Information Products Management in the Internet Age

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Abstract
We are living in an incredible time, a time of technology and information. In the electronic market place of today, digital goods consist primarily of information products. Information or knowledge goods are a peculiar kind of commodity. Management of these information products requires librarians to deal with information not just as a set of objects or artifacts such as data or files, but also as a process that extends from information identification (sensing), collection and organization through its processing, maintenance and use.

Introduction
The emergence of information and communication technology plays an increasingly important role in modern society. The term "inform" originally meant "to give shape to" and information is meant to shape the user who gets it, to make some difference in his outlook or insight. Information is a thing, an entity to be captured, organized, manipulated, and retrieved. It becomes a national asset as important as mineral resources, water, forest, etc. Securing, developing and using efficiently this strategic resource is a task of paramount importance for any society and state. Electronic information in the new era is changing the duties and services in all fields from traditional to digital form.

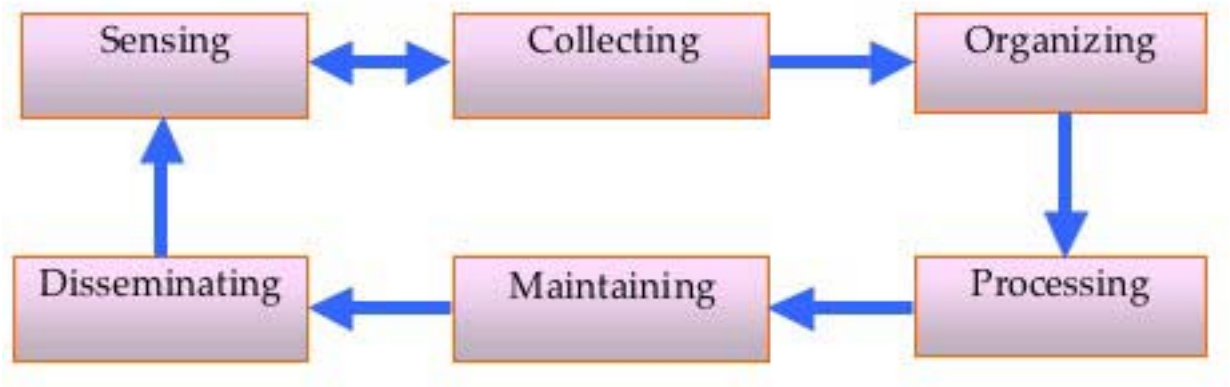
Today, the meaning and function of paper are being transformed by its encounter with the computer. The use of the Internet and the power of search engines have changed the role of libraries and their services radically. Now the library users have fewer barriers, as the much information is available on the Web with customized form. The library profession is poised to move from collection management to content management even though collection management in the traditional sense is concerned with storing and managing the information in its physical form at the document level. Today, librarians are focusing on capturing, organizing, manipulating and accessing information more effectively by implementing information technology as an intermediary between the producers and users of information resources.

The term information product refers to electronically deliverable knowledge-based products. Electronic information products are available in the form of CD-ROM, DVD or floppy disks and also through the Internet and online databases. Information products contain information originally published in electronic form or information originally published in print form and then made available electronically.

Information Products Management
Information Products Management requires librarians to deal with information not just as a set of objects or artifacts such as data or files, but also as a process that extends from information identification (sensing), collection and organization through its processing, maintenance and use. The basic idea underlying this process is that information products have a 'life cycle,' from creation through use in decision making and subsequent disposal, that librarians need to capitalize on the information's potential value. Management of the information product's life cycle requires librarians to appropriately plan a budget for evaluating and using information products expeditiously and exhaustively. (Marchand, 2001)

The figure below shows the six phases of the information life cycle as the base of the information management practices model. The purpose of this life cycle is to improve the ways that information is used for decision making by users; each phase is dependent on the last. Sensing information from outside on market shifts, users' needs, and new technology changes, influences what information is collected by establishing information needs. Collecting new relevant information not only prevents information overload, it also determines how a librarian organizes, indexes and classifies information and links databases to promote access and use by its users. Organizing information properly enables librarians to process information for different decisional contexts (see figure 1).

