

*Incidental Paper*

**The Role of Print on Paper  
in the Publishing House  
of the Future**

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***Program on Information Resources Policy***

Harvard University

Cambridge, Massachusetts

Center for Information  
Policy Research

An incidental paper of the Program on Information Resources Policy.

## **The Role of Print on Paper in the Publishing House of the Future**

Joost Kist

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## One

### **Print and Electronics: Conflicts, Claims, and Competition or Complementarity**

During the last fifteen years, especially in the late 1970s and early 1980s, there was much talk of the coming disappearance of print on paper. Phrases like “electronic publishing” and “the paperless society” were coined with more enthusiasm than understanding of what was meant by them or of how these phenomena would be brought to pass.

Now, in the 1990s, there is still no sign of a reduction in the use of print, but we are witnessing a revival of the same over-enthusiasm for new technology that led to wrong prophecies fifteen years ago. Current predictions are that in a few years:

- the personal computer (PC) will “shrink” into a cellular system, portable everywhere and accessible by voice and pen for an array of purposes, led by electronic mail; and
- television sets will become telecomputers, capable of receiving, transmitting, storing, editing, and processing digital video and reachable anywhere by fiber network.

Further,

- the task of learning to use these new computers, it is claimed, will be eased greatly by graphical user interfaces, and
- it is prophesied, once again, that paper will disappear, this time onto optical discs.<sup>1</sup>

The age of “document image processing” has dawned and soon—according to the electronics industry—it will be possible to store all the texts we produce or receive (complete with graphics, sounds, and images) on devices little bigger than a matchbox (within the hand-held “electronic book”) and to retrieve whatever we need in microseconds.

These prophecies may be just as ill-founded as the earlier crop. True, recent history provides examples of supersession in the information industries. Letterpress printing was replaced by offset and the gramophone record and audio tapes were replaced by the compact

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<sup>1</sup>Although these examples are extremes, they and items like them represent valid growth in capabilities—smaller, faster, cheaper, etc.—that will become available in a variety of products. Thus, while the PC may remain a PC, special cellular devices may be marketed with many PC capabilities and specialized PCs can incorporate cellular phones.

disc (CD)-audio. The role of newspapers and journals changed with the emergence of radio, while radio responded to the entry of television. The content (substance), presentation (layout, color), and distribution of traditional media always has to be adapted to the marketplace. Most commonly, however, new technologies co-exist with the old ones. For example, we now have the benefit of receiving junk mail not only by conventional postal service but also by facsimile (fax) and e-mail. Co-existence seems the rule, but only at the price of changes in the roles and markets of the older technologies. We should not again be mesmerized by the over-optimism of hardware and software gurus which has plagued us ever since computers entered the information process.

CD technology and high-definition television (HDTV) may make users feel happier, but only when CD and HDTV really provide better quality will they enable the changes in substance that are theoretically possible. Then and only then will the new technologies lead to loss of markets by older competing media.

Document image processing is no panacea. Undoubtedly, the technology of storing text originally printed on paper—also known as “folio” text or optical character recognition (OCR) text—and pictures in optical storage devices is developing rapidly. In theory, finding text by using full text retrieval systems is far superior to searching through bookcases and crowded desks—superior, that is, if the universe of the search is large enough. In some fields of service, “browsing” using these types of systems can be quite rewarding, providing everything is digitized. But where is the technology for finding texts after they have been lost? Where is the technology that provides a real helicopter view of the different kinds of information we might need, a view offered by well filled bookshelves or cluttered desks? The main problem often is a lack of suitable indexing concepts, and so far there is no easy, simple procedure to index images in a useful way.<sup>2</sup>

Success in the use of computers lies in understanding both that they can sometimes assist human beings in carrying out some tasks but also that human beings will need training and

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<sup>2</sup>The transfer of the process involved in a helicopter view of paper materials to a computer-based equivalent should eventually be possible, but the reverse process, the equivalent to applying full text retrieval techniques to print items, is not. Browsing through paper materials remains superior, but it must be admitted that the advantage may be due only to still inadequate amounts of suitable materials in electronic form and, consequently, a concomitant lack of incentive to build “browsing” software.

guidance and may not understand the real nature of some of the problems they encounter. The inherent strengths of print publications will secure their role in the publishing scene for decades to come—strengths derived, however, from the historical position of print and from traditional notions of literacy. Books and journals are conveniently portable. They are discrete, safe, serendipitous, tactile, and easy to customize. They have their own identity, personality, or *gestalt*.

Of course, a very large amount of training is needed, provided, mostly, by governments in public schools, to develop basic “book” literacy—reading, writing, composing, speaking. In the future—and the future has begun—equivalent training will be needed in the use of computers for wordprocessing and other basic tasks. The amount of paper reading matter a potential user needs to absorb in order to begin to use a PC implies that, for the time being, only books can help users understand the problems associated with the new technologies. As hardware and software are increasingly built with internal aids to help users use them and to turn complex tasks into simple ones—the concept of “complexity hiding”<sup>3</sup>—with variations from application to application and user to user, this situation *may* be becoming less true.

In some cases, for quite straightforward reasons, print will reach its upper limits of usefulness. The accumulation of published paper in some areas will grow so massive as to become unmanageable. The extent to which the paper document will be retained will depend on the ease with which the electronic version will come to be read and the safety with which it will be stored. Although progress certainly can be anticipated, electronics still has quite a way to go. This dilemma is the origin of numerous electronic publishing applications, all of which, however, retain the alphabet; and the paper document is still indispensable to both efficient use of the human eye and brain and to the demands of human reason.

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<sup>3</sup>Several reports published by the Program on Information Resources Policy have explored complexity hiding, in particular the following studies by Martin L. Ernst: *Electronic-Print Competition: Determinants of the Potential for Major Change* (1989, P-89-4), *The Personal Computer: Growth Patterns, Limits, and New Frontiers* (1991, P-91-6), and *Users and Personal Computers: Languages and Literacy, Costs and Benefits* (1993, P-93-1).





