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**CD - ROM DATABASES:
IMPACT ON LIBRARY AND
INFORMATION SERVICES**

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ABSTRACT

This paper discusses CD-Rom databases origins and generation, including their formats and file structures, characteristics and their use in retrospective and current awareness searches. CD-Rom databases may be discipline, mission, problem, interdisciplinary or multidisciplinary oriented. This paper concludes by highlighting the impact of CD-Rom databases use on libraries and information services.

INTRODUCTION

In all database activities, the prime objective of making available information easily accessible to all who need it emerges as no small task, especially in light of the realities of scattered resources and inadequate funding.

The past decade has seen a considerable number of technological advances and developments in the machine-readable database field and these have had a decided impact on the types of search services provided to users. Far more databases exist today than at anytime in the past, and far more users are receiving search services from machine-readable databases than at anytime in the past. We now have machine-readable databases in almost all the major fields of science and technology, as well as databases covering news, articles, legal cases and status, drug and poison information, etc. There are hundreds of valuable databases and many more private databases. The problem is making them known, understood and used by researchers and the public at large.

DATABASE ORIGINS AND GENERATION

Many database were produced in the late 1960 and early 1970s. (Clarke, 1998). A database exists once a file has been created and converted to machine-readable form. A few databases were generated specially for the purpose of information retrieval, but because of the data input is high and could seldom be justified for purpose of retrieval alone many more databases were created as by-products of other activities. Some were created because machine-readable databases were needed as a component of a computerized process control or production system for publishing primary journals. indexes or abstracting journals. Others were created because computerized

typesetting was used to produce a hard-copy publication. Computers have proved to be economic and effective tools for producing primary and secondary publications. Consequently, every time a publisher uses photo-composition, a potentially machine-searchable file exists. The machine-readable files once created, can be automatically reorganized, merged with other machine-readable files, reformatted and repackaged to meet the demands of various markets. It is obvious that machine readable files are considerably more flexible and can serve many more functions that can create hard-copy records.

The by-product aspect of machine-readable is no longer the *raison d'être* for many of today's major databases. Many publishers or organizations in the business of information handling have adopted a "database approach" to management of their processing systems and distribution of their information files. In such organizations, the database management system impacts all the information function of the organization such as abstracting, editing, indexing, authority files, production schedules, sequencing of tasks etc through to the composition and distribution of products whether printed, microfilm, or machine-readable. The database approach, (which has been adopted by many publishers) asserts that there exists, for each enterprise, an accumulation of information that is pivotal to its operation. This concept implies that the description and treatment of such a collection should not be oriented toward specific processes but should be determined by the value and character of the information itself. An integrated database usually means an organized collection of the computer-readable information in which the information about each entity is recorded once in standardized form, and all access to that information is achieved through indexes and references to the basic record and the authority files that support it. An integrated database management system then, requires definition, design and standardization of the data elements that comprise the files.

TYPES OF DATABASE

CD-ROM database is an organized collection of information in machine-readable form. The collected information may be bibliographic, or bibliographic-related; natural language text; numerical; or representational. (Huang, 1989). An example of a bibliographic database is the MARC II

database of the Library of Congress or the Chemical Abstracts Service's (CAS) Condensates tapes and Library and Information Science Abstracts (LISA). The CASIA (Chemical Abstracts Subject Index Alerts) tapes, which contain subject index terms and postings that consist of chemical abstracts citation numbers is a bibliographic-related database because the citation number refers the user to other tapes or hard-copy sources that contain the full bibliographic record for the citation. A natural language text database would be the text portion of the New York Times Information Bank which contains not the full text of the articles from newspaper but textual summaries or abstracts of the articles. System 50 for State Statutes of Aspen System Corporation, an example of a full-text database, contains over 200 million words of statute law in the form of full text. (Huang, 1989). Examples of numerical databases are numerous but a familiar one would be the Nigeria Census Tapes containing current census data or UD Census Tapes produced by the United States Bureau of the Census. A database that contains not alphanumeric data but graphic or pictorial representations such as the CAS registry structure database, which contains chemical structures, is referred to as a representational database. One then can see that there are many of databases, containing many types of information, which are represented in many ways.

DATABASE PRODUCTION

Databases are produced by both governmental sources and private sector. Included in the private sector are profit-making and not-for-profit organizations such as professional societies. Many of the largest and most heavily used databases were produced by government. Some examples of these are: the MEDLARS (Medical Literature Analysis and Retrieval System) tapes produced by the National Library of Medicine; the MARC II (Machine-readable cataloguing) tapes produced by the Library of Congress, the ERIC (Educational Resources Information Center) tapes of the National Institute of Education; the DDC tapes (Defense Documentation Center) tapes of the Department of Defense; GRA (Government Research Announcements) of the National Technical Information Services (NTIS) and STAR (Scientific and Technical Aerospace Reports) tapes produced by the National Aeronautics and Space Administration (NASA). The fact that government generated data

bases are heavily used is a function not only of their usefulness but also of the fact that their production and use are subsidized by the government.

