Drexel University INFO 653: Digital Libraries　　　　　　　　Professor Xia Lin
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Books of the Future

What is the matter that you read, my lord?
\- Hamlet, II. ii.

This paper examines the current features of and future possibilities for electronic books. After a brief history of printing and the introduction of electronic publishing, the forms and features of eBooks will be described. The strengths and weaknesses of eBooks will then be examined along with other related issues. It will be concluded that eBooks hold the promise for obtaining widespread use in the not too distant future.

Evolution of the Book

The method of printing books on paper has a long history behind it. As the publishing process has developed over time, it can be seen that publishing is the resulting interaction of technology and commerce. Any advances in publication methods are kept in check by other factors, such as the cost of the new technology, which determine the nature of future printing methods.

Printed communication has found mediums in prehistoric cave paintings to clay tablets to carved woodblock prints, and then through Johannes Gutenberg's invention of moveable type. In the 1800s the industrial methods of paper production lessened the quality and longevity of printed materials. With recent conservation and preservation efforts, however, paper quality has improved through the adoption of international standards for printed paper (ISO 9706).

Products of the modern-day printing press, however, have their limitations. Paper books are susceptible to physical damage, and are time and space dependent. Digital formats of information offer more rapid methods for publication and distribution. They also share many of the technological advances of mediums that have gained popularity over the book. Even before the explosion of the World Wide Web, books were no longer central method of transferring information:

> In many ways, we have, for better or worse, already moved beyond the book. Even on the crudest, most materialist standard involving financial returns, we no longer find the book at the center of our culture as the primary means of recording and disseminating information and entertainment. The sales of books and other printed matter, for centuries the centre of our technology of cultural memory, have now fallen to fourth position behind the sales of television, cinema, and video games. (Landlow, 1996, p. 23)

Paper books still have a place within society, but their electronic forms may hold more long-term promise for becoming the standard format for transferring information. Electronic journals, for example, have already gained widespread popularity among the scholarly community (Mercer, 2000). There are many issues relating to the features and use of eBooks (cf. Lunch, 2000; Weeks, 2000), and it remains uncertain how popular they will become.

Fortune Tellers Abound

From the World's Fairs of the 1950s and beyond, many people have consistently overstated the scope of technological innovations that the future will bring. Although technological progresses are steadily increasing at an exponential rate, there are other human, social, and economic factors that sometimes slow development. In other cases, the values of new technologies are simply overestimated. After the invention of microfilm, for example, many futurists were fond of predicting an early end to the paper library and the impending formation of a paperless society. The benefits of microfilm, however, did not fully meet these expectations; even in today's electronic world, paper remains as well used as ever.

During the introduction of electronic media and books, there were predictions regarding the digital demise of traditional forms of publication:

> By the turn of the century, paper will satisfy less than 5 percent of the total commerce in information. Although education and entertainment have their own migratory paths and rates, the objective will be the same: paper is going to be replaced with electronic media. (Kounta, 1992, p. 39)

Over the next few years, an overstated backlash occurred against these futurists and their paperless predictions, stating that electronic books would never become a reality, and that the traditional library was here to stay. Mann (1993), for example, applies the weaknesses of microfilm in a straw man argument against the flexibility of digital media. Furthermore, librarians and patrons did not yet realize how explosive the growth and popularity of online information would become:

> Telling the average public library patrons or average undergraduate students that they can traverse the Web to find a good WAIS server that may help them locate the information they need is basically telling them to go to hell. (Crawford, 1995, p. 128; see also Crawford, 1999)

With the public acceptance of new and improved technologies, the pendulum is swinging back towards acknowledging the reality of electronic books. Libraries are purchasing Rocket eBooks (Burk, 2000; Fialkoff, 1999), for example, and the growing popularity of the World Wide Web has paved the way for users to adopt these new, easy-to-use technologies. Electronic books, long though of as books of the future, are already here.

Types of Electronic Books

Books placed in a digitized format have become a reality. With the help of intermediate software applications, existing electronic files and documents can be converted into electronic texts that can be loaded onto eBooks for reading (Morgan, 1999). Two types of electronic books currently exist, with a third format in early development (books on tape, and their new incarnations, audio books, cf. http://www.audible.com/, are not covered in this essay). This section will define these three types of eBooks, followed by a exposition of their inherent strengths and weaknesses and related issues.

