 The current interest in electronic publishing arises primarily from the rather depressed economic state of the publishing industry in both Europe and the USA. Publishers are experiencing reduced rates of revenue growth, and much lower profit margins. Electronic publishing provides opportunities for more efficient production of printed products, and the distribution of electronic versions of these products into both existing and new market sectors.
- 112 It is inadvisable to take developments in the USA out of context, and apply them to Europe. There are fundamental differences in the business environment. US publishers have a massive domestic market with none of the language problems which fragment the European market. They also have a much wider choice of distribution channels. There is little evidence of any technological superiority of the USA over Europe except in a few areas such as full-text retrieval software. Indeed the USA has had to import videotex, video cassette and video disc technologies. Where US publishers do have an undoubted lead is in the extent to which technologies such as computer phototypesetting are used.
- 113 Many of the current electronic publishing technologies are in an early stage of development, and some of these technologies will be modified to such an extent that totally different applications will be implemented from those originally foreseen. This has occurred already with videotex services in their shift from information to transaction services. It is especially difficult to predict direction and rate of technological advance within the publishing industry for two particular reasons.
- 114 Firstly, publishing has always been an industry which has been highly resistant to change, relying heavily on the skills of individual craftsmen. Secondly, users (readers) are also resistant to change, especially when the new products themselves are liable to change within a short period of time, and when a change in attitudes is required. The effective use of technology requires a considerable

investment in time and money, and there is a natural reluctance to make such an investment until there are clear indications of the scale of the market demand.

- 115 Consequently the approach adopted in both Europe and the USA is to establish trial projects. Most of these projects are very limited in their scope, and it is doubtful whether the results are adequate for the accurate assessment of market demand. In the case of both Prestel and Telidon, government forecasts have proved to be wildly optimistic, and companies involved in the subsequent commercial services feel disillusioned about the situation.
- 116 There would thus seem to be a need to bring a degree of rationalization to these pilot trials, so that the entire publishing industry could benefit from a reasonably accurate assessment of the market. The facility to exchange experience is essential, and is the primary reason for the establishment of groups such as the Electronic Media Committee of the US Information Industry Association, and the International Electronic Publishing Research Centre (IEPRC) in the UK.
- 117 So far very little attention has been paid to the needs of users, either in terms of the information or entertainment they require, or the way in which they wish to receive it. There do seem to be clear indications that electronically published products and services must offer additional value and facilities compared with printed equivalents.
- Products and services most likely to succeed will probably fulfil the following criteria:
- they can be easily and cost-effectively generated from the existing publishing operation;
 - they can be distributed through a variety of channels;
 - they require little or no investment by users in expensive terminal equipment;
 - the technologies used give the electronic product major advantages in delivery speed, ease-of-use over the printed product;
 - little user training is required.
- 118 The user, especially in the domestic market, is faced with a plethora of new services as the television set changes function from an entertainment medium to an information medium. This change often requires the user to interact with a computer-based system, an

interaction which requires some degree of skill, and a certain amount of courage. The same television set will also be acting as the terminal for video cassette recorders, video disc systems, personal computers, video games, videotex etc. With the limits on leisure time and disposable income, and the resistance to paying for anything that originally was provided free-of-charge, any product or service that involves the user in any financial commitment will have an additional marketing barrier to overcome.

- 119 Revenues from these services may, in fact, present publishers with a new set of problems. Firstly, considerable capital investment will be required, at a time when revenues from conventional products are falling in real terms, and European publishers are only just emerging from the transition from letterpress to offset printing techniques. In many cases publishers rely on prepaid subscriptions from purchasers, or rights payments from book clubs and syndication agencies. On-demand publishing, with payment on a use basis, will have a considerable effect on cash flows.
- 120 However, the ability to service selective markets, and to charge users appropriately, is an important advantage to electronic publishing, as shown by the Closed User Group concept of Prestel. Despite the size of the US national market, publishers are making a major effort to identify dispersed specific markets (on an industry basis, for example), and then to link these markets together by cable/satellite to give a single market of a size sufficient to justify the investment involved. European publishers are expressing concern about the impact of cable/satellite services on advertising revenues, and a balance will have to be kept.
- 121 Smaller publishers face special problems in obtaining funds for capital investment and in obtaining skilled personnel. Little seems to be known about the large number of smaller publishers in the EEC, and until accurate information is available on staffing levels, equipment installed, profit and revenue figures etc, there may be a danger of losing some of the large publishing base which is a feature of the European publishing industry at present.
- 122 The keys to success in electronic publishing are probably a vertically integrated corporate structure, a good revenue base from which to fund capital investment, a clear indication of the needs of users, and the ability to react quickly and positively to new technological and marketing opportunities.

