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CD-ROM & Ubiquitous Paper

Businesses can publish information on CD-ROM which could not be delivered easily in other ways, such as maps linked to inventory or production data, organizational charts with supporting employee data, tutorials on company methods and practices, etc. If the presentation uses multimedia, and relies on selection of specific information from a large quantity of data, CD-ROM is better than any other media (including videotape or print).

This paper recommends a strategic course of action which will help businesses manage information more efficiently. It begins with reliance on an emerging technology known as EDD as a means to create, store and disseminate 'portable documents'. Use of portable documents will prepare the organization to use CD-ROM effectively, and can easily be extended to include multimedia, even advertising. As transmission standards emerge, use of portable documents will position the organization to take advantage of cable-phone distribution.

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CD-ROM & Ubiquitous Paper

1. Optical Publishing Comes of Age

Compact Disc Read Only Memory or "CD-ROM" has been available for more than 10 years (Philips and Sony introduced CD-ROM just 1 year after the introduction of music CD's). At first it did not catch on because the data was limited to text; multimedia-capable computers were not widely adopted until the last 3 years.

The early adopters in terms of using CD-ROM have been companies with large quantities of reference data, such as airlines (to distribute flight schedules), military manufacturers, software and hardware vendors (for online documentation).

There are today more than 10 million CD-ROM drives installed worldwide. These are roughly divided by region as USA 50%, Europe 25%, Japan 12%, and rest of the World (that's us) 13%. The annualized growth rate of the installed base is about 70%. More than 5000 commercial CD-ROM titles have been published, of which approximately 10% utilize multimedia capabilities.

CD-ROM production is inexpensive, even in quantities as low as 500 units. The marginal cost of a CD-ROM in quantity of 500 is about US$ 4. In a typical commercial run of 15K discs, unit cost is about US$ 1.20 (these figures exclude packaging). Eastgate Technology's CD-ROM pressing facility in Singapore is already producing more than one million CD's per month.

This situation reflects the fact that it is becoming viable to use optical media for training, distribution of mission-critical corporate documents (eg- manuals and policy guides), and even marketing presentations.

It is only partly true that electronic dissemination via networks will replace CD-ROM, and most online data is presently stored as raw text. Information stored centrally and made accessible through a computer network constitutes an alternative to CD-ROM, but only if the data changes frequently, and if the selection of a specific subject of interest can be made quickly.

Those businesses which stand to gain the most from optical publishing are those which already rely heavily on print publication, eg- attorneys, auditors, government agencies, associations, advertising agencies, production services, and of course, trade publishers. But to some extent, every business is a publisher. The convergence of media production and information technology will certainly affect the way businesses collect, handle and disseminate information.
2. CD-ROM versus other Electronic Media

CD-ROM still cannot compete with the portability of videocassettes, since there are over 150 million VCR's worldwide. Video presentations can be distributed with confidence that they can be viewed at home or in most any office. But VCR's are a poor choice for textual or interactive presentations.

Due to the complexity and high cost of mastering a videodisc, and the limited data capabilities, videodisc technology is rapidly being eclipsed by CD-ROM. For one thing, videodisc like videotape is a poor choice for text. And premastering for CD-ROM is almost trivial when compared to videodisc, which relies on optimizing the edit list of a broadcast-quality videotape.

CD-ROM offers excellent textual and interactive capabilities. CD-ROM can include full motion 1/4 frame video, using only software decompression, which is adequate for most training, promotion and informational applications. In 1994, we will see the commercialization of MPEG movies on Video CD format. A single Video CD can contain 74 minutes of full-frame 30 frames per second video in VHS quality.

CD-ROM standards are evolving. Today's standard is ISO-9660, which enables discs to be used on any computer. The so-called "Orange Book" standard is now becoming accepted for writable CD-ROM's, including both single session and incremental or multisession types. Today's multimedia computers are capable of recording onto and playing back from CD's which include text, audio and full motion video.