The first type of eBooks are Web books. These are electronic texts which can be viewed or accessed via the World Wide Web. This requires a computer with an Internet connection and the necessary reader software. Project Gutenberg, for example, at http://promo.net/pg/, is a long-established online library containing electronic texts. These Web books are of non-copyrighted materials in the public domain, and are presented in a basic format of plain text. Two commercial examples of Web books are the products offered by NetLibrary (http://www.netlibrary.com/) and the documents traded with the Adobe Portable Document Format (PDF) Merchant (http://www.adobe.com/products/pdfmerchant/). The most popular Web book to date is the eBook *Riding the Bullet* by Stephen King, which was downloaded 500,000 times within the first forty-eight hours of its release in March 2000.

The second type of eBooks can be called Palm books. These are books that can be read by a handheld, battery-powered computer, which can either be a type of Palm Pilot or a dedicated reader device. Unlike the Web books, these eBooks are more portable and do not necessarily require an Internet connection. The Rocket eBook, sold by NuvoMedia, is an example of a Palm book. Rocket eBooks are currently selling for $200 at http://www.rocket-ebook.com/. Other Palm books include the Softbook Press Softbook Reader (http://www.softbook.com/), and the Everybook Dedicated Reader (http://www.everybook.net/).

The third type of electronic books are currently in development. These books would use electronic ink to display content. Lucent Technologies (formerly Bell Laboratories) is in the preliminary stages of designing and constructing flexible plastic paper containing electronic ink. The ink can be magnetized to show customized content, and then re-formatted for the next use (Bindra, 1999). The project, officially known as eInk and also dubbed Paper 2.0, has produced some early prototypes of signs in shopping centers (see http://www.eink.com/).

Pros of Electronic Books

Although none of the above types of eBooks will be replacing or even matching the popularity of printed books any time soon, there are several unique advantages their structure offers over traditional printed publications. Many of these advantages are inherent in the format of the electronic devices; digital instruments can offer a level of features and flexibility that will never be possible through printed books.

One of the most fundamental advantages to eBooks is their method of publication. An electronic text, which could be created by anyone, has the potential for instant worldwide distribution over the Internet. Electronic books also offer instant access to materials from virtually any location, without the dangers of damaging a printed copy; the virtual nature of eBooks allows easier access to electronic publications. A listing of available eBooks, for example, can be integrated into a library's online catalog (Ballard, 2000), thereby offering a complete substitute to why many people visit a library building.

The economic advantages to eBooks are readily apparent. The overhead publication and distribution costs of electronic books is already considerably lower than using a printing press (Hayes, 2000). Some costs are passed on to the eBook consumer, who must download or somehow obtain the document, but in most areas the corresponding expenses relating to printing

materials are obsolete in the digital world. As described in the next section, however, these cost benefits have not yet been fully realized in consumer eBook prices.

Other advantages to eBooks lie in the increasing capabilities of the eBook readers, many features of which are not possible with print on paper. A single electronic reader, for example, can hold more than one electronic text, and the potential exists for portable readers to contain entire libraries. The content of each electronic document can furthermore be expanded, customized, or updated as its user desires. Customized notes can also be written in the electronic equivalent of margins. The complete text of electronic books can be searched – a navigation tool unmatched by traditional back-of-the-book indexing systems. Further enhancements include an interactive dictionary, with instant access to the definitions of highlighted words within the text, and the capabilities of displaying multimedia that cannot fit on paper. Adjustable displays, including variable font sizes and levels of backlighting, are another advantage that eBooks offer.

All of the above advantages are already a reality in existing eBook products (DiNucci, 1999a), and have the potential to improve along with future technological advances. Along with these features, however, come some limits to what eBooks can accomplish in comparison to the familiar printed book.

Cons of Electronic Books

The disadvantages of eBooks can be traced to one of two causes: (a) the shortcomings of current eBooks technology and its derivatives, such as the current resulting costs; (b) incongruencies that eBooks pose with current user expectations and conceptions of how books are handled.