## Two

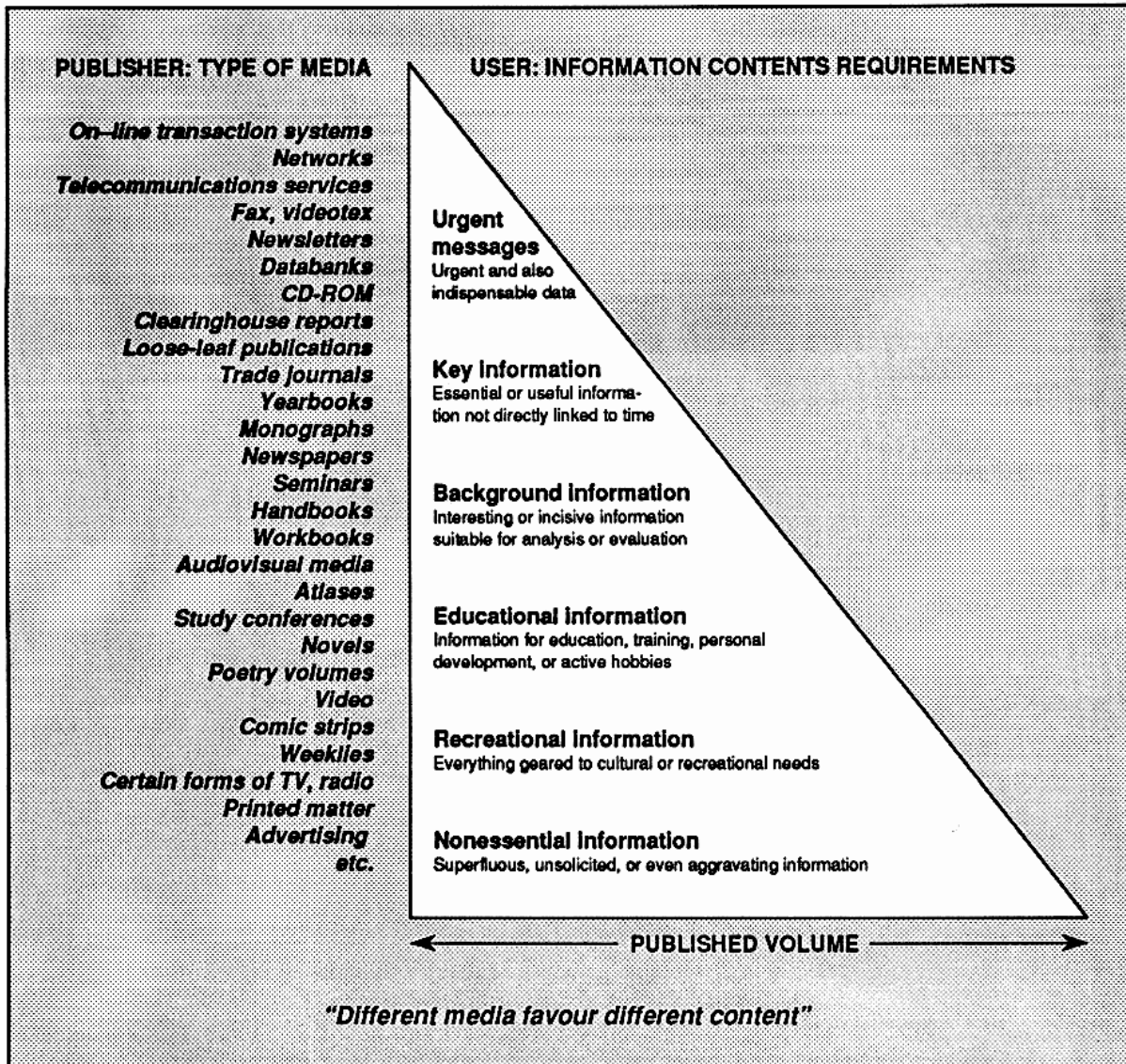
### Characteristics of the Publishing House of the Future

On the assumption that co-existence is to be the pattern, what will the “mixed-media” publishing house of the future be like? I have formed certain impressions over the last fifteen years, as a result of discussions with managers and experts while visiting many houses engaged in information provision and multi-media publishing. The following discussion, which is less a forecast than a plausible scenario, is based on those impressions and, more generally, on my years of experience in a European publishing company and informed by a deep understanding and wide appreciation of what is happening in Europe. Some of those I interviewed were first and foremost profit-making print publishers cautiously exploring new technologies; others—sometimes in the same house—were information providers delivering editorial content by using multiple publishing media. Most of the houses share nine characteristics likely to apply to the publishing house of the future:

(i) **Organize, format, and write information for a specific medium.** Text or numerics will seldom be lifted directly from a printed book, journal, or chart for presentation in a form unedited or unformatted for an electronic medium. As **Figures 1 through 3** indicate, the new media require very special and new editorial skills to adapt and manipulate content.

(ii) **Present information at different levels to specific user communities.** Such presentation gives users the opportunity to scan, browse, and even search further (horizontally) or deeper (vertically), or both, when a particular item of news or information—or even a subject area—warrants it. Some publishers call this “repackaging information,” and they mix paper text (folio), fax, and electronic delivery for this purpose (see **Figure 2**). As shown in **Figure 3**, this repackaging can lead to publishing on demand and to customizing information for special groups or clients.

(iii) **Develop and build on subject matter expertise.** Legal, business, medical, and financial information and statistics at many levels of detail and complexity were and will remain the most common targets, as well as government (especially regulatory), scientific, and technical areas. New subject matter will include travel, leisure, sports, culture, and entertainment. Much rapid growth and expansion is underway.



