Chapter: Microforms

Definitions

The term microform is applied to all forms of microreproduction on film or paper (e.g., microfilm, microfiche, microopaque, microprint, microcard).[1]

Microforms are generally viewed by individual users at specially designed machines or "readers," which provide the needed magnification.

The term micrographics is the overall technology in the creation and use of microforms.[2]

A microimage is a reproduction of an object, such as a source document, which is too small to be read or viewed without magnification.[3]

Brief History

Pre-1920's

Although treated as a novelty until the 1920s, microforms originated much earlier. John Benjamin Dancer, an English scientist, known as the 'father of microphotography," began to experiment with and manufacture microproduced novelty texts as early as 1839. In 1853 he successfully sold microphotographs as slides to be viewed with a microscope. Utilizing Dancer's techniques, a French optician, Rene Dagron, was granted the first patent for microfilm in 1859. He also began the first commercial microfilm enterprise, manufacturing and selling microphotographic trinkets. Dagron, in the fall and winter of 1870-71, during the Franco-Prussian War, demonstrated a practical use for microforms when carrier pigeons were used to transport microfilmed messages across German lines to the besieged city of Paris.

1920's

The first practical commercial microfilm use was developed by a New York City banker, George McCarthy, in the 1920s. He was issued a patent in 1925 for his Checkograph machine, designed to make permanent film copies of all bank records. The device used motion picture film and a conveyor belt to photograph checks before they were returned to bank customers. In 1928 Eastman Kodak bought McCarthy's invention and began to market it under Kodak's Recordak Division.

1930's

By 1933 there were over 700 machines in American banks. With a perfected 35mm microfilm camera, Recordak in 1935 expanded and began filming and publishing the

New York Times in microfilm. Two significant events in 1938 hastened the use of microforms for archival preservation in American libraries and institutions. Because of rapid deterioration of the newsprint original and the numerous difficulties in storage and use of newspapers, Harvard University Library began its Foreign Newspaper Microfilm project. Today this project continues, sponsored by the Association of Research Libraries, and the microform masters are stored at the Center for Research Libraries in Chicago. That same year also saw the founding of University Microfilms, Inc. ('UMI') by Eugene Power[4]. He had previously microfilmed foreign and rare books, but in 1938 his work became a commercial enterprise as he expanded into microfilming doctoral dissertations.

Use During World War II

Although World War II slowed the growth of institutional applications of the new microfilming industry, microphotography was still used extensively for espionage and for regular military mail. To conserve space, letters going overseas (and vice versa) were sent on microfilm, with a V-Mail or "hardcopy" being produced and forwarded at the receiving side. The war also brought a threat of destruction to the records of civilization. This threat added an urgency to the microfilming of records, documents, archives, and collections. During the closing war years and the immediate postwar years, there was a flurry of microfilming by occupying nations.

Post-World War II (1950's and 1960's)

After the war, the idea of using microforms for active information systems, and not just for preservation of materials, was proposed. Vannevar Bush[5] and Fremont Rider[6] both envisioned libraries utilizing microforms as active information sources as well as a storage medium. A lack of standardized formats, the poor quality of reading devices, and the emphasis in the industry on commercial business applications all emerged as obstacles to the concept. However, increased funding and improved technology in the late 1950s and 1960s encouraged academic libraries and research libraries to continue to expand their activities in the area of microforms.

1970's

The l970s brought a general decrease in library finances, along with a rapidly growing information society and computer industry. Limited funding, coupled with the information explosion, forced libraries and institutions and their users to microforms as an alternative to bulky, expensive print materials. Improved film, readers, viewers, reader-printers, and the advent of portable or lap readers made this money-saving choice more acceptable. However, user reluctance remained a strong deterrent to microform use.

1980's and 1990's

The improved technology of the 1970s also increased COM, or computer output microform, applications. Microforms produced directly from a computer are being used to produce parts catalogs, hospital and insurance records, telephone listings, college catalogs, patent records,. publisher's catalogs, and library catalogs. Some large institutions have begun producing their own COM publications in-house, with smaller institutions utilizing

commercial service bureaus. A summary of services offered and criteria for selection of a service bureau have been offered by Hoberg[7]

Advanced technologies which extend the basic COM process are available now. State of the COM art technology and applications for today's office are summarized by Suiter.[8] CIM (computer input microform) uses optical character reader equipment (OCR) to scan print documents and convert them automatically to digital information on magnetic computer tape. This technique speeds up the process of data entry, eliminates human error, and allows permanent storage of data in a microformat. Microfacsimile transmission is especially useful for large data files which must be maintained in remote locations and updated frequently. With microfacsimile, digitized microimages can be transmitted through a telecommunications network and output as COM microforms.