Appendix One

Three brief illustrations are given of the way in which companies in the USA are rapidly adopting electronic publishing technologies to enhance old products and generate new products.

Dow Jones

- A1 Dow Jones is a major US business publishing company with close similarities to the UK Pearson group. The foundation of the services offered by Dow Jones is *The Wall Street Journal*, which has a circulation of over 2 million copies. In addition, Dow Jones publishes 20 local newspapers, *Barrons* (a financial newspaper), the *Asian Wall Street Journal*, and academic books. Dow Jones take the view that printed material will continue to provide a considerable proportion of their revenue and have recently invested \$70 million in new printing facilities, linked by satellites in order to improve the timeliness of the newspapers.
- A2 As with many US companies, Dow Jones are involved in a range of electronic publishing activities. In conjunction with Bunker Ramo (a subsidiary of Allied Corporation) Dow Jones offer a news retrieval service. The computer files are updated on a minute by minute basis, and a simple command structure is used. Only a short back file of 90 days is maintained. The service has over 20,000 customers making it the second largest service after the TRW credit rating service.
- A3 Many of these customers use small business computers, such as the Apple, to interface with the service. In this way, customers can keep their own stock portfolio on the Apple and update them via the News Service. There are some 7,000 shops selling conversion software for this application and Dow Jones provide a 21 hour per day toll-free 800 number to support the service.

- A4 There is also a heavy involvement with cable distribution. In Dallas a full news service is provided on cable by Dow Jones together with the *Dallas Morning News*. In Princetown a 110 channel service is in a trial stage, and another major trial is taking place in Fort Worth. Dow Jones typically charge \$40 per month access fees for unlimited use of their cable based services, but regard this as too high and are planning a significant reduction in 1982.

Standard and Poors

- A5 Standard and Poors (S & P) is part of McGraw-Hill, who also own Data Resources Inc. S & P have adapted the strategy of developing a range of different electronic products for differing markets. The S & P Corporate Records are one of the leading sources of corporate information on US quoted companies. The published version is now printed by computer photocomposition, and the tapes are searchable via the Lockheed DIALOG service. Another S & P product is the Blue List. This is a daily compilation of bond prices, and is printed overnight for guaranteed delivery anywhere in the US by 9 a.m. local time the next day. This delivery criterion is important because the Blue List is the accepted list of closing prices of bonds on which future transactions are then based. The Blue List is now available online, and this has resulted in a slight increase in subscriptions. S & P faced two major problems in launching the service. The first was customer resistance, and a new marketing and sales support operation had to be devised. Secondly, S & P were worried that the online availability of the Blue List would have a deleterious effect on trading. In the past a broker had to back his judgement on how a bond might move until the next day's issue of the Blue List. In online the status could be checked at once, but in practice no change in trading behaviour was noticed. Other S & P publications and services are now being considered for such treatment. No cable services are planned because the cable penetration of business premises is regarded as too low at present for this to be an effective market.

Areté Publishing Corporation

A6 This company was established by the Dutch VNU company to publish the *Academic American Encyclopedia*. From the inception of the project in 1977 it was envisaged as both a full text database and a printed multi-volume publication. The database is now available on the NYT Information Service (where it complements the new full text version of the *New York Times* itself), on the Dow Jones service and on some interactive cable tv services. At a late stage of the cable tv project (which was managed by OCLC in Ohio) it was realized that users disliked seeing visual images on a tv screen without sound (a form of sensory deprivation). A video disc version was developed using the FVA Model 3 video disc player which has a micro-processor built in. The trial disc has spoken captions, and does not have an associated printed index. Arêté regard the video disc market as too small to put the entire encyclopedia on disc, but with a 10,000 projected user market would see a set of eight discs retailing for \$350 compared with \$450 for the printed version.

Note: Arêté's encyclopedia and tapes were optioned out to Grolier, Inc. publishers early in 1982.

