

Identification and Evaluation of Software for Microcomputer-Based In-House Databases

Carol Tenopir

One of the most important aspects of creating an in-house database using a microcomputer is the choice of software. There are an increasing number of software packages available that are appropriate for library databases, but the choice of the one that best meets your needs is not always simple. This paper examines the growing literature on the topic to provide help in the identification of microcomputer software for library database applications and to assist in the evaluation process. Appendixes list selected microcomputer software directories and specific software packages.

INTRODUCTION

In-house online databases, created by a library or information center to meet the special information retrieval needs of its clientele, are becoming increasingly popular. These databases serve many purposes. They can replace print versions of such locally created tools as referral directories, indexes to vertical file materials, or abstracts of literature on a specific topic. They can be indexes to special types of materials or collections (e.g., audiovisuals, engineering drawings); full text or abstracts of internal corporate reports; or a central access system for all of the information resources in the information center. What in-house databases have in common is that they are all created with the library's own unique constituency in mind. The databases are created for a given situation and thus tend to be narrowly focused and very patron-oriented. They offer online retrieval to materials that are sometimes accessible nowhere else; allow easy updating of often rapidly changing information; and provide

increased control over all information resources.

Until recently, however, the high costs of hardware made in-house databases out of reach for the small information center. The proliferation of small, powerful, but relatively inexpensive microcomputers since the late 1970s is changing this, and many managers of small libraries or information centers are now creating (or considering) online information retrieval systems for in-house materials.

The creation of an in-house database is not merely a matter of identifying the application and purchasing a microcomputer. Many decisions and plans must be made to create a successful database system, both in conjunction with and independent from the hardware choice. Some of the most important of these decisions relate to software, for poor software can cost information managers and end users more than the cost of the hardware in terms of wasted time, extensive modifications, and frustration. Without good software that is suited to the application, the system will

never perform as it should. Appropriate software is so important that many experts urge potential microcomputer users to first shop for software to meet their needs, then purchase hardware that can run this software.¹

Information managers must decide whether to purchase a prewritten, off-the-shelf software package, lease or purchase a hardware/software turnkey package, write their own programs, or have custom programs written for them. They must be familiar with existing packages in order to see all options open to them. Finally, they must feel comfortable with their ability to evaluate the many choices in order to develop or select the software that best meets their needs.

Unfortunately, no definitive formula for choice of microcomputer software for in-house databases is possible because software choice is ultimately dependent on each individual situation. The literature on the topic is sparse and uneven in quality, and "most reports deal with isolated techniques and system features."² There is a growing body of literature, however, that can provide help in choosing software for the creation of a microcomputer-based in-house database in the information center. This article will review and evaluate that literature, including sections on purchasing versus programming; directories of software; evaluation of software; and sources for software descriptions or reviews. It will not discuss literature that deals only with microcomputer characteristics or choice of hardware, nor will it include most descriptions of specific in-house database applications. Literature from related fields will be included only as it supplements the library literature.

PURCHASE OR PROGRAM

One of the first software decisions that must be made is whether to purchase a prewritten software package, lease or purchase a turnkey system, or create custom programs. Custom-created programs may either be written by the library or data processing department staff or by consultants hired for that purpose.

The debate over whether to purchase or program is not unique to microcomputer systems, but it surfaces repeatedly with mi-

crocomputers because they have been sold as "personal computers" that are especially easy to program and because commercially available microcomputer software has the reputation of being poor.

Until very recently, little microcomputer software for library applications was available, so programming in-house may have been the only alternative. As recently as 1980, the fact that there was little software for libraries and information centers was a real problem in the use of microcomputers in libraries. Pratt said in that year, "There does not seem to be anything presently on the market aimed at libraries. Thus it is necessary for libraries to write, or have written, their own programs for their own purposes."³

Lundeen noted in 1980 that "much of the applications software being marketed for micros is of mediocre quality, and it is often very poorly documented. The librarian eager to use a micro in a library application will usually have to write (or have written) the software to do the job."⁴ Lundeen went on to point out, however, that "the librarian who is contemplating using micros to automate should realize that the programming is not likely to be a trivial task. Software may well cost much more than the system hardware."⁵

Pratt also realized that the complexity of many library applications complicates in-house programming. He believed "it is unlikely that any library would have sufficient in-house capability to develop an adequate system. To have one custom-designed by outside consultants will probably prove more costly than acquiring one of the already available commercial turnkey systems."⁶

In the last year, a growing recognition of the complexity of the in-house database programming task, together with an increase in the number of available software packages and turnkey systems, has led to a swing away from recommending customized programming. In spite of Rowat's fear that "packages suitable for use in libraries will not be developed by the commercial sector until the library and information market is perceived to be one of sufficient coherence and size to warrant the considerable investment needed,"⁷ more and more writers are realizing that "an astonishing

number of companies . . . are now competing frenetically to anticipate and fulfill all conceivable needs of consumers of software," including libraries.⁸ The number of packages suitable for creating in-house databases has grown tremendously in the last year. The introduction of the de facto standard operating system CP/M, together with the availability of standard higher-level languages on microcomputers, has allowed the proliferation of prewritten software packages.⁹

Programs for in-house databases are complex and expensive to develop, making it less advantageous to do in-house development when something good is available commercially. Complicated "total library systems" are compared to home building in *Small Computers in Libraries*.