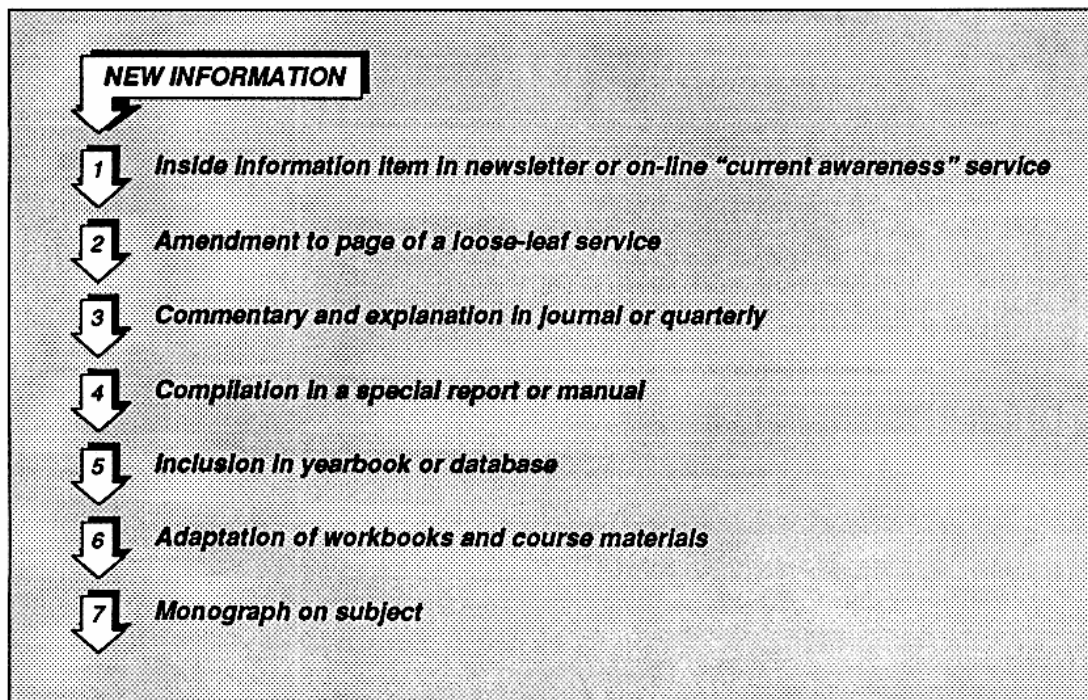
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Figure 1

### Different Media Favour Different Content

(iv) **Concentrate on a distinct market.** Each company will tend to isolate one or more particular professional, managerial, or special interest groups with a need for specific subject-based knowledge and will then aggressively market to those groups, as shown in Figure 4.

In order to offer each client group the broadest knowledge base of information it may need, publishing houses will increasingly attempt to provide not only textual and numeric information but also images. Market-oriented companies, building on their own database(s), will also download third-party databases mounted on their computers or gateways to customers or other external hosts, or both. Some will offer the ability to combine downloaded information with an organization's proprietary data, analytical material, and commentaries. Given the increasing popularity of the PC, this procedure is likely to be preferred. A user-oriented information provider will maintain an awareness of both the human potential for random behavior and serendipity, always greater than expected in the business community.



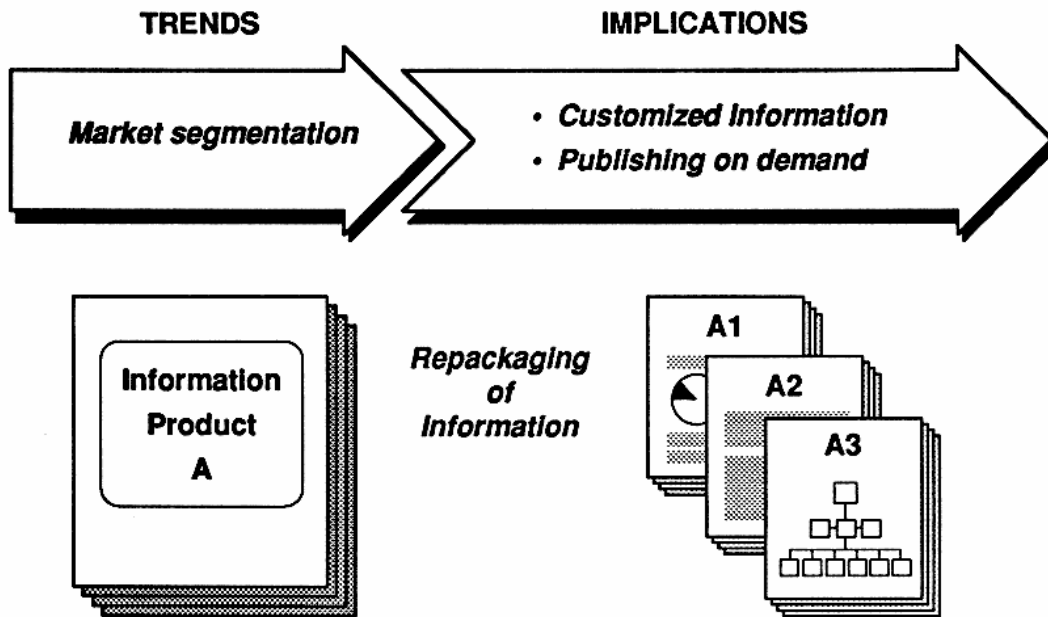
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Figure 2

### Presenting Information at Different Levels

(v) **Concentrate on *niche markets*.** Electronic publishers will not look to mass audiences for success, so long as they are unable to tap strong advertising potential with the new media. But once a critical mass of users of a new technology has been achieved, then electronic

publishing could become an advertising medium. Several organizations (Prodigy, CompuServe) are already reaching mass audiences; although they handle *some* advertising materials, so far no highly effective format for general electronic advertising has been developed, in particular one that would not slow presentation of the materials the audience wants. This problem may be turn out to be especially difficult.