Appendix Two

Sales figures of leading US and European publishing companies

A7 These figures include companies whose prime function is publishing. Conglomerates, like the Reed Paper Group, are excluded as most of their revenue is generated by non-publishing activities. In the US several major periodical publishers, e.g. Hearst, Conde Nash and Triangle, are privately owned, and sales figures for these companies are not available.

Europe

<i>Company</i>	<i>Country</i>	<i>Sales (1980) \$ million</i>
Bertelsman (incl. Gruner & Jahr)	Germany	2,954,971
S. Pearson (incl. Pearson-Longman)	UK	1,554,843
Axel Springer Verlag	W. Germany	1,139,884
Thomson Organisation	UK	967,778
Associated Newspaper Group	UK	697,778
Heinrich Bauer Verlag	W. Germany	491,329
News International Limited	UK	444,709
British Printing Corporation	UK	443,853
Burda GmbH	W. Germany	429,665
Librairie Hachette	France	417,588
Arnoldo Mondadori Editore	Italy	382,033
Gutenberghus Gruppen Vgs.	Denmark	247,907

United States

<i>Company</i>	<i>Sales, \$ million</i>
Times Incorporated	2,881,783
Times Mirror Co	1,639,000
Gannett Co Inc	1,065,000
Knight-Ridder Newspapers	980,000
McGraw-Hill	880,000
New York Times	651,000
MacMillan Inc	530,000
Harcourt Brace Jovanovitch	456,000
Dow Jones	441,000
Meredith Corporation	349,000

Except where specified revenues are for the 1979 trading period.

Appendix Three

A8 A list of information services current and proposed on the Mead Data Central NEXIS service is as follows:

Present

<i>Title</i>	<i>Period of coverage (beginning)</i>
<i>American Banker</i>	January 1, 1979
<i>Summary of World Broadcasts and Monitoring Report (BBC)</i>	January 1, 1979
<i>Japan Economic Journal</i>	June 1980
<i>Washington Post</i>	January 1, 1977
<i>Periodicals</i>	
<i>Aviation Week and Space Technology</i>	January 1975
<i>Business Week</i>	January 1975
<i>Chemical Week</i>	January 1975
<i>Congressional Weekly Report and Editorial Research Reports</i>	January 1975
<i>Dun's Business Month</i>	January 1975
<i>The Economist</i>	1975
<i>Newsweek</i>	January 1975
<i>US News and World Report</i>	January 1975

The service also covers abstracts and extracts of reports filed with the SEC by approximately 9,000 of the companies required to make such filings, and made available via Disclosure Inc, *Encyclopedia Britannica* (specifically the ten volume *Micropedia*, and the *Macropedia*), and the *Federal Register* from July 1980.

Coverage is also planned to include:

ABA Banking Journal
Chemical Engineering
Christian Science Monitor
Coal Age
Coal Outlook
The Dorvillier Letter
Electronics
Engineering and Mining Journal
Engineering News-Record
RayLux Financial Service Newsletter
The Reuters European News Service
States News Service
Synfuel Week
The United Press International: biographical database Update/
American States

Wire services to be covered include:

Associated Press World, National and Business wires
Jiji Press Economic News Service
Kyodo English Language News Service
PR Newswire
Reuters General News Report
United Press International: world, national, business and sports wires
United Press International: states wires
Xinhua (New China) News Agency

Newsletters:

Latin American Regional Reports
Latin American Political Report
Latin American Weekly Report
Latin American Commodities Report
Latin American Special Report
Latin American Book News
Latin American Economic Report

Bibliography

What follows is not intended as a definitive bibliography of electronic publishing. Inevitably in a study of this type much of the input is drawn from brief news items or personal contact. The items listed are some of several hundred consulted in connection with the study.