One source of competition for CD-ROM publishing is dissemination via telephone or cable. Recent alliances between cable television and telecoms providers in USA assures that Americans will soon have interactive television in the home. Similar services are being introduced in Hong Kong and Britain. These services will provide video-on-demand, gaming and various experiments in home shopping. But businesses face an infrastructure obstacle in that most offices do not have access to cable television. So CD-ROM is a better delivery mechanism for the workplace.

The dissemination of information via CD-ROM provides incredible opportunities for making businesses more efficient and more competitive. For example, one of the key challenges facing multinational advertising companies today is how to coordinate their efforts across diverse countries and regions. This can be accomplished with a compendium of regional advertising on CD-ROM. Such a disc would be searchable by country, media or product type, and would provide a ready reference when planning a new ad campaign. Other examples include:

- electronic catalogs or brochures
- company news-magazines (with organizational charts as an interface)
- online help systems & guided tours

What makes CD-ROM a better alternative for business publishing is that for the foreseeable future, there is more control over and greater reliability in the distribution of a disc. The new cable-phone services will not be introduced uniformly, but in a series
of experimental tests, and will likely be geared up first for the home environment.

3. Moving Towards Electronic Document Delivery

Organizations face tremendous structural change as they attempt to cope with information overload. This problem is painted graphically in Alvin Toffler's book "Power Shift". What we see today is a flattening of the organization; less bureaucracy and more networking between departments, with individuals coming together in ad-hoc project groups. This restructuring is being driven by the need to get fast access to diverse information.

Office automation is seen as a necessary evolutionary step, and one of the most talked about areas of office automation is imaging. Generally we think of imaging as a solution to paper storage, and in some sense as a competition for microfilm. It used to be fashionable to convert inhouse paper to microfilm, but there is a great danger in doing so. Sometimes it is necessary to retrieve and amend images previously stored on microfilm. While the cost of creating a microfilm image is only pennies, the cost of retrieving an electronic copy of that microfilm is several dollars. True, imaging solutions are available which make it possible to convert from microfilm to electronic storage. But some scanned images represent designs or logical layouts; for these a raster image is not sufficient. These documents also need to be converted from raster images into vector images in order to make them editable.

Even for text, scanning alone (just to get rid of paper) is rarely sufficient. Access is more important than storage. Textual imaging should also include OCR technology to convert the text into a searchable free-text database.

The fact is, microfilm and imaging are most useful for assimilating external information (e.g., newspaper clippings, correspondence received, etc.). Look closely at any contemporary organization and it's apparent that the real document dissemination problem is severe bottlenecks in the flow of internal information, and publishing of this information externally. Microfilm and imaging can't help.

The source of most internal bottlenecks is incompatible file formats in computer-generated documents. Different divisions of a company often prefer different computing platforms, but a document created on a PC cannot be viewed on a Mac, and so on. And we're not talking about disk compatibility here. A person distributing a document in an office network must ensure that each reader has a copy of the application program used to author the document, as well as any fonts used in that document. The great equalizer is the photocopy machine; when a presentation has to be made in a hurry, chances are that someone will resort to cut and paste to join graphics and text.

The solution to this problem is a technology known as "Electronic Document Delivery (EDD)". There are at least half a dozen software solutions being introduced now to support EDD. At the high end, there are solutions such as Northern Telecom's
Helmsman (the authoring package costs USS 30,000). In the mid-range are products like Adobe's Acrobat, Tumbleweed’s Envoy and Farallon’s Replica. At the low end of the spectrum is Common Ground, from No Hands Software. This powerful tool (offering postscript compatibility and JPEG compression) sells for just USS 189.95.

It is widely felt that the recent merger of Adobe (inventor of PostScript) and Aldus (owner of PageMaker) is designed to promote Adobe’s Acrobat software for authoring of portable documents. With this merger, the architects of the 80’s DTP revolution are poised to make EDD an important publishing technology in the ’90’s.

What EDD software do is provide a way to create and distribute ‘portable documents’, digital copies of documents which can be viewed without relying on either the application or the fonts used by the author. Think of EDD software as a way to export from your word processor, spreadsheet or page-layout package, into a portable document which can be distributed on disc media or over computer networks. The portable document can be read on any PC, Mac or Unix computer with an installed viewer application. In some cases, the viewer can even be embedded in the document.