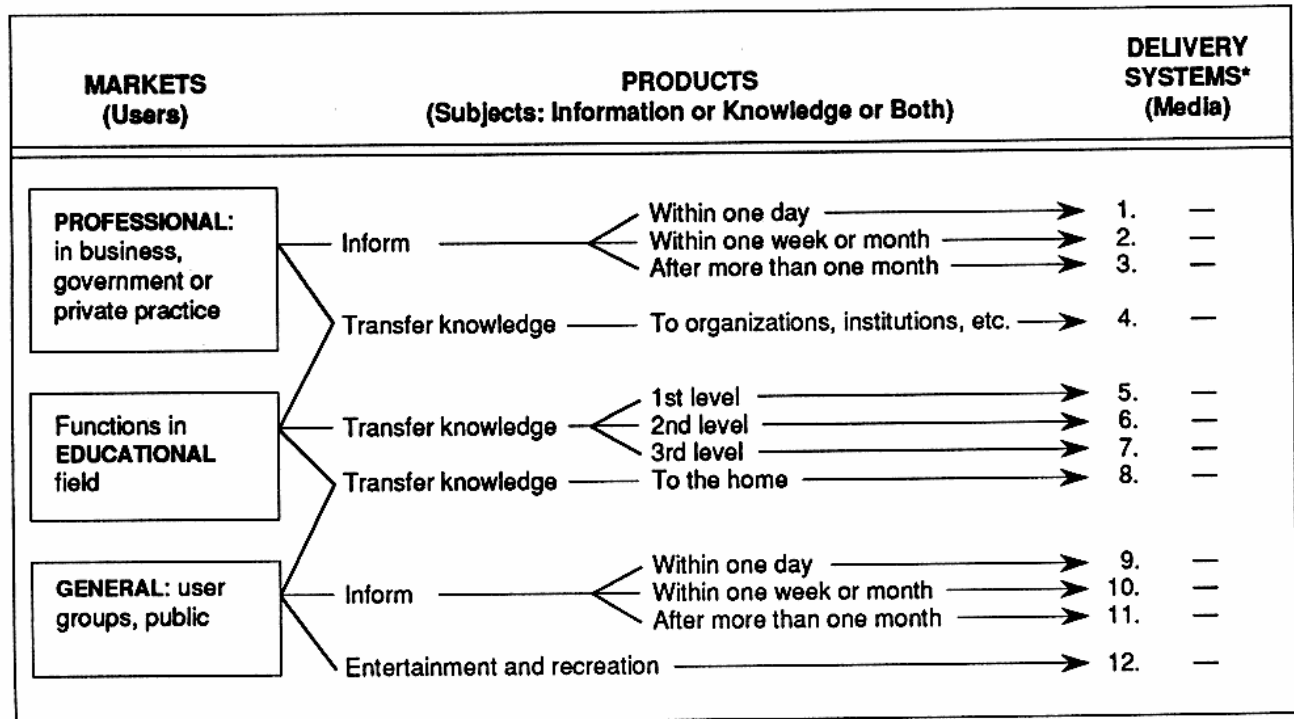


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Figure 3

### Repackaging Information

Some electronic information companies will even re-enter print publishing to complete packages for their niches. In France, the LEXIS system was licensed by a traditional publishing company that intended to download electronic information into print or paper products. In the Netherlands, the European law publisher Wolters Kluwer uses its comprehensive legal database to publish books and journals in parallel to CD-ROM (compact disc read-only memory) and on-line formats.



\*Media here means a different medium for each item, e.g., item 1 might be electronic mail, item 2 an electronic weekly or periodical, and so on.  
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**Figure 4**  
**Concentration on Distinct Markets and Supplying Appropriate Media**

(vi) **Pay close attention to customer service.** Not only will systems and staff help customers use information content or respond to questions and complaints, but a vast amount of time and effort will also go into training customers and keeping them up to date and proficient in the materials and in the use of the system. Audiotex will be important here. “Help desks” for customers of loose-leaf products are being transformed by this technique into more general customer information services. The publisher’s customer file is its hidden treasure. It is important to strengthen the relationship with the professional customer by providing a regular stream of information to accompany a subscription or a controlled-circulation system.

(vii) **Recognize and accept that personal computers will be increasingly vital in generating interest in information, broadening the user base, and, ultimately, making possible the integration of external and internal data.** Through downloading as well as

through software that enables the integration or manipulation (or both) of information drawn from the database of an electronic publisher, users will be able to determine which data are relevant to their needs and will specify the systems for organizing or manipulating the information. With the advent of PCs, new pricing strategies started to evolve; these will move away from the older timesharing principle toward pricing by units of information.

(viii) **Continue to grow in response to technology.** Advances in the near future are likely to come in three principal areas:

- *Data collection:* Optical scanners and use of PCs to capture both transaction data and other data that change rapidly will lead to improvements in data collection techniques. Other “data-rich” applications include home and recreational uses, such as multimedia encyclopedias, how-to software packages, which is to say, a wealth of possibilities in reference subjects and serious “games” of many types.

- *Local, national, and international networks:* Increased use of portable teletransaction devices (working with the computers and scanners mentioned above) will make data collection more timely, while the capability for transforming transaction data into information will improve with more sophisticated computer facilities. Advances in the quality of flat-panel displays will open greater opportunities for electronic books with traditional types of fiction and nonfiction substance (novels, history books, etc.).<sup>4</sup>

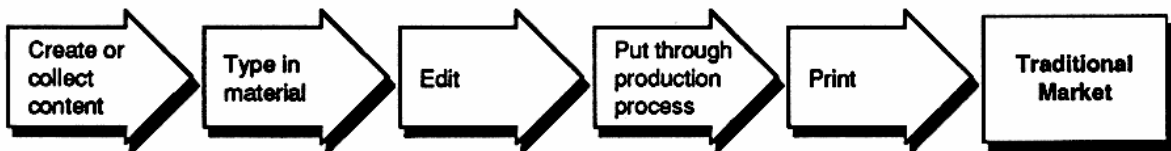
- *Processing and storage:* The expansion of computer networks will help increase access to external databases. Improved desktop publishing capabilities, in combination with databases and networked PCs, will help publishers develop customized information products through digital originals (all possible page elements—text, graphics, halftones, and separations), “electronic pages” created on PCs or workstations. The digital file, which replaces the final film or printed page, is maintained in purely electronic form throughout production. In this evolutionary process, the digital original becomes the *only* source of publishing material (and of copyright!) that can be processed to make many kinds of information products in the form