COM microforms can also be used in word processing and electronic mail applications to make permanent copies of transmissions. For existing large files of microforms, CAR (computer assisted retrieval) can retrieve information from individual microforms through a computer index. Although costs for these technologies are still high, the costs of CAR systems have recently decreased 15-20 percent, with the capabilities of the systems doubling.[9]

Videodisc and optical disc technologies are new areas of experimentation for the storage and retrieval of data. Several manufacturers are offering such systems currently.[10] Videodisc can combine for storage and publishing both still and moving pictures, while optical disc stores digital data. Badler and Grills[11] and Kish[12] both comment on the high costs of optical disc technology when compared to microforms and on the probability of these costs remaining so in the foreseeable future. Veaner[13] and Chadwyck-Healey,[14] in analyzing the status and future of videodisc technology, agree that its limitations and costs will keep it from competing with microforms for permanent storage. Chadwyck-Healey summarizes the outlook for microformats: "Microforms have a future not only in the short term but probably in the more distant future as well."[15]

Unique Characteristics

In usage, microforms are viewed primarily by individuals rather than by groups. In addition, the format can serve two main purposes in organizations: records can be purchased and stored for research and archival reasons: and/or current institutional records can be produced, stored, and utilized in microforms.[16]

Unique in their characteristics:

- Microreproductions can be made on either opaque or transparent backgrounds.
- Microforms can be produced, stored, and used on roll film or flat film.

- Film polarity for black-and-white microforms can be positive or negative.
- The use of color film is the exception, because of expense and shorter shelf life.
- The actual size ratio of the microreproduction to the original can vary, requiring corresponding magnification for proper viewing.
- Microforms can be produced on a high-quality archival film, which assures the institution of the permanence of its collection and records.

(*A complete description of the various types of microforms is found in the 'Other Concerns' section, near the end of this discussion*.)

Advantages

Advantages of microforms relate to equipment and space requirements, costs, collection development, and provision of services.

Advantages

- Microforms conserve storage or shelf space by requiring 90-95 percent less space than the print equivalents.
- Purchase of microforms can reduce binding costs of serials, costs of document storage, mailing or shipping costs in acquisitions and interlibrary loan, replacement costs for missing or damaged items, and acquisition costs, as the microform copy is usually less expensive than its print equivalent.
- Collection development needs are furthered through the purchase of microforms because a wide range of materials are available in microforms; rare and out-of-print materials can be made more widely available; microforms can retain the clarity and readability of the original; and an extensive permanent collection can be made available when archival quality film is purchased, properly cared for, and stored. "Rigorously precise studies indicate that the 500+ year life expectancy of microfilm, when properly prepared, stored and managed, far surpasses any other medium in terms of longevity and ability to accurately reformat information."[17]
- Using microforms can improve both services to users and administrative functions. For users, microforms are easily converted back to print with reader-printer access; they can be quickly and easily updated or replaced; and they are less likely to be mutilated or removed from the collection. The ease and rapidity of replacement is also helpful in fulfilling administrative functions such as microform catalog updating. With the proper equipment, microforms can also be duplicated from one microformat to another, or be incorporated into computerized retrieval systems and word processing systems.
- Chances of misfiled or lost documents decrease dramatically.[18]
- Copies of documents generated from microform are accepted in court.[19]

Special Criteria

In the selection process,[20] collection managers should consider:

- Microforms must be compatible with the existing microforms collection and with available equipment. Reduction and magnification ratios, type of microformat, storage requirements. and standards which were followed in the manufacturing process should all be considered.

- The type of film stock- silver halide, diazo. or vesicular- should be selected according to the intended uses of the microform. Silver halide film has been determined by the American National Standards Institute to have an indefinite shelf life if properly cared for and stored.