Many of the large scientific, technical and discipline-oriented databases have been produced by professional and technical societies in the not-for-profit part of the private sector. Some of these are; the SPIN (Searchable Physics Information Notices) tapes of the American Institute of Physics, BA previous (Biological Abstracts Previews) of Biosciences Information Service, CA Condensates of Chemical Abstracts Services, PATELL (Psychological Abstracts Tapes Editions Lease License) of the American Psychological Association, COMPENDEX (Computerized Engineering Index) of Engineering Index, Inc; and METADEX (Metals Abstracts Index) of the American Society for Metals.

Karen (1990) states that databases are produced within the private sector, however, many of these have had research and development funds from the government, which helped them to get started, or to conduct research associated with systems or products.

The number of for-profit organizations producing databases is small but some of the databases are very important. For example, the Institute for Scientific Information Publishers (ISIP), the Science Citation Index (SCI) tapes and the Social Citation Index (SSCI), Excerpta Medica is produced by the Excerpta Medica Foundation, the F&S Index of Corporations and Industries by Predicasts, Inc, and the New York Times Information Bank is produced by the New York Times. (Karen, 1990)

FORMATS AND FILES STRUCTURES

It is necessary at this point to understand the make-up of a database in terms of the records and data elements that comprise it, the difference between the distribution format of a database as it is provided by the producer and the format of a database as the processor has structured it for searching; the meaning of batch, online and interactive; and of course, the difference between retrospective and current awareness searching. Data elements are the basic building blocks of databases. In the case of bibliographic databases some of the generic names of the elements are; author, title journal name, volume number, issue number, date of publication. Index term, keyword, abstract, publisher's name, etc. The data elements are the smallest units that

comprise the records, which in turn, comprise the file. A search is permitted to access individual records within the file or individual elements within the records. Thus, one can require specific index terms in a search question; the computer searches the index portion of the records in the database to locate terms, matches and then produces the records that match the question. On the other hand, if the searcher knows the citation or reference number of certain desired records he may specify these and the records will be displayed.

Usually, a directory is associated with each word and it specifies the elements that are present, their location in the record and the length (number of alphanumeric character) of the data content of the data element. The standard arrangement of data element stages, data content and directory information for the records is referred to as the format of the record, and the arrangement of the records on a tape or other media is referred to as the file structure or file format.

Most databases are distributed by their producers in the form of sequentially arranged records on magnetic tape. The processors may either search the file in the distribution format or they may reformat the database and store it on tape, disc or other media for searching. There are conceptually two basic structures for searchable files-sequential or inverted. In a sequential file, records are arranged sequence with all the elements for a given record retained in one place. In an inverted file the searchable data elements are sorted with all postings that pertain to a given entry (e.g. an index term or title term) associated with that entry. In an inverted file, all useful search terms are inverted, elements such as author names, patent numbers, and key words are inverted.

An on-line system is one in which the user through a terminal is in direct communication with the central processing unit of the computer. An interactive system is one in which there is a literally an interactive two-way communication between the user and the machine, and the time for response by the machine is, or should be immediate. (Kamamugire, 1997). On-line searches of bibliographic databases are usually run against inverted dictionary type files. A batch processing system on the other hand is one in which multiple jobs or scratch questions are "batched" together and run at one time. The search questions may or may not be entered via a terminal but they are saved until the time of the batch run.

Retrospective and current awareness searches differ with respect to the correctness of the file against which they are processed, and with respect to the number of times the question is run against the files. A retrospective question is the one, which is run against older, historical or past, whereas a current awareness search is run against only the current or most recent file.

Retrospective question is usually run once against a collection of many database issues or volumes, while a current awareness profile is run many times, each time against a different issue of the database. Computerized current awareness systems are usually called SDI (Selective Dissemination of Information) systems. Information is searched for and selected from the file in accordance with the users search profile. The output or search results are disseminated to the user (s). In the case of SDI, once a profile of the users' interests is developed and refined, it is run on a regular basis against new issues of the database(s) requested by the user. SDI searches are usually run in the batch mode against sequential files. Search out-put-can be dissemination to the user through the mail or stored for later retrieval through his terminal. Retrospective searches are run on inverted files for fast searching.

SDI and retrospective searches differ in purpose. The purpose of a retrospective search may be to provide the user with: (a) a few relevant references to become acquainted with a topic; (b) a thorough coverage of the literature on a particular subject; or (c) one or more references that contain the answer to a specific question. These searches are conducted on demand and in "past" or retrospective files. The completeness of the search question processed against the file varies considerably with the users' purpose.

In contrast, SDI searches are conducted in order to keep the user up to date with the published literature in his field. The user profile is usually designed to be as complete as possible and to achieve high recall. The same profile is used over against new issues of the database. The profile is, of course, modified over the course of a year if changes in user interests or data base output indicate the need.