In general, there are 3 approaches to this problem:

a) The software is used to author digital copies which can be read with a separate viewer. This has the advantage that there is only one file format to maintain, and this file is editable.

b) The software acts as a printer driver and outputs both a bitmap image and the text contents (needed for searching). In this case, the digital copy is separate from the original document, and cannot be edited directly. The advantage is that the copy has 100% of the fidelity of the original image, and can be searched for any particular word. When this is a multipage document, the text can be used to create hypertext links.

c) The software acts as a printer driver, but stores output as a modified postscript file. This maintains the structure of the document, for search and hypertext linking, but does not offer 100% fidelity. The software achieves a close match to the original document by using a small set of standard fonts which can emulate almost any other font. Unfortunately, these have to be converted to a bitmap at the time of viewing, which can slow scrolling and other browse operations.

Besides enjoying the advantages of text search and hypertext linking, portable document users can also add their own annotations and bookmarks, copy to another application, print relevant portions of documents, and view documents with sound, animation or even full motion video.

Many organizations, especially print publishers, are sitting on a wealth of data ready for publishing, ie- in the form of page layouts. These can be converted to portable documents and mastered onto CD-ROM by service bureaus. Companies like Hewlett Packard are already using the portable document technology to post technical addenda on internet, where they can be easily downloaded by users worldwide.
4. Creating Information Products on CD-ROM

Consider that what goes into a CD-ROM publication is different from what goes onto the disc. First, one uses a set of tools, including word processors, page layout software, and authoring programs which convert the documents to electronic paper, identify the structural components, and link the components using hypertext. The tools, intermediate files, and so on, never make it to the final disc.

On the disc is a set of data and one or several applications to view the data. The form of the viewer application, as well as the format of the CD-ROM, will determine what platform the CD-ROM can be used on. With an ISO-9660 disc and separate applications capable of running on Mac and Windows, the CD-ROM can be used on both platforms. Such a disc is said to be a "hybrid."

The most common applications on CD-ROM are browsers and viewers. Browsers display a menu of image files, or a list of sound clips. Viewers enable users to access the data in a rich format of audio, video and text. In both cases, what is being sold as a CD-ROM is actually an information product consisting principally of a 'data-set'. The reason that a browser or viewer application is required at all is that there are no standards for reading these data-sets.

Producing audio and video for multimedia distribution on CD-ROM is very similar to the production process for a corporate video (ie- VHS quality) presentation. The emphasis is on quantity (and fast turnaround) rather than quality. It is not even necessary to use broadcast quality equipment, which is why there is a tremendous potential market in desktop solutions. As can be observed in the soaring stock price of companies like Avid, SuperMac and Adobe, the computer is a very flexible environment for creating audio and video cost effectively.

One step in the media production process is quite different for CD-ROM publishing; output to tape is not necessary. Audio and video content can simply be saved in a digital file, such as a WAV file for sound, or an AVI file for video.

Interactivity is added to an electronic publication during the "authoring" process, using special tools known as authoring software. Examples of authoring packages include Director, Icon Author, Authorware, and Toolbook. These software let authors represent their content as modules or nodes, and create links between these nodes. If the nodes are highlighted text, the tools let an author define where the hypertext links jump to. If the nodes are audio or video clips, the tools let an author define what options are presented to the user at the completion of a clip presentation, typically a set of buttons.

The difference between these typical authoring packages and the EDD document software is their reliance on programmers. All of these packages are based on the author creating 'if-then-else' branching structures. The EDD authorship model is based on desktop publishing, where the author defines a rectangular area on the page, and then indicates the media object (typically by naming a graphical image) which will appear in that position.
As EDD tools evolve to enable placement of multimedia objects such as audio and video in addition to graphical images, it will be much easier for businesses to create electronic publications. Companies like Adobe and Aldus are betting that businesses will want to create electronic publications in the 90's as easily as they created print publications during the 80's. That is, without programmers.