- As color film is more expensive but not permanent, the need for black-and-white or color film should be evaluated.

- The polarity of black-and-white film must be considered. With reader-printer equipment, negative polarity will produce the traditional black image on a white background in paper copy; while positive polarity film will produce a white image on a black background. Some reader-printers will produce a traditional copy from either positive or negative film polarity.

- The sharpness and completeness of the microimages when viewed should be considered, as well as the clearness and readability of paper copies when produced at a reader-printer.

- All packaging and containers should be certified free of harmful chemicals.

- The ease of use, including eye-readable headings, frame numbers, indexing on the film, and the availability of print indexes, should be considered prior to purchase.

- When large microform sets are purchased, all of the following must be considered: the publishing schedule, the date of termination, the completeness of the set, the availability of replacement parts, and the pricing of individual parts and the total set. In addition, the selector should determine the availability of individual titles from the set for preview, evaluation, and/or purchase.

Review Sources

Evaluative Review Sources

Periodicals

- International Journal of Micrographics and Video Technology
- Journal of American History
- Library Technology Reports

- Microform & Imaging Review
- Serials Review

Books

- Cumulative Microform Reviews 1972-1976. Westport, Conn..: Meckler, l979.
- Cumulative Microform Reviews 1977-1984. Westport, Conn..: Meckler, l986.
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A checklist, devised and tested, can be used by an institution's staff to assist in the evaluation of their microform storage and care practices. Available as an ERIC document (ED 181 883), readers can evaluate practices in which they are currently engaged, as well as those they need to undertake.[21]

Users and Microforms

An area of great concern to institutions and producers is the lack of acceptance by users of microforms. Salmon summarizes research about user resistance to microforms, categorizing the difficulties as poor cataloging and indexing; lack of portability; difficulties in equipment use (such as noisy and hard to manipulate); missing or reversed pages; physical fatigue and eye fatigue; and use problems, such as taking notes, making notes on the document, flipping pages, and comparing two or more documents.[28]

This identified user resistance was the topic of a study by Whitmore, completed in 1980. She hypothesized that a microform-user instruction program in two academic libraries would improve user attitudes and acceptance of microforms. The experimental groups who viewed a slide/tape program about microforms did exhibit slightly more positive attitudes toward microforms than did the control groups. Whitmore concluded that user education could assist in changing negative attitudes.[29]

Boss and Raikes stated that most difficulties with microforms are the result of inadequate facilities planning and operation. They produced guidelines which provide assistance for collection managers who wish to make the best and most efficient possible use of microforms in their institutions.[30] Hall and Michaels also maintain that the "best possible viewing environment is a particularly important element of a successful microform operation."[31] The guidelines they have developed are for a regular microform reader maintenance and repair program. Both sets of guidelines, if implemented, could result in improved user satisfaction.

Another approach to improving microform use and acceptance in institutions is proposed by Eichhorn. She suggests that a uniform set of standards for public service is needed, and recommends five steps for the development of these standards in local institutions.[32]

Administrative Tasks

Microforms have been used by institutions for various administrative purposes, such as keeping circulation records, acquisition records, and card catalog production. Saffady discusses some of these applications.[33] However, prior to initiating such applications, the collection manager makes some decisions regarding media and system selection.

Choosing the right type of media is an important element in using microforms for administrative tasks. Artlip discusses making a choice between microforms and newer media applications now available, such as optical or magnetic disc, giving the strengths and limitations of each.[34] Dodson takes the more traditional microfilm and discusses the effects of light, heat, humidity, scratches, and longevity of the three main types of film: silver, diazo, and vesicular. Implications for collection managers who must choose the right film type for a specific purpose are given.[35]

Collection managers are faced with the task of evaluating and selecting micrographics systems which will meet their institutional and user requirements. Meyer offers a list of considerations in choosing such a system:

- type of input
- nature of the information to be stored
- how the information will be used
- overall system cost
- speed and ease of document retrieval
- need to disseminate the information to several locations
- capability and cost of making duplicates, either in another microform or on paper
- frequency with which the file is changed or updated
- need for file integrity
- storage density
- anticipated means of reading and duplication at central and/ or remote locations
- compatibility with other information systems such as data processing[36]