This process of the information life cycle is a continuous evaluation of information at each phase of the life cycle. At the sensing phase, people use cognitive judgments about information resources to decide whether potentially collectable information will satisfy a new or unanswered problem or decision. At the collection phase, they decide whether the decisional benefits received from the collecting



The Life Cycle of Information Management

of new information are worth the associated cost of its collection. At the organizing phase, whether appropriate data structures, standards, and routings can be established to help ensure information can be used to process decisions. At the processing stage, whether the information collected and organized actually satisfies analytical and decision needs. At the maintenance phase, whether information should continue to be stored and updated in anticipation of future use. And lastly, at the dissemination stage, whether the information has been disseminated immediately and whether the information has reached the targeted audience.

Challenges in Information Products Management

The emergence of an information-based society is affecting products management in a major way. The underlying issues are technological change, environmental protection, the shift to a service-oriented culture and the rapid growth of information. These changes are occurring in a climate of user needs reform and continued fiscal restraint. Here is an overview of issues and trends.

- the demand for easy access and retrieval of information;
- the growing shift from print to electronic media;
- the need to provide alternative formats (e.g., large print, Braille and talking books);
- the call for information that is timely, relevant and concise;
- new processes and methods to store, publish and disseminate information;
- the concern for plain language and clear test structure;
- the staggering volume of available information and the effect of information overload and visual noise
- the call for greater coherence in visual communications

Electronic information products management faces many challenges. Examples of policy issues include invasions of personal privacy, civil liberties, free access to undesirable materials by minors, the digital divide, taxation, multiple jurisdictions, and the impact of encryption on law-breaking and national security.

The computer, through network-mediated access to information, acts as intermediary between the people and their information assets. Enabled by modern software technology, this intermediary can have many capabilities and complex behaviors. The challenges are to organize the functionality and interfaces of this intermediary in a way that is most natural, pleasant and effective for its user's context.

Types of Information Products

Information products include a description of the upcoming significant information being produced by research and development. Generally, information products included all books, journals, reports, reference resources, newsletters, etc. In the Internet context, the term refers to electronically deliverable "knowledge-based goods," also known as "digital goods." Knowledge dissemination should enable to have an easy access to the information products, whatever is the form of information delivery.

Information products come in variety of formats.

1. Books

a. Monographs: a written account of a single thing
b. Anthologies : a collection of selected literary pieces or passages or works of art or music
c. Reference: a work containing useful facts or information

2. Periodicals

a. Scholarly Journals
b. Magazines
c. Newspapers

3. Non-print materials

a. Television
b. Film/Video
c. Radio/Audio Tape
d. Pictures

4. Internet

a. Online Databases
b. Websites
c. E-mail\

Principles of Information Products Planning
Technology is forcing businesses to reinvent themselves. Businesses are undergoing a transition from traditional paper and broadcast formats to a hybrid of dynamic media that harnesses the power of computer and software. For the first time in history, a business can economically communicate with all of its employees, business partners, and customers around the world at the same time. Corporations must recognize information product planning and information architecture as valuable processes and make them part of corporate structure. The interactive nature of electronic publishing calls for a comprehensive planning approach. Principles for the planning of printed and electronic products are listed below.

- Use the format best suited to disseminate information in both official languages (separate versions or a bilingual format) by assessing factors such as accessibility, availability, dissemination, printing and distribution costs, and environmental impact.

- Use a format compatible with common manufacturing and distribution methods, and ensure it is based on standard paper sizes, printing press sizes and container or envelope sizes.

- Use one-colour printing wherever possible, and limit multi-colour printing to products where it is a functional requirement (e.g., when presenting information such as geographic maps, charts, or safety instructions).

- Select cover stock on the basis of functional needs (handling method of binding, product life cycle); consider using the same paper (self-cover) for both contents and cover, where feasible.

- Select the appropriate paper on the basis of user needs, cost and environmental impact. Such factors include product life cycle; archival value and use of permanent papers; surface finish; grammage; opacity; handling and distribution; and, of course, recycling.