Prices for eBooks and eBook readers remain prohibitive to many potential users. The Rocket eBook, currently selling for $200, represents a cost that nowhere applies to purchasers of printed books. The more limited selection of electronic texts, furthermore – most of which are heavily representative of non-copyrighted materials – are often at least as costly as their printed counterparts. It is of note, however, that less than a year ago the Rocket eBook price was $500. As the research costs for eBook hardware are obtained, the prices will continue to decline for improved products, as will the prices for eBook publications as their demand increases.

The hardware used to read eBooks is nowhere near the levels of durability of hardcover and softcover books. The current generation of eBooks readers are too fragile to be used in the same manner of printed books (Sottong, 1999). Although it is reasonable to assume the quality of reader hardware will improve over the years, certain qualities of print on paper (such as limited water and pressure resistance) will likely not be matched by electronic devices within the foreseeable future.

The physical appearance of eBooks does not yet match the quality of printed books. The display resolution of computer screens and electronic devices is considerably less than the print quality produced by a printing press. For many users, screen glare and eye strain are a serious concern, but all signs indicate that the display technology will continue to improve with time. Microsoft, for example, has announced plans to produce a new generation of Palm devices using their ClearType technology.

One potential vulnerability of eBooks has to do with how they change the manner in which books have been read throughout history. Electronic books are categorically different than printed books in that they require an intermediate tool for viewing (and even eInk requires additional technology to format the pages). Without the hardware, Internet connection, or battery power required by an eBook reader, electronic documents are useless. An extraordinary level of reliability must therefore be instilled within the electronic devices that handle the replacements for printed books. This seems to be an essential requirement for eBooks before they are adopted by most users.

The usability of eBooks should also approach that of paper books. The virtual aspects of electronic information are more difficult for users to comprehend than the structure of a paperbound book. More and more computer users, however, are becoming comfortable interacting with digitally-based information. Handheld palm eBooks, moreover, are more similar to printed documents than is a computer monitor. Yet there remain certain limitations to using eBooks instead of paper books. A paper book can be opened and flipped through, while an electronic text is more difficult to navigate – especially since traditional means of use, such as gauging a book's length by its thickness, are not available. The ease of use of eBooks must remain a high priority as eBooks develop. Minimal technical skills should be needed by the novice user, even as the eBook technology and its advanced features grow and improve.

None of these problems with eBooks are insurmountable. As the eBook technology improves, so will its ease of use. A new generation of eBook hardware, for example, offers reduced screen glare, improved fonts and layout, along with the flexibility of instant access to personalized and customizable electronic books (DiNucci, 1999b). As eBook technology develops, systems will need to be established to preserve older eBook formats. Migration concerns and other issues will be discussed in the next section.

Other Issues

Along with the benefits and detriments of eBook systems, there are other aspects and implications of eBooks that are also worth mentioning. The method of creating of eBooks entails many different publication problems than arise with printed books.

<u>Environmental Impact</u>

The overall influence of eBooks on the environment remains unclear. Many of the earlier attempts at designing paperless systems not only failed, but may have ultimately produced more paper than necessary. The printing of electronic books may likewise actually use more paper than the printing press system of publication. For example, what good is a electronic copy of a document, such as an online PDF, if everyone just prints it out, as opposed to using paper for a single copy and then circulating the document? It may be just as likely however, that the circulating document would be photocopied for the same reasons. An online version, meanwhile, offers access points from which the document could be shared by multiple users worldwide.

Environmental concerns over a duplicated paper expense are further countered by responsible paper production practices:

> The argument that our paper consumption threatens our rainforests is based on the widely accepted mistake that paper pulp is normally produced from hardwood. Although negligible quantities in some countries are produced from hardwood, the fact is that regular large-scale paper production depends on plantations of softwood. You need plantations, and not forests, if you wish to carry on your industry, and you need to bed our more new trees than you fell, if you wish to increase production and profit. Paper documents pose no threat to the environment. (Larsen, 1999, p. 25)

As society becomes more comfortable handling online information, it can also be hoped that less paper use will occur as people grow accustomed, with the help of improved technology, to reading materials on screen.

Standard Specifications

With the variety of eBook hardware already available, it is important that standards and guidelines for the formatting and publication of eBooks be adopted. This ensures compatibility between different existing systems, and greater hopes for an easy and less costly migration to future technologies.