1. Norman, A. *Electronic Document Delivery: the Artemis concept for document digitalisation and teletransmission*. Oxford: Learned Information, 1981.
2. Page, J.R.U. *Electronic Document Delivery: proceedings of a workshop and exhibition organised by the Commission of the European Communities, Directorate General Information Market and Innovation, Luxembourg, 18–19 December 1980*. Oxford: Learned Information, 1981.
3. Cantraine, G and Destine, J. *New Systems and Services in Telecommunications*. Amsterdam: North-Holland, 1981.
4. 'A micro age of networking,' *Data Communications*, May 1981, pp 87–97.
5. Williams, M.E. 'Highlights of the online database field,' in *National Online Meeting Proceedings 1981, New York, March 24–26, 1981*, pp 1–6).
6. 'Satellite tv starts dishing it out,' *Business Week*, 19 October 1981, p 63.
7. Book, A. 'Boston computer Prestel begins service in November,' *Direct Marketing*, September 1981, pp 78–79.
8. Chakraborty, S. 'Strategic planning for telecommunications — a systems approach,' *Long Range Planning*, October 1981, pp 46–55.
9. Syfret, T. 'Will video kill the cinema?' *Media World*, October 1981, pp 15–17.
10. Kinch, D. 'Processors of the foreign word,' *Printing World*, 12 August 1981, p 20.
11. Davies, T. 'Looking ahead at tomorrow's business,' *Business Information Technology*, October 1981, pp 11, 13–14.
12. Meadows, A.J. *New Technology and Developments in the Communication of Research During the 1980s*. University of Leicester. Primary Communications Research Centre Occasional Papers, 1980.

13. Senders, J.W. 'An online scientific journal,' *Information Scientist*, March 1977, pp 3-9.
14. 'Just what can laser printing do for you?' *Direct Response*, July 1981, pp 13-14, 24.
15. Eager, V.W. 'Electronic mail in the GTE information service,' in *National Online Meeting Proceedings, 1981, New York, March 24-26, 1981*, pp 179-182.
16. Bridges, K. and Lawrence, B. 'Minicomputers: their use in integrating online information and office systems,' in *National Online Meeting Proceedings, 1981, March 24-26, 1981*, pp 81-90.
17. Neustadt, R.M. 'Regulating abundance: policy issues raised by electronic publishing,' *Telecommunications*, September 1981, pp 53-54, 56, 62.
18. Holmes, P.L. 'The re-use of machine readable data and copyright — a pragmatic approach to the problems.' (Pre-print of a paper given at the 5th International Online Information Meeting, London, 8-10 December 1981.
19. DeLay, R. 'The 1980s: a time for international cooperation,' *Direct Marketing*, July 1981, pp 30, 32, 34-36, 38-39.
20. Leblang, P. 'New electronic media: retail opportunity,' *Direct Marketing*, August 1981, pp 56-60.
21. Clarke, E. 'How to increase volume turnover,' *Marketing*, 2 September 1981, pp 18-20.
22. Translations. *Better Buys for Business*, Sept/Oct 1981, pp 513-516.
23. Shotwell, R. 'Getting into database publishing: some possibilities and pitfalls,' *Publishers Weekly*, 11 September 1981, pp 45-46.
24. Brighish, A.P. *Electronic Yellow Pages: a memorandum for electronic publishers*. Information Systems Marketing Inc, 1981, 6 p.
25. Carroll, R. 'Books called to the bar,' *Library Association Record*, September 1981, pp 414-416.
26. Publishers Association. *Electronic Publishing — an Introductory Guide*. London: Publishers Association, 1981.
27. Leary, G. 'Vast prospects for Prestel,' *Library Association Record*, September 1981, pp 417-418.
28. Robson, T. 'Teletext — progress and prospects,' *Independent Broadcasting*, June 1981, pp 18-19.
29. Whitehead, J. 'Word processing and information management,' *Aslib Proceedings*, September 1981, pp 325-342.
30. Lloyd, J. 'Telematics — the steam power of the late 20th Century,' *Financial Times*, 28 July 1980, p 7.