Thus, it involves many factors, including user needs and access; reproduction (text, graphics, sound); storage capacity; text retrieval software; user manual; applicable standards; and links with other information sources. (Davenport, 1998)

Characteristics of Information Products
Information is a primary example of a digital product, i.e., knowledge-based goods that can be digitized and transferred over a digital network. Information goods include a wide range of traditionally paper-based products such as books, magazines, newspapers, journals, photographs, and maps and other graphics. Most of these products are first produced in digital format and then printed on paper. Some information products such as databases, computer software, and computer games are distributed and used in digital format. Since video and audio signals can now be digitized, multimedia products such as movies, television programs, and sound recordings can be digitized, and combined with information products or sold separately as entertainment products. Clearly, these are all transparent examples of products that exist as physical products but that can easily be digitized into electronic form.

In order to be useful for decision making and to meet the end user's satisfaction, information products need to have certain characteristics, and these are equally necessary even for one person's decision. Important characteristics are described below.

a. Information must be accurate: This refers not only to the question "Are all the 'facts' true?," but also, perhaps more importantly, to information that is in the form of estimates, opinions, or judgments. Obviously, in these cases one cannot be 100% sure of accuracy, and must think about, for example, the adequacy of the sample in cases of survey information; the dependability of the person giving the opinion or judgments; and how reliable the statistical methods are that might have been used to produce the information.

b. Information should be up-to-date: This might seem obvious for everyday use, but it is something that requires a lot of thought and effort if it is to be achieved in knowledge information systems. If a database is not

properly designed, then information can easily get out-of-date.

c. Information should be timely: This is one aspect of information for which modern information technology can really make a difference. A few decades back, library databases were maintained manually such manual work did no facilitate quick or indexed retrieval of data. Such laborious task involved much time, energy and did not proved cost effective. Today, data is entered into the system at appropriate times, and the librarian as well as users can obtain all sorts or analytical information more or less instantly.

d. Information should be complete: Information should be complete and comprehensive based on the most current research data available, using sources that carefully examine many aspects of concern. It should be drawn from sources having a background of knowledge in relevant information, and citations should be complete and the sources of information fully identified.

Preservation and Life-cycle Management of Electronic Information Products

The development of preservation criteria for electronic information is more complex and less straightforward than for paper publications, although some of the basic considerations will remain the same in both types of media. Issues that might be considered in the long-term preservation and life-cycle management of digital information products include:

- Legal restrictions
- Cost
- Documentation/metadata
- Quality control/quality assurance
- Provenance/authority/authentication, and
- Other context-specific issues

Legal restrictions include national security, privacy, and various intellectual property rights, similar to the paper paradigm. A potential significant difference may arise with regard to adequately sorting out intellectual property rights in hybrid digital information products which might integrate dozens or even hundreds of sources.

The costs arise from the labor required to evaluate and subsequently manage the digital information, as well from the technological infrastructure.

Documentation, also referred to as metadata, is especially important for scientific data and other esoteric information products that require some ancillary explanation to facilitate their use. Digital data that are so lacking in documentation that even an expert in the same discipline is unable to understand them are obvious candidates for the trash bin, unless their originator can be found and persuaded to make them intelligible. The physical separation of explanatory documentation from the data themselves should be avoided.

Quality control and assurance is another retention criterion that needs to be considered in whether to preserve an information product. One method appropriate for both paper and digital information is peer review. In contrast to paper products, however, electronic information may become corrupted due to technical deterioration or anomaly, or through the intentional or accidental introduction of errors as a result of use. What makes the quality control even more difficult for electronic information is that sometimes the problems, such as viruses, are not readily apparent and may lie dormant until some future point.

Provenance and authentication have parallel importance for both paper and digital forms, but pose more problems in the electronic context. As in the case of quality control, the original and authentic version may be difficult to ascertain, and fraudulent or illegal modifications can be made that are difficult or impossible to detect.

Issues that might be considered in purging or deeper archiving of documents include:

- Age of document
- Physical condition
- Cost
- Use history, and again
- Other context-specific issues

The implementation procedures for retaining and purging documents are also likely to differ from the paper model. Digital information products are more voluminous, varied, and complex than their paper counterparts, and therefore require a broader range of expertise for their proper evaluation and become more labor intensive and costly to screen.