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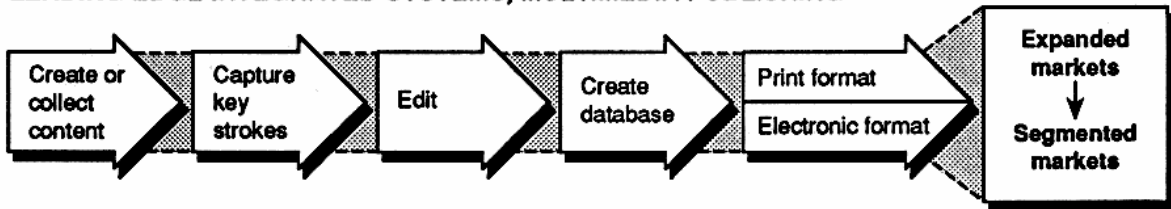
<sup>4</sup>Also coming—though maybe not all in the immediate future— are user manipulation for finding and filtering materials; home storage of materials in massive amounts; and faster communication or delivery of texts and pictorial, video, and audio materials downloaded directly from the publisher.

of a book, newsletter, video, compact disc, etc. The breadth of opportunity offered by digital originals will make it worth the publishers' effort to invest in these new processes that will also eliminate steps in the traditional production process and effect significant savings along with print-on-demand and laser-printing technology. Not least important, digital original material can potentially solve inventory problems (see Figure 5).

#### TRADITIONAL STEP-BY-STEP PUBLISHING



#### LEADING EDGE INTEGRATED SYSTEMS, MULTIMEDIA PUBLISHING



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Figure 5

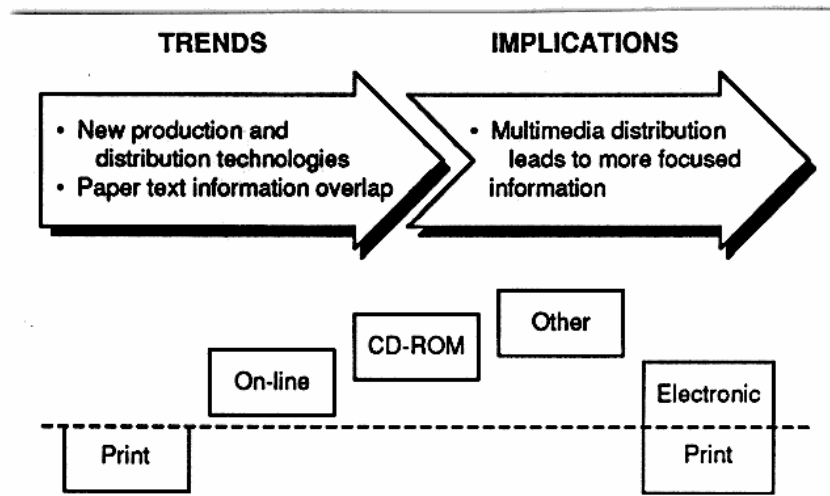
#### Traditional and Advanced Publishing Processes

(ix) Develop the *culture* within their own organization, so that—from the point of view of their own staff—an electronic or audiovisual medium becomes as natural a vehicle for publishing as any other. To achieve this end, in almost all cases in which companies moved into electronic distribution, experience and exposure have proved essential (see Figure 6).

The publishing house of the future will not, therefore, fight against false enemies, a point Umberto Eco has touched on:

Even if it were true that today visual communication overwhelms written communication, the problem is how to improve both. In the Middle Ages





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**Figure 6**

### **Developing a Corporate Media Culture**

visual communication was, for the masses, more important than writing. But Chartres Cathedral was not culturally inferior to the Imago Mundi of Honorius of Autun. Cathedrals were the T.V. of these times, and the difference with our T.V. was that the directors of the medieval T.V. read good books, had a lot of imagination and worked for the public profit.<sup>5</sup>

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<sup>5</sup>Keynote speech, International Conference on Books and Literacy: A Response to New Developments, 26 Oct. 1987, Amsterdam, the Netherlands.