32. Garner, M.S. 'Online access to legislative information,' in *National Online Meeting Proceedings, March 24–26, 1981*, pp 233–238.
33. Trauth, E.M. 'Data transmission via cable — regulatory problems,' in *National Online Meeting Proceedings, March 24–26, 1981*, pp 463–468.
34. Jones, B. 'Viewdata — positive,' *Media World*, October 1981, pp 28–29.
35. 'Gateway links Prestel with private databases,' *Viewdata and TV User*, April 1981, p 8.
36. Donn, M. 'Viewdata for the businessman in advertising,' *Direct Response*, September 1981, pp 13–14.
37. 'Status und Struktur der europäischen Druckindustrie,' *Deutscher Drucker*, June 1981, pp 42–48.
38. 'Order line growth for teleordering,' *The Bookseller*, 22 August 1981, p 627.
39. 'How cable tv success hinges on satellites,' *Business Week*, 14 September 1981, pp 74–75.
40. 'Technologies for the '80s,' *Business Week*, 6 July 1981, pp 30–35.
41. Oakeshott, P. and Green, B. 'Computers and the editorial future,' *The Bookseller*, 11 July 1981, pp 116–117.
42. 'International Electronic Publishing Research Centre develops rapidly,' *IEPRC Press Release No 18/81*, July 1981, 7 p.
43. Morgan, P. 'Viewdata: a way through the jungle of stored information,' *Managing Information*, August 1981, p 40.
44. Syfret, T. 'Shopping by television — the possibilities,' *Media World*, August 1981, pp 25, 28.
45. Murray, I. 'A lead Britain must keep,' *The Observer*, 6 September 1981.
46. Campbell, R. 'Publishing in the information age,' *The Bookseller*, 18 July 1981, pp 188–192.
47. Burnett, R.A. 'New directions in media: revolution or evolution,' *Direct Marketing*, May 1981, pp 62–64.
48. Grosser, H.D. 'Teletex — a step toward text communication,' *Telecommunications*, June 1980, pp 59, 60, 62.
49. Bott, A.J. and Routhorn, G.A. 'Teletex — spreading the word,' *British Telecom Journal*, Winter 1980/81, pp 29–31.
50. 'Videodiscs: a three way race for a billion dollar jackpot,' *Business Week*, 7 July 1980, pp 72–81.
51. Horder, A. 'Video discs — their potential for information storage and retrieval,' *Reprographics Quarterly*, vol 12, no 2, pp 46–48.

52. 'Le videodisque, manuel d'entretien de l'avenir,' *L'Usine Nouvelle*, 17 September 1981, pp 112–113.
53. Fox, B. 'Videodiscs — too late for the gravy train,' *New Scientist*, 30 July 1981, pp 277–280.
54. Lippman, A. 'The computational videodisc,' *IEEE Transactions on Consumer Electronics*, August 1981, pp 315–319.
55. Marsh, F.E. *Videodisc Technology*. NTIS Report CONF-810322-1.
56. Hordner, A. *Video Discs — their application to information storage and retrieval*, 2nd edition, 1981. NRCd Publication No 17.
57. Stagg, L.J. 'GEC contribution to viewdata,' *GEC Journal of Science and Technology*, vol 47, no 1.
58. 'Window on the world: the home information revolution,' *Business Week*, 29 June 1981, pp 76–82.
59. Aregon International, IPC Agricultural Press and Misset. *Final Report of the Study on Videotex in Agriculture*. Report presented to the Commission of the European Communities, August 1981.
60. Miller, D. 'Where is videotex going,' *Data Communications*, September 1981, pp 97–105.
61. Sharp, R. 'This exciting new medium: special report on videotex,' *Computing*, 24 September 1981, pp 17–29.
62. Gilbert, D. 'Prestel gateway to third party databases — its importance to British business,' *Index*, May 1981, pp 28–29.
63. White, M.S. 'Viewdata — a review,' *Information Scientist*, December 1978, pp 145–153.
64. Campbell, J.A. and Thomas, H.B. 'The videotex marketplace: a theory in evolution,' *Telecommunications Policy*, June 1981, pp 111–119.
65. *Viewdata*. Special supplement to *The Financial Times*, 24 March 1980.
66. Nederlandse Organisatie van Tijdschrift uitgevers. *Electronische media en het voortbest aan van de tijdschriften*. NOTU, 1981, 19 p.
67. Murchake, J. 'Electronic alternatives may well increase need for postal service,' *Direct Marketing*, September 1981, pp 32, 34, 36.
68. Brepohl, M.K. 'Le nouveaux media: possibilités, perspectives, problèmes,' *Bulletin de documentation economie*, November 1980, p 43.
69. 'The continental paper chase,' *Marketing*, 21 October 1981, pp 34–35, 37–39, 42.
70. Saalfeld, K. 'Federal republic — newspaper strength in depth,' *Media World*, August 1981, pp 14–23.

.

2

ISBN 0 904933 34 2