Methodologies for Digital Preservation of Information Products

Digital resources are tomorrow's heritage. The strategies and methodologies for digital preservation concerns include deciding what to digitize, formats for texts and images, quality of images, and costs. Technology preservation involves data storage on a stable medium, and in a suitable environment; the refreshing or copying of the data to new media as required; maintaining the data integrity of the containerised digital data and associated contextual information file; preserving the original software application(s) required to access the data types preserved; providing the operating systems on which the original applications ran and preserving the hardware platform on which the operating system was designed. (Peters, 2000)

a. Moving information to an improved storage media: The rate of change of media technology establishes a certain inevitability in the application of this strategy. The improvements in storage media are so great as to drive market forces. Longevity of a floppy disk common until a year or two ago, can be estimated at between one and ten months. CD longevity is estimated between 10 and 100 years. Other advantages can be found in the aggregation of larger quantities of information to facilitate data management. Information can be stored in Floppy disks, Hard disks, Readable Compact Discs or Rewritable Compact Disc. The user can choose the desired storage capacity and select the appropriate storage device.

b. Data migration: Migration of information is commonly associated with archival storage. We have all known software upgrades to "orphan" or render unreadable, files created under an earlier version. The most serious problem facing librarians of digital collections, is not unstable media, but data format and software obsolescence. Transforming information from one digital format to another is an essential strategy for persistent adherence to international standard formats.

Migration procedures offer a variety of options:

- Routine refreshing, copying the bit stream from one location to another, whether the physical medium is the same or not.

- Changing file formats from one application to another (e.g., MS Word to Word Perfect)

- Changing file formats from one format to another (e.g., numeric to ASCII text) (Loomis, 2001)

- Creating derivative access copies (e.g., TIFF to PDF)

However, a reliance on migration as a preservation strategy is not without risks. Infrastructure risks include the presence or lack of persistent institutional support, in terms of funding, hardware, software and staff to manage the repeated migration of digital collections. Technical risks include the unintentional modification or corruption of the structural elements of the file during migration.

c. Emulation of software and hardware platforms aims to use the power of present computer technology to function as if it were the technology of a previous generation. Rather than repeatedly creating new versions of a digital document, recent experimentation has shown that it is possible to develop a set of specifications for the building of emulators that can render the content of digital documents on future unknown platforms. The representational information contains all the technical characteristics, including format, navigational structure such as a table of contents, application software, and the computer specifications and system requirements necessary to read that document.

d. Secure systems administration: Secure systems technologies provide a stable environment for digital archives. Data replication is achieved in various ways, by mirrors, differential and full backups, off site duplicates, procedures for validating migrations and data integrity.

e. Digital archaeology: When preservation strategies have not been applied to systematic digital archiving and all else fails, it may become necessary to work out how to read the stored bits. Because of the manner in which magnetic media are written, it is possible, given sufficient resources, to recover much material believed lost. The cost of large scale data recovery, however, renders digital archaeology an untenable strategy for digital preservation.

Comparing Conventional Printing with "Internet Printing" — Some Physical and Conceptual Differences

The World Wide Web is different visually as it provides both static and active pages comprising a wealth of information, graphics, advertisements, interactive options and links to related information. Hypertext markup language (HTML) code, which specifies the primary underlying visual structure for Web applications, is like a primitive typesetting system. The user, by changing default settings in his or her browser, controls many of the aesthetic features, including typefaces, font sizes, background color and whether or not to display images. (Lucas, 2000)

It costs much less than conventional printing.
The Web levels the playing field—companies and organizations of any size can reach thousands of potential clients at very low cost, unlike advertising in media such as television, national publications or direct mail. Also, e-mail via the Internet is much less expensive than "snail mail."

It allows more frequent updating of information
If necessary, information can be updated on a minute-by-minute basis. One does not have to wait for budget approval of the next press run to deliver timely information.