## Three

### Future Systems and Services

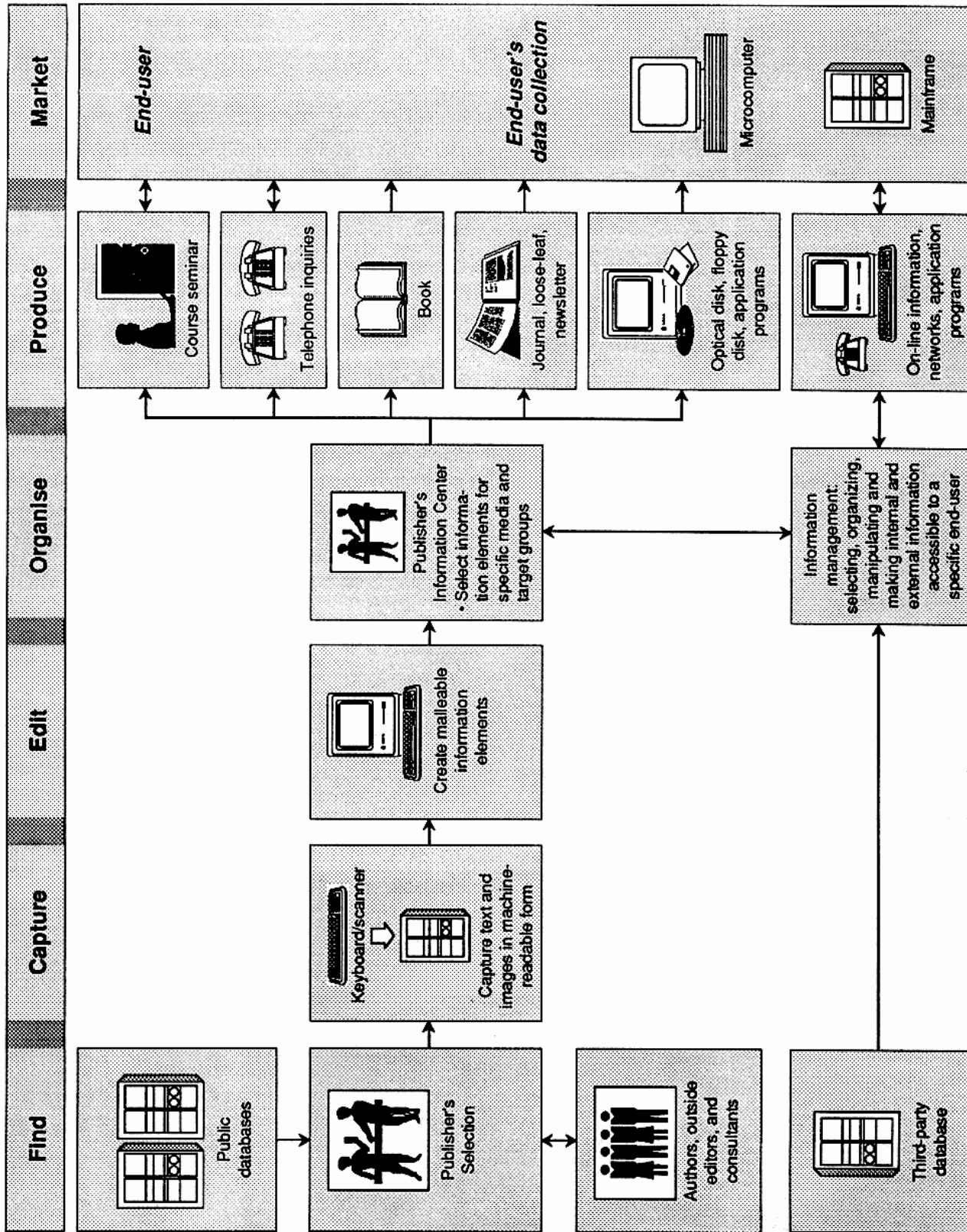
Those nine observations, or characteristics, suggest a road map for the publisher of the year 2000 (see **Figure 7**) that summarizes different types of old and new publishing. A publisher will not need to perform all these activities simultaneously. The publisher of the year 2000 will continue to publish print-on-paper products, but these will be created and manufactured with the assistance of computers, and alternative modes of delivery will supplement the paper text, or folio, format. Successful publishers will plan their personal routes and navigate through a sometimes confusing and constantly changing but immensely challenging technological environment. The model publishing house and the possible routes it will take are the subject of the remainder of this paper.

End users will be supported by information supplied through voice, data, text, and video. They will have many media, new and old, at their command—books, journals, telephones (and audiotex), seminars, discs, on-line, etc., etc. Publishers will have authors and editors but will also be able to access public and private databases. Text will be keyboarded and captured in machine-readable form in order to format information for specific media and target groups. Information will also be “managed” (selected, organized, made accessible) for specific end users who request on-line delivery of items and to process some kinds of transactions.

The model publishing house will include a wide range of components and services. At the moment, only a few very large multimedia companies offer complete sets of communications and information-providing facilities. As the model indicates, in this environment the role of the publisher will remain to publish, in whatever medium, and to choose wisely the packages most appropriate for each market. Information printed on paper will not be replaced but supplemented, enhanced, and sometimes repackaged by the new devices.

**Figure 7** serves as a kind of historical survey to describe the roads publishers have already taken to reach new frontiers:

The oldest road is *on-line delivery* of text and bibliographic information from a central mainframe computer to passive or interactive users. In the U.S., public on-line consume



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Figure 7  
A Model Publishing House of the Future

systems and videotex, both around for many years, remain relatively low-use entities, with limited revenues and a limited potential for near-term growth. On the other hand, on-line, real-time, and transaction services have become big business. The real-time information services in the financial sector still dominate the supply side of the industry, accounting for over 50 percent of the revenues. Spending on business information was sparked in the mid-1980s by technological advances that made the development of new products possible. The ability to manipulate larger databases created opportunities to analyze information in new ways and to transmit that information on-line in real time.

In Europe, *videotex* is on the march. The interconnection of national videotex (e.g., Minitel in France) allows users in one country to access services in another. Because of diverse billing practices, however, these interconnections do not provide access to the whole range of services available in other countries, but progress is being made through bilateral agreements between telecommunications operators.<sup>6</sup>

Yet, such bilateral agreements are probably not the best approach to building up a transparent European Economic Community (EEC)-wide access to videotex services, which would require about sixty-six such agreements. A Community agreement for the creation of a European "kiosk" would be more effective.

As an information presentation format (set of characters, graphics), videotex offered an alternative to ASCII; thus, terminals in Europe have been either "ASCII" or "videotex." Since numerous specific structures, e.g., "pages" and "screens," were created for videotex, videotex became incompatible with the ASCII environment. The boundary between ASCII and videotex, however, is diminishing, a trend seen at the level of terminals. For example, companies do not want to equip employees with two different terminals and prefer a unique terminal that offers access to both internal or external resources, whether videotex or ASCII. The development of multistandard and multiprotocol videotex terminals in various European countries reinforces this trend.

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<sup>6</sup>In the U.S. videotex has had little success and has a blurred (and poor) identity. If it were called "on-line information services," it might well do better.

To encourage PC-users to employ videotex networks and services, network operators or information providers have promoted "chips" and software that "enable" the PC to act as a videotex terminal. In addition, hosts that distribute ASCII databases try to entice videotex users by developing "interfaces" that make the databases available from videotex terminals through a simplified command language adapted to videotex-specific function keys. Videotex network operators increasingly provide access not only to videotex-like terminals (including videotex-emulating PCs) but also to ASCII-like terminals (PCs or teletypes). **Table 1** indicates the problem areas for European publishers that want to apply information technology.