These total systems are much too elaborate and complex to consider writing them "in-house," at least for libraries that do not have NLM-style budgets. This is not to imply, as some think, that computer programming "is too complicated for librarians". . . . It's not that librarians can't write complex programs, it's that doing so is not their job.

You could build your own home, but hardly anybody does. It's simpler, and probably cheaper, to have somebody else build it.¹⁰

The *Library Systems Newsletter* estimates that programming costs more than 80 percent of the total cost of developing a new system.¹¹ This article cites another disadvantage of doing your own programming or having it written for you—"the customer pays directly for the developer's mistakes. In contrast, when one purchases a software package from an established firm, one normally gets a working product that has already been installed and which can be investigated before purchase."¹²

Rorvig, in his 1982 book *Microcomputers and Libraries*, takes exception to the trend away from in-house programming when he states that "the best way for librarians to get the software they need is to learn BASIC or other languages and then to program functions for themselves. . . . In the final analysis librarians will not receive the applications software of greatest benefit to their institutions unless they themselves learn to program microcomputers. This is not as formidable a task as it might first seem."¹³ These statements are not in tune

with the growing current consensus and were met with an outcry of dissension.

In a review of Rorvig's book, Gordon says that for librarians to write their own application programs is "neither a practical nor financially feasible approach." She points out that "major computer manufacturers . . . spend two thirds of their engineering dollars on software development; and typically 30 percent of a large corporation's total data processing budget is spent on software."¹⁴ Clearly, small libraries cannot afford such an investment.

Schuyler advises that the "expertise needed to program a sophisticated application is quite substantial; the time necessary is considerable." He goes on to warn that "information such as this, written with a tone of authority, may set the reader on the wrong path from which it may be time consuming (and therefore costly) to recover."¹⁵

Even favorable reviews of Rorvig's book by Grosch and by Pratt take exception to his opinion on programming. Grosch advises, "It still is true that a certain class of serious professional users will find that they must do some software development; however many librarians will find an assortment of software to enable them to use their micro as a professional support tool."¹⁶

Pratt warns:

Except under unusual circumstances this [writing your own program] is not a good idea. The writing of a fully debugged and operational system to perform any library task is not something to be undertaken without a strong commitment of resources and time. It is difficult to do, especially by inexperienced programmers. Librarians simply do not have the time to become good programmers in addition to their normal duties.¹⁷

The consensus in the library literature seems to have changed in two years to favor the purchase of existing microcomputer software or turnkey systems rather than developing programs from scratch. This may not always meet every need in all situations, however. Turnkey systems especially allow no local modifications, and the application must be tailored to meet the constraints of the software. A middle ground that combines both options is often desirable.

Modifying an existing software package to meet individual needs may provide the best of both options. Kelley recommends

purchase of "modular software" for applications that are "fairly complex and unique." Modular software is defined as a "program that acts as a tool, enabling someone with very limited programming skills to develop useful programs which are somewhat specific to the user's situation."¹⁸ Database management systems (DBMS) are well-known examples of modular software.

The literature contains many descriptions of DBMS software, including examples of libraries or information centers that have adapted different DBMS programs for the creation of in-house databases. (See, for example, *Small Computers in Libraries*.) The DBMS literature is too extensive to be covered completely in this article, but the adaptation of DBMS for use in libraries is addressed, as DBMS software allows information managers to create customized database systems without having to do extensive programming. There are many commercially available DBMS programs suitable for library/information retrieval applications to varying degrees. Kelley believes a "DBMS program is the most important piece of software one can purchase."¹⁹

Another, more difficult, way to combine prewritten software and customized programming is to purchase a package written in a known programming language and to write additional routines "to layer over the preprogrammed ones."²⁰ The problems with this approach are that the information center must then also be responsible for programming and that modification of an existing program may affect other parts of the program in unexpected ways. Plans for any such modifications should be made cautiously.

If prewritten software is the best option for the creation of microcomputer-based in-house databases, how can information managers find out what is available? Vickery and Brooks saw the need for a directory of available software for use in libraries in 1980.²¹ Even in January 1982, there was "no easy way of discovering what software was available."²² Garoogian calls this a "variation on the familiar library problem of bibliographic control."²³ In the last year, several publications have appeared that help to meet this problem.