A business does not have to reform itself overnight to obtain the advantages of electronic publishing. Many service bureaus already offer corporate clients the opportunity to venture into electronic publishing using CD-ROM. These companies provide a variety of multimedia production services, including the following components:

- systems analysis & design
- software development & system integration
- media production
- authoring (inclusive of premastering)

Of these services, corporate clients will be most interested in authoring and premastering. The process of premastering a CD-ROM is the creation of an image of the final CD-ROM, typically on a large magnetic hard disk. The final step of premastering, creating a one-off disc or "gold disc" is performed on a desktop CD-ROM recorder. Premastering is the phase at which the author and client test out all the interactivity. Once approved, a gold disc may be used for mass replication.

Service bureaus charge less than US$ 500 for premastering. As businesses gain confidence, they will surely bring the authoring and premastering services in-house. This adoption process will be expedited by EDD, which makes it possible to rely on existing investments in desktop publishing equipment and skills. This is essential for commercial publishing operations, which can be expected to flock to "No Programmers Required" solutions based on EDD.

Except in diversified publishing companies with their own media production units, the media production services are last to be brought in-house.

5. Commercializing Electronic Publishing

The cost of entry into CD-ROM publishing is extremely modest. A CD-ROM recorder with the required premastering software is just US$ 5,000. A video digitizer and compression board capable of storing full motion video on the PC is about US$ 500. Software for digital video editing is in the neighborhood of US$ 500 (and up). A complete corporate CD-ROM production facility is possible for less than US$ 10,000.

Corporate publishers will rationalize this investment based on the value of gaining faster access to relevant documents. But no matter how affordable the production cost, every commercial publication is funded principally by advertising. Electronic publications must find ways to incorporate advertising in order to be viable.
Moreover, the failure of online services like IBM's Prodigy demonstrate that advertising has to appear non-intrusive. The problem of how to incorporate advertising in electronic publications which have buttons and 'if-then-else' structures is extremely vexing. Since it's unacceptable to superimpose advertising on the content, publications like Newsweek Interactive on CD-ROM place advertising in a separate section. But viewers can't really be expected to seek out the advertising, and they don't. Newsweek sells little ad space.

Fortunately, the page-orientation of printed publications is not only a familiar interface, it offers a non-intrusive way to present advertising. Using EDD's portable document technology, it is possible to produce a magazine consisting of digital pages which can be browsed onscreen. These pages incorporate all the features of a print magazine, including headlines, editorial text in various fonts, and full color pictures. Most important, these pages include advertising.

The ability to incorporate ads as part of the user interface is a significant breakthrough not found in electronic publications which rely on traditional programmer-oriented authoring tools. People expect to see ads in a magazine, and will not react as if advertising has been superimposed on the content.

Advertising, like the other content, can be made interactive. In this way, an electronic magazine can incorporate product demos, locations of dealers, or a complete television ad in addition to the print ad. In fact, magazine publishing on CD-ROM is a huge opportunity for trade publishers, who are entirely funded by advertising.

Page-orientation is not limited to magazine formats, but can be used for training manuals, directories, anything that would traditionally be printed. For example, one can envision advertising being incorporated in geographical databases. There are many types of information, such as a listing of business locations, or a telephone directory, which lend themselves to graphical illustration in the form of a map. Maps have traditionally been printed, but electronic map viewers are now becoming a component of auto designs. It's certainly just a logical extension of this to include site-specific advertising as part of the data.

6. Conclusion

Businesses must begin to strategically rethink their use of paper for in-house documentation and publication to the outside world. Using EDD's portable document technology, businesses can easily move to publishing on CD-ROM.

With the introduction of page-oriented multimedia authoring tools, electronic publications can deliver both the impact of television and the depth of print. Best of all, these publications can be created using a company's existing investment in desktop publishing equipment and skills.

As businesses gain experience distributing systems documentation, catalogs and other reference materials on CD-ROM, they can delve into publishing training and promotional material on CD-ROM. This information can also be distributed in LAN
networks, and later, even community-wide cable-phone network environments.

Page-orientation is really just an intuitive interface into a multilayer, multimedia publication. But this approach lends itself to support from advertising, since people are accustomed to seeing ads on the printed page. This will facilitate the commercialization of electronic publishing.