An expected further development is the *on-line scientific library*, which might be based on a consortium of universities, government research establishments, and publishers that would provide databases on specialized scientific and technical topics of interest to corporate, university, and government researchers. Databases within this host operation might include published information, preprint versions of articles and reports, and informal exchanges of findings and insights among researchers.

Individual databases might have password criteria for access that would reflect technical and contractual restrictions imposed by ultimate rights holders. Such hosted databases or clearing houses might be either stored in a single place or distributed on the network. Traditional publishers would organize peer-group review processes that would be necessary and establish the contractual relationships of rights owners, host operators, and users. Given that the primary concern here is to further the field of study involved, authorized users of the on-line scientific library might pay an annual fee for unlimited access.

*Electronic document interchange (EDI)* is essentially a restricted access activity usually developed for a single industry or group of organizations operating with one another. EDI differs from true electronic publishing, which since the early 1970s has meant use of computer technology to make information *publicly available*. Of all the modern on-line communications techniques, EDI will have the greatest impact on everyday business life. Every business transaction is accompanied by supporting documentation, and the volume of paperwork is growing almost uncontrollably. Up to 15 percent of the value of products or services can be allocated to handling such transactional paperwork. By permitting direct transfer of data between computer systems, EDI does away with most of the paper. Because

Table 1

**Problem Areas for European Publishers Applying Information Technologies**

PROBLEM AREAS	INFORMATION TECHNOLOGIES			
	On-Line	Videotex	CD-ROM	Audlotex
<b>Equipment</b>	—	Multiple standards (three in Europe)	Problems with LAN configurations	MF phone and digital exchange needed for inquiries
<b>Software</b>	None needed for retrieval, but communications software needs careful configuration	Communications software seldom has all three standards built in	Each CD-ROM has its own software and front end	—
<b>Access</b>	—	Good nationally. Only French provide "easy" international access	After loading, (which can be a problem), relatively simple	—
<b>Training</b>	Complex search strategies require good training and frequent use to stay effective	—	Given by vendor	—
<b>Billing</b>	Paying for network use outside one's own country can be an enormous problem	As for on-line services	Wide variation of licensing fees	Can be a problem when dialling internationally
<b>General</b>	Interface designed for information professionals; users must pay even when no results received	Poor image in many countries	Databases on multiple CD-ROMs need special players	—

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incoming data are directly stored in a computer system, relevant application programs can be immediately activated and a faster, more flexible response becomes possible. For publishers and booksellers, using computers to speed handling orders and returns should lead to greater efficiency and better customer service and communication with clients. But, again, the key words differentiating EDI from electronic publishing are "publicly available."

In recent years the library communities of North America and Europe have focused their attention on the topic of networking and electronic document interchanges. The Research on Advanced Communications for Europe (RACE) project has been working on a set of broadband integrated services digital network (BISDN) standards that offer the prospect for the academic communities on both continents of moving from a *wide-area* network (WAN) environment of 2 megabits per second (Mbs) to one that offers 622 Mbs plus rapid expansion to 2488 Mbs before 1998. In parallel, local area networks (LANS) will generally have a capacity of 155 Mbs.<sup>7</sup> Such stupendous growth creates a highly favourable environment for all players involved in electronic document delivery systems. To maximise this opportunity the current commercial independence of these systems will need to evolve toward constructive interdependence; as a consequence, some professional demarcation lines will be blurred.

The off-line *electro-optical* delivery approach enables users to tap proprietary sources of fixed or long-lived information from a compact optical disc (as a kind of "frozen" database). Instead of obtaining information on-line from a central source, users can store and use stupendous amounts of information, text and, in some cases, images on their own disc players attached to PCs or workstations. The CD has the potential for interactive information access, particularly in the areas of training and leisure.

To users, optical disc memory can be indistinguishable from other kinds of disc memory, just bigger (and a little slower for accessing random data. For personal storage (which requires both reading and writing operations), the use of optical discs will happen, but not quickly.

In the U.S., where the titles and uses of CD-ROM are growing rapidly, this technology may be reaching a take-off point for very fast growth. For the time being, however, the number of people actually able to use CD-ROM information titles remains low. The total number of CD-ROM drives in the marketplace worldwide is estimated at around seven million. Because many of these drives are in libraries, the number of possible users is considerably higher than the number of drives. But the estimated number of drives is very low, compared with the current audience for traditionally printed publications.

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<sup>7</sup>European Commission DG XIII-E 1993 Internal Document.

Growth, of course, on the small value base of the CD-ROM market is extremely high, as in the on-line industry in its early years. The sharp acceleration in the number of CD-ROM titles suggests both that demand is beginning to develop and that, at the same time, the larger content supply provides a stimulus for the spread of CD-ROM hardware.

Variants of CD-ROM—notably CD-Interactive (CD-I) and the electronic book—are set to make an impact on general consumer markets, although it is too soon to assess their progress. A CD-I player may well become a feature of many homes, along with the TV, the radio, the tapedeck and the CD-audio player, if manufacturers can sustain the impetus of the initial marketing activity and if, above all, they can stimulate production of CD-I titles.

The electronic-book format has been written about for many years. One of the first models was produced by Sony and is now licensed to more than fifteen other hardware manufacturers. It is a combination of a hand-held CD-ROM player and a small CD-ROM—an eight-centimeter disc (rather than the more familiar 12 cm variety) with a 200 megabyte capacity. Its success will depend on high-quality display, reading-support software, and a full equipment package as “hand-holdable” as a print book (although if too small, it may only have limited specialized uses).

*Multimedia* is a new area of interest, based on CD-I or CD TV technology, that interactively incorporates movies, diagrams, sound, and text into a service or a full learning environment which supports such activities as the creation of virtual reality situations.