SOFTWARE SOURCES

Until 1982 there were no microcomputer software directories targeted to library or information applications, although there were directories of microcomputer software applicable to other special interest areas (notably education and business). Several general microcomputer software directories have had to serve the information manager's needs. Myer's 1982 book includes an annotated list of software directories of all types. Garoogian covers sources for identification of software (pre-1982) in her article in the premiere (February) issue of *Software Review*.

Datapro Directory of Microcomputer Software began publication in 1981. In its section on "Data Management and Database Management," it includes information about DBMS, file management, storage and retrieval, and specialized storage and retrieval software packages. *Small Systems Software and Services Sourcebook* describes more than thirteen hundred small-computer software packages. *International Microcomputer Database* is available online via DIALOG. It is a combined online file that includes the *International Mini-computer Software Directory* and the *International Microcomputer Software Directory* and describes more than ten thousand commercially available software packages. Management Information Corporation, Cherry Hill, New Jersey, publishes an annual survey on small business computers, peripherals, and software.

Many other microcomputer software directories include only programs for a specific type of computer or operating system. (See, for example, *The IBM Personal Computer Software Directory*, Farmingham, Mass., International Management Services, second quarter, 1983.)

Database management system software for microcomputers is included in general DBMS directories, notably *A Buyer's Guide to Data Base Management Systems* (Delran, N.J.: Datapro Research Corp.) and *Datamation* magazine's regular DBMS software surveys. Appendix A lists some general microcomputer software sources.

These general directories include more software packages that are inappropriate

for library applications than are appropriate. They therefore provide an information glut and can be frustrating to use. Recently published directories that are limited to library applications software are briefly reviewed by Tenopir.²⁴ These directories are a welcome addition to the field and will be examined more closely here. Publication information for each is given in appendix A.

Online Micro-Software Guide and Directory: 1983-84 includes descriptions of more than seven hundred microcomputer software packages, ninety of which are database management systems. A chart compares the major features of the most popular DBMS packages, although not enough information is given to allow real evaluation.

Information for each package includes:

- name, address, phone number of company
- contact person
- software name and version and date released
- cost
- applications
- operating environment
- hardware requirements
- documentation (a list and prices but nonevaluative)
- product description (several descriptive sentences)
- where purchased.

The arrangement of the *Online Micro-Software Guide* is alphabetical by company, with indexes by software name and producer. An addendum provides a much-needed index by applications, but an index by operating systems or hardware would be another useful addition.

The arrangement of this directory is straightforward and easy to follow. Four packages are listed on each page with a reduced typescript that keeps the size of the total directory manageable but causes some eyestrain.

A large number of microcomputer software packages are added to the market each month. Supplements to the directory in October 1983 and 1984 include hundreds of these new packages. The microcomputer software market changes so rapidly, however, that a printed publication can never

be up-to-date. The *Online Micro-Software Guide and Directory* is also available online in a BRS as "File Soft."

A nice feature of this directory is the inclusion of nontechnical articles on various aspects of software use and a bibliography of articles on microcomputer software. These additions make this directory more than just a listing of hundreds of packages.

Micro Software Report: Library Edition (Jeanne Nolan) came out in July 1982. This directory contains almost three hundred software packages, approximately sixty of which are DBMS. It does not claim to be selective, so it is difficult to explain why there are four hundred fewer packages in it than in the Online, Inc., directory. One explanation is that the Nolan directory is more focused on the library market; the Online directory contains many general-purpose software packages that might be used in information work. Another reason is that information on packages in the Nolan directory was gathered from printed sources, while Online contacted software vendors directly.

Micro Software Report is arranged alphabetically by software-package name with an index by application. Information for each package includes:

- package name
- producer
- description (one to two sentences)
- equipment requirements
- source of reviews if any
- whether or not the review was favorable
- installations (this element is usually missing)
- price
- address.

Citations for reviews is a nice idea that was expanded in the fall of 1983 with the publication of *Microsoftware Evaluations*. (See "Software Description and Reviews," in this article.) No articles or guides to evaluation are included in the directory.

A 1983 edition of *Micro Software Report* includes many new software packages, additional review citations, an index to software by producer, an index to producers, and an index to software by type of equipment. The new edition is better than the first, since the first seems to have suffered

from the hurry to get it out. Three pages of addenda and errata arrived with the 1982 edition.

The Online and Nolan directories are limited to microcomputer software for information work, but other directories of library/information software also include some microcomputer software. *Directory of Information Management Software: For Libraries, Information Centers, Records Centers* covers only commercially available software packages for the creation of in-house databases. Detailed information on more than fifty packages includes:

- software name
- address and phone number of vendor
- contact person
- hardware and operating system environment
- capabilities and components of the package
- total price based on several typical library scenarios
- sample installations
- evaluative comments.