It allows limited, but increasing, interactivity.
Everyone knows about hyperlinks, which allow jumping to another website, or to different places within one website. This is not real (two-way) interactivity, however. Limited interactivity is possible through the use of HTML forms. Online forms can be filled out by the browser (client) and sent back to the host (server). The server can then send another HTML document back to the client, based on the form data received. This process is used to take orders or to present the client with customized information. Interactivity

has become more powerful and pervasive since scripting languages, such as Java from Sun Microsystems, have become supported in the major browsers. Error checking can now be done at the client end. Java, Microsoft's ActiveX, and other tools make it possible to send small applications to a client's computer, which will operate interactively with the server software to provide specialized applications. An increase in Internet bandwidth would also change the type and amount of information that can be presented and worked with interactively.

It is a medium for the delivery of new types of information products
Many people keep up with stock investments or do their banking online. Some newspapers, such as the Wall Street Journal, allow receiving daily, customized, versions of their products online. It is not hard to imagine that a firm that sells specialized information might want to set up a website, accessible only to its customers, to deliver menu-driven individual packages of information online.

It is causing organizations to rethink internal "behind the firewall" information systems.
HTML is becoming the basis for the exchange of information within some organizations. Cross-platform browsers and scripting languages solve many compatibility problems. Web tools and servers are relatively inexpensive. For companies that are worldwide, and for people who travel, local access to the Internet may be easier than access to a corporate network. "Behind the firewall" management information systems based on Web tools can provide inexpensive platforms for the rapid, widespread, exchange of information and discussion.

It requires the development of new skills and new ways of thinking.
New technologies start by imitating old ones. Guttenberg's printing with movable type started by imitating the hand lettering of the monasteries. Television started by broadcasting what, essentially, were radio programs. Applications on the Web have started by imitating printing. No one knows where we are going or how quickly we will get there. That's part of what makes it interesting. All we know is that, in the information age, we have tended to underestimate, rather than overestimate, the rate at which things will change.

Conclusion
At the outset, Electronic Information Products, being a relatively new trend in the information world, have generated lot of debate over their access, storage, preservation, and copyright. An important aspect of an Electronic Information Product is its surroundings. These are the attributes, such as service and brand image, that add value to the core product. Its further development and issues surrounding it can be resolved with collaborative efforts of librarians, researchers and the publishers.

References

1. Brown, John Seely, and Duguid, Paul: The Social Life of Information; Boston, Harvard Business School Press, 2000 pp 147-158.

2. Davenport, Thomas H., and Prusak, Laurence: Working Knowledge: How Organizations Manage What They Know; Boston, Harvard Business School Press, 1998 pp 128-147.

3. Dhillon, Gurpreet: Managing Information System Security; London, Macmillan Press Limited, 1997 pp 138-155.

4. Elke Duncker: Digital Libraries; School of Computing Science, Middlesex University, London. 1998 Retrieved from http://www.cs.mdx.ac.uk/staffpages/elke/DLpage.htm

5. Harrison, Norma, and Samson, Danny: Technology Management: Text and International Cases; Boston, McGraw Hill, 2002, P. 48.

6. Loomis, Mary E. S.: Data Management and File Structures; 2nd Edition, New Delhi, Prentice-Hall of India Private Limited, 2001, P. 13.

7. Lucas, Henry C., Jr.: Information Technology for Management, 7th Edition; New Delhi, Tata McGraw-Hill Publishing Company Limited, 2000 pp 30-35.

8. Marchand, Donald A., and others.: Information Orientation: The Link to Business Performance; Oxford, Oxford University Press, 2001 pp 28-35, 74-89.

9. National Louis University Library Online Tutorials: Retrieved from http://www.nl.edu/ulibrary/tutorials/what_is_information1.html

10. Peters, Dale: Digital Technology: The Preservation Challenge of the Digital Library; A paper presented to the Library and Information Association of South Africa (LIASA) Conference, 28 September 2000.

11. Skyrme, David J.: Capitalizing on Knowledge: from e-Business to k-Business; Oxford, Butterworth Heinemann, 2001 pp 137-146.

12. Sveiby, Karl-Erik: Informatized Markets - Dream Turns to Ashes, in Transformation. London, February 1996. Retrieved from http://www.sveiby.com/articles/PerilsofInformatized.html

13. U.S. Environmental Protection Agency (EPA)

and the Environmental Council of the States (ECOS) : Information Products Bulletin: What Is a Significant Information Product?; 2002 Retrieved from http://www.epa.gov/ipbpages/siginfo.htm

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