Another electronic publishing medium, unrelated to CD-based media, is *audiotex*—in the most restrictive sense, interactive voice information services, but the term is also used to refer generically to all premium rate services (PRS). Interactive audiotex, using touch-tone multifrequency telephones or voice-recognition technology, or both, to permit users to guide their enquiry, is likely to become very important. In the U.S., it has already had some success, such as for reporting utility metre readings and obtaining billing or bank balance information. In Europe, experimental services, on, for example, personal health care or certain types of financial information, indicate a very strong build-up, owing especially to ease of use and the widespread availability of the basic necessary equipment—a telephone. For these complicated subjects, though, the procedures are still too intricate and mistakes force



too much back-tracking and repeat entries for audiotex to be generally useful—yet. For more complex subjects, PCs with visual displays and print-out (paper!) capabilities seem now to be the likely winners.

An important development related to audiotex that will help stimulate growth is its link to another widespread, simple technology, the standard facsimile (fax) machine. The resulting *audiofax* service permits access to information by ordinary telephone, with interactivity by voice or tone recognition, as well as fast and effective hard-copy delivery by fax of more detail than may conveniently be provided by recorded or synthesized voice.

The essence of another medium, the *bulletin board* system, as viewed in Europe, is that it allows users to employ information of interest economically but without any assurance concerning its source, accuracy, or control. Information sourced from a bulletin board often is subject to no limits on modification or reuse. The bulletin board is “an information bank, accepting deposits and withdrawals, but assuming no responsibility for source or content.”<sup>8</sup> Pricing is usually transactional; there is usually no charge for information (and no value added to it). A great deal of government data should be available in this format, with prices fixed as a transactional cost and open access allowed to every network user.<sup>9</sup>

The *fax-installed base* increased worldwide from two million in 1985 to ten million in 1990. The EEC-installed base grew from 150,000 in 1985 to 3,200,000 in 1990: 513,000 in Germany, 234,000 in Spain, 773,000 in Italy, 944,000 in the United Kingdom, and 432,000 in France.

The combination of fax with audiotex (*audiofax*) is attractive, because it links two widely distributed and easily used types of terminals. The association of fax with audiotex (or *videotex*) allows a user rapidly to select a document that will be delivered by fax.

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<sup>8</sup>European Commission DG XIII-E 1993 Internal Document.

<sup>9</sup>European and U.S. views of bulletin boards are not identical. In the U.S. they are still in a formative stage and come with a huge variety of practices: not everyone can use all bulletin boards; users can have read-only or read-and-enter privileges; and pricing can be free or fixed or managed some other way. Stronger editing and peer review systems can be incorporated, if desired. Some segments of the U.S. market will offer opportunities for publishers, but others will probably continue in their present forms. In the U.S. bulletin boards are viewed as having many exciting possibilities.

“Fax-boards,” which turn a PC into a fax machine, are a new development: users can manipulate data and dispatch information to a list of correspondents. Fax hosts can be linked to LANs; information received on such a host can be dispatched within a networked organisation.

Boundaries between ASCII and videotex are blurring. Videotex, audiotex, and fax can be combined into hybrid applications, namely, audio-fax, audio-videotex, video-fax. This convergence of complementary and interrelated channels is usually defined as *telematics*. The marriage of these formats and channels is not merely technical. The variety of audiotex and videotex services depends on the existence of “premium rate services” and on the diversity of price bands. For value-added services (e.g., audiofax), where price is not based on time (length of the call) but on the value or volume of information selected by telephone and delivered by fax, flexibility of tariffs will be crucial. Interconnexion of national videotex networks and the establishment of a pan-European premium rate service are gradually progressing through bilateral agreements.

*Desktop publishing* arrived with the appearance of powerful Apple- and IBM-compatible PCs, software, and better quality laser printing. Software for page make-up—what-you-see-is-what-you-get (WYSIWYG)—is essential to desktop publishing. Although the word “publishing” is a misnomer if the desktop product is not distributed or delivered to a user, as a technology desktop publishing opens a way for a vast new group of people using small systems to practise do-it-yourself, electronic-based text (folio) publishing.

Although none of these electronic roads, already travelled or yet to be travelled, will eliminate the use of print-on-paper, clearly in the near future many attractive publishing opportunities will very likely involve electronic delivery media. Electronic publishing will be demonstrably superior to print-on-paper when information is:

- extremely time-sensitive (e.g., financial, legal, and medical transactions)
- volume-sensitive (huge on-line or on-disc databases operated by government, legal bodies, scientific institutes, and multinationals)
- intended to be manipulated or combined with other kinds of information (e.g., EDI and marketing data).

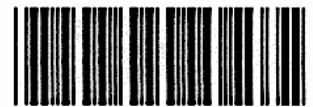
Within the publishing industry, electronic publishing eventually will become a discrete segment alongside book and periodical publishing.

Further, growth rates in all subdivisions of the electronic publishing segment augur well for the future. In particular, there are good prospects for the newer electronic media, especially those based on CD technology. In consequence, while the book and the periodical must not by any stretch of imagination be considered obsolescent, in the future the most attractive publishing opportunities will very likely involve electronic delivery media, but only if they possess the ability to provide information to people in the forms in which people desire it.

This message can be as much a lesson for the traditional publishing industry as for publishers in general. Around the year 2000 on-line, on-cable, and stand-alone information products and services, accessed through computers and telecommunications, may be expected to have become a seamless extension of paper text (folio) products and, thus, full members of the publishing family.

## Acronyms

BISDN	broadband integrated services digital network
CD	compact disc
CD-I	CD-Interactive
CD-ROM	CD read-only memory
EEC	European Economic Community
EDI	electronic document interchange
HDTV	high-definition television
LAN	local area network
Mbs	megabits per second
OCR	optical character recognition
PC	personal computer
PRS	premium rate services
RACE	Research on Advanced Communications for Europe project
WAN	wide-area network
WYSIWYG	what-you-see-is-what-you-get



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