DATABASE CHARACTERISTICS AND USE

There are many different databases and their differences can be described in terms of their characteristics. It is on the basis of various combinations of characteristics that a user or library decides to search or offer

services from a given database. The first and most important is the subject matter covered by a database. A database with appropriate coverage is needed to effect a proper match between in user question and the database to be searched. As indicated earlier, data bases are discipline oriented, or even multi-disciplinary in character. Examples of disciplinary databases are CA (Chemical Abstracts) condensates Polymer Science and Technology (POST), MEDLARS (Medical Literature Analysis and Retrieval System). Examples of mission oriented data bases are the Nuclear Science Abstracts database produced by the Atomic Energy Commission and the STAR (Scientific and Technical Aerospace Reports) database of the National Aeronautics and Space Administration. Problem oriented databases are AHEEP (Abstracts on Health Effects of Environmental Pollutants) and PIP (Polluted Information Project) a database prepared by the National Science Library of Canada using input that is selected from several commercially available databases. An interdisciplinary database would be CBA (Chemical and Biological Activities) and two multi-disciplinary databases are the Institute for Scientific Information's Science Citation Index (ISICI) covering virtually all areas of science and technology, and the MARC (Machine-Readable cataloging) tapes of the Library of Congress covering most of the monographic literature processed by the library of Congress regardless of subject content.

Other characteristics of databases that affect the quality, timelines and thoroughness of search results and the cost of processing are;

- (a) The type of source material included (journal articles, monographs, reports, theses, government literature, critical reviews, book reviews, newspaper articles, patents, etc);
- (b) Completeness of coverage (cover-to-cover, selected articles, selected issues of a journal, "all" vs "selected items" of any types);
- (c) Lapse time between the appearances of an item in the primary source, the secondary source, and the machine readable database (the machine-readable product may precede the printed secondary source);
- (d) Indexing and coding practices employed (free languages keywords, controlled and uncontrolled index terms, author titles versus augmented or edited titles, codes to indicate subject matter, types or classes of any sort, etc);

- (e) Availability of abstracts, extracts or text on the database for search;
- (f) Data elements included for search (access points) and/or display (author, title, journal references, index terms, codes, cited references, etc).
- (g) Size and growth rate (how many records or references are contained in the file from year of the database through the last completed year? What is the size of an average record in terms of number of characters? And, what is the percentage growth rate of the database per year?);
- (h) Frequency of issue or update (how often are the new issues of the database produced? - weekly, semi-monthly, monthly, bimonthly, quarterly, annually, etc.)

IMPACT OF DATABASE ON LIBRARIES AND INFORMATION SERVICES

Database searching have the following direct impact on libraries:

- (1) It affects the acquisition policy of the library by increasing or decreasing acquisitions, as it points out the nonuse of some journals and/or the need for other journals;
- (2) It affects the interlibrary loan traffic of the library as either a borrowing organization or as a lending organization, depending on the correspondence between the library's serials and monograph collections and the retrieved citations from database searches;
- (3) The library can expand or deepen its services by offering personalized data base search services, for both individuals and organizations, from data base it processes;
- (4) It allows library to function as an intermediary, preparing search questions and processing them via an on-line service, or through another center;
- (5) It makes library to function as a referral center, directing its customers to the appropriate databases and service centers.

Libraries have an inherent obligation to provide information services to support the educational, recreational, personal and economic endeavors of users. Information services in libraries take a variety of forms including direct assistance, directories, signs, exchange of information from a reference source, readers advisory service, dissemination of information in anticipation

of users needs or interests, and access to electronic databases. Provision of information in the manner most useful to its clients is the ultimate test of all a library does.

With the use of CD-Rom databases, users have the following benefits:

- Save time and money by quickly pinpointing the information needed using a variety of simple and advanced search tools.
- Print all and graphics straight from the CD
- Download images (Photographs and line drawings) for use.
- Easily export text into different formats for use in presentations.
- Access to information, enabling you to conduct comprehensive research and analysis.
- Exclusive access to additional reference content.
- The option to browse the information by section, by country or by date, plus an optional word search to narrow your results further.
- Active interlinking allowing navigation via hyperlinks within viewed documents to other related information, thus reducing search time considerably.

Libraries are faced with the challenge of delivering information services in a new context in which information explosion, coupled with technological revolution, are expected to play a key role.

Information and communication technologies (ICT) have brought a lot of conveniences to the library users (Gupta, 1996). As libraries continue to be flooded by more and more electronic resources, future students will become more and more dependent on them (McGeary, 2005).

If a library is considering providing database services to its users, it must understand before making a selection what types of services are available, and it must know how to evaluate both databases and process centers. Any library that has not implemented the use of information technologies to its services is outdated. (Jimba, 1997).

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