System selection could also involve a decision to contract with a micrographics service company. Such agencies offer a wide variety of services which could replace some or all in-house activities. Hoberg offers a summary of micrographics service agencies and discusses criteria an institution should use in the selection of such an agency.[37]

COM (computer output microform) is a major type of system utilized in administrative functions. A current overview of COM system applications for information storage and retrieval in the modern office is presented by Suiter, who maintains that "image management on film will be here for a long time to come." Latest developments in computer-aided design (CAD), data-base management, computer-assisted retrieval (CAR), word processing, and the personal computer are presented.[38]

The availability of Library of Congress MARC records and bibliographic data-base records for individual institutions on magnetic tape has influenced many institutions to

convert from the standard card catalog to a COM microform catalog. Computer magnetic-tape records can be used with a COM recorder and a mainframe computer to produce microfilm or microfiche catalogs. This option for a COM catalog is discussed by Diaz,34 Saffady,35 and Malinconico.[39] A Library Catalog Cost Model has been developed by King Research and tested in 72 libraries.[40] This computer cost model compares 12 alternatives to maintaining the standard card catalog. Seven of the alternatives include some use of a COM catalog.

Special Problems

Special management problems which have developed related to microforms, include those with standardization, bibliographic control, copyright, and legality of records.

A lack of standardization of film types, film sizes, frame patterns, and reduction/magnification ratios has plagued microforms' users since the beginning years. Only recently have industry wide standards been adopted and voluntarily adhered to by producers.

The membership of the Agency for Information and Image Management (AIIM), formerly the National Micrographics Association (NMA), represents both users and producers of microforms. It is the organization primarily responsible for developing and proposing industry and national standards in the United States. Based on a consensus of the members, it makes recommendations to the National Information Standards Organization (Z39) of the American National Standards Institute (ANSI). If the deliberations lead to adoption as a national standard, the committee further submits its recommendation to the International Standards Organization (ISO) for possible adoption as an international standard. Kidd has compiled a listing of the micrographic standards of AIIM.[41] Current standards deal with roll film and fiche formats, quality of resolution and density, and storage conditions for archival purposes. Also available from AIIM is its Standards Set, which is published as a two-volume loose-leaf binder to facilitate continuous updating.

Other special characteristics of microforms include:

1. Polarity, or the light/dark relationship in a microimage. Film produced by a direct image process will produce a positive polarity microform -- one with a light background and dark images. Film produced by a reversed image process will produce a negative polarity microform -- one with a dark background and light images.
2. Three major types of film are used in the manufacture of microforms:
    - Silver halide film, or "silver film," combines silver and a member of the halogen family in either a direct or a reverse process to produce microimages. It was the first type of film used and is the only one for which national standards have been developed. Silver film is considered to

be permanent, of archival quality, and is recommended for preservation projects.

- Diazo film is produced by a direct image process, using diazonium salts, ammonia, and light to produce microimages. Diazo film is less expensive and more quickly produced than silver film.
- Vesicular film is usually produced by a reverse image process which uses heat and ultraviolet light to produce microimages. This newest type of film is also less expensive and quickly produced, but is highly susceptible to image loss at high temperatures.

The reduction ratio of a microform is the ratio which indicates the number of times the original image has been reduced through the filming process.

3. The magnification ratio is the opposite of a reduction ratio. It is normally used to indicate the power of a lens in a microreader, viewer, or reader-printer.
4. Resolution is defined as the sharpness of a microimage. Quality and degree of resolution can be determined by checking a Resolution Test Chart, on the first frame of a microform.
5. Contrast is the tonal difference (high and low brightness) between the light and dark areas in a microimage.
6. The term generation refers to the relationship between the original or camera film master (the first generation) and the copies made from it. A copy which has been made from the first-generation master is termed second generation, and so on. With each generation there may be a loss of resolution or image quality.
7. Computer output microform, or COM, is the process by which the binary signal output, directly from a computer, is converted by COM recorder equipment to an analog signal, which is then processed as microimages. The output from the COM process is normally microfilm or microfiche.

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16. C. Lee Jones, "Preservation Film: Platform for Digital Access Systems," The Commission on Preservation and Access Newsletter (July 1993)

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18. "Microform and Optical is not an Either/Or Proposition," Managing Office Technology (Dec. 1993)

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