The Open eBook Publication Structure Specification has been established with these concerns in mind. It defines a uniform format for eBooks publications, built upon a mix of existing HTML and XML standards (Microsoft, 1999). The specification was developed in conjunction with publishers, software and hardware developers, and is supported by the National Institute of Standards and Technology (NIST).

Preservation

Concerns over preserving printed books usually focus on the wear and tear of a physical item. The use of digital documents can be more heavily encouraged because these dangers do not apply as much in the online world. There are serious preservation concerns with electronic documents, however, due to the rapid development of new computer systems. In some ways printed books are easier to preserve in this respect: a 500 year-old book can be easier to preserve than an obsolete 5.25 inch floppy disk. As new hardware is developed, effort is needed to allow for the migration of existing materials to the new platforms so that they can still be accessed.

Security

One sticking point of the new technological abilities of eBooks is the need for secure documents and commercial products not to be exploited. The potential exists for easy and instant mass production and distribution of eBooks, something which at face value is a good thing for consumers. For publishers, however, this presents an added vulnerability to copyright infringements and the like to occur with digital documents, and is considered a serious drawback to digital forms of publication.

The digital frontiers that eBooks cover are still susceptible to this type of lawlessness. For example, unencrypted PDF editions of Stephen King's *Riding the Bullet* were made available online (Kane, 2000). The flexibility of digital media does not easily lend itself to structures that limit its capabilities; it remains uncertain how to best implement a secure eBooks system which

protects authors' and publishers' rights without violating users' privacy or restricting the features or usability of the products (the first sale doctrine, for example, which gives owners usage rights, needs to be kept intact). Developing such systems is certainly a top priority for the publishing industry (cf. Microsoft, 2000).

Publication Models

With the low overhead costs of publishing and distributing eBooks, the potential exists for a radical change to traditional publishing models. In some cases the middleman publisher can be eliminated together, as illustrated by the rampant self-publishing on the World Wide Web. Other Internet-based publication models, such as the Napster file-sharing system and the direct marketing possibilities available through vendors such as FatBrain and other online publishers, are quickly gaining popularity (Albanese, 2000; Milliot, Reid, & Zeitchik, 2000; O'Reilly, 2000; Rose, 2000).

The consequences of the use of eBooks over time entail that each of the above topics be addressed adequately. Only then will eBooks be fully prepared to gain widespread popularity throughout the publishing industry.

Conclusion and Predictions

Only when eBooks have all of the features that their print counterparts possess, along with enhanced technological capabilities, will they become a success. The technology behind eBooks must remain transparent, and their usability must improve along with the features and abilities.

It is difficult for many people to envision a world where eBooks outnumber printed books. Although the book will not disappear, as the current status of electronic journals illustrate, it is realistic to assume that eBooks will change the way our society handles information. In retrospect, it is worth considering that the first VCRs, which cost over $1000 (and whose manufacturer, Sony, was sued by Universal Pictures for alleged copyright violations that stemmed from the product's use [464 U.S. 417]), were considered by some as too different from the way movies were normally watched to hold promise.

Once the technological capabilities of eBooks have been fully developed, the biggest factor determining their adoption is their perceived usability. The power and control of these new technologies will become more and more enticing to most users. Consider that the Internet explosion, for example, happened to occur when the Web became easier to use than a library.

New generations will more readily adopt new technologies, picking up the slack in a user base that the newly developed technologies are creating. As Richard Brass, the Vice President of Microsoft's electronic books endeavors, states: "The cards have been dealt. The only difference is how fast people will play the hand." (in Levy, 2000).

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Since the above essay was written, there has been a new wave of publications and developments in the eBook industry. Stephen King, for example, has undertaken a self-publishing effort with his new online novel "The Plant", with an honor-based payment structure of one dollar per chapter. Journal and news articles, business developments, and industry conferences continue to flourish with the growing capabilities and popularity of electronic books. To keep up-to-date with these ongoing developments, check resources such as the online computer news aggregator Linkston (http://www.linkston.com/) and the online bibliography of information technology articles at Current Cites (http://sunsite.berkeley.edu/CurrentCites/).