The information is more comprehensive than that given in the two microcomputer software directories because the scope of this directory is limited to in-house database software. A hardware index allows ready identification of the microcomputer packages. Additional lists of special application software and general-purpose DBMS suitable for information work include only name of package and address and phone number of vendor.

The *UNESCO Inventory of Software Packages*, to be published soon, will contain descriptive and comparative information about many software packages for information work. It will not be limited to microcomputer software, nor will it be limited to software for one type of library application, but it will attempt to be a comprehensive international summary of all software for information work.

Information on software for this directory was solicited from libraries and information centers around the world. Information managers were asked to notify the National Center of Scientific and Technological Information about computer applications in their centers. The information about the software used in their applica-

tions was then verified with the software vendors. Locally developed software, as well as commercially available packages, will be included.

In addition to these directories, several journals have published listings of library applications software. Results of the second annual survey of the library automation market by J. Matthews in the March 15, 1983, *Library Journal* include a directory of all active systems, including microcomputer systems. The October 1982 *Software Review* includes descriptions of five microcomputer packages for library applications. The July 1982 issue of *Program* profiled several British software packages for in-house databases. *Monitor* surveyed interactive online software in April and May 1982. An early issue of the new periodical *Electronic Library* will contain an international directory of mini- and microcomputer software for library and information applications.

Appendix A lists all of these directories and periodicals that will help the information manager identify software packages for the creation of microcomputer-based in-house databases. Other new directories can be expected now that the microcomputer software market is growing so rapidly.

EVALUATION OF SOFTWARE

Software directories allow available packages to be located, but they as yet provide little help in the evaluation of these packages. This is in part because of the lack of critical or evaluative information in the directories, but it is also because, as mentioned earlier, software evaluation is so dependent on individual situations. There is no one best microcomputer software package for every library's in-house database system because "best" will vary with varying needs. However, some general guidelines for software evaluation are applicable to every in-house database.

The literature on evaluation of software for library applications is still sparse, unlike the extensive literature on educational software evaluation. Library and general computing literature does contain enough information to allow formulation of

guidelines, however. In many cases, these guidelines are not unique to microcomputer software selection. Many general principles of selection of automated systems or software evaluation for libraries are applicable to evaluation of software for microcomputer-based databases.

The first step in any software evaluation should be analysis of needs and preparation of general specifications. Tenopir advocates the preparation of formal, written specifications whether or not they are required by the parent organization.

The exercise of identifying the library's needs and determining specifications to meet these needs is the best way to formulate specific questions to be asked, to communicate needs to the vendor, and to ensure that a software package will be able to deliver all the things expected.²⁵

She goes on to outline the things that must be included in the specifications. These include both general and specific library and data processing requirements.

Matthews stresses that each information manager must identify and emphasize "my needs" before thinking about purchasing microcomputer software.²⁶ "These requirements should be written and reviewed by various shareholders in the selection process."²⁷

Emard cautions that the "first, and maybe the most important, thing to remember when you set out on your quest for software is to have your applications (or your problems if you like) firmly in mind—and preferably on paper."²⁸

Blair echoes these feelings when he advocates that "you sit down with your staff and outline several major needs before reading the computer journals or visiting a computer store."²⁹ The questions he suggests answering in the initial phase are:

1. Is there any reason to store retrieval from online database searches?
2. Will editing of reports and other documents be attempted?
3. Are there records that need cross-indexing for retrieval via several keys?
4. Would exchanging files with several other companies be advantageous?
5. To what degree would online accounting and budgeting enhance operations?
6. Do statistics and graphs play a signifi-

cant role in your reporting procedures?

7. Who will be in charge of the application?

General guides to needs analysis and specification writing for library automation projects are also applicable to the purchase of microcomputer software. Matthews' *Choosing an Automated Library System*, Corbin's *Developing Computer-Based Library Systems*, and Boss' *Library Manager's Guide to Automation* are mentioned by Tenopir as some of the sources that can help in this phase.³⁰

When the needs assessment is completed and preliminary specifications have been written, it is time to evaluate how individual software packages meet these needs. Suggested evaluation strategy varies in the literature from the extremely simple to an involved process. Because the requirements of software for in-house databases are complex, the prices are usually higher than other microcomputer software, and because so much staff time is involved in implementing a database system, the evaluation of software for in-house databases should not be overly simplified.

Matthews summarizes possible evaluation techniques for choosing any automated library system. He outlines five possible ways to approach evaluation: subjective judgment, cost-only technique, weighted-scoring technique, cost-effectiveness ratio, and least total cost.³¹

Subjective judgment follows no strategy or set procedure and is not recommended. The cost-only technique also should not be used as it considers only which system has the lowest cost and does not draw distinctions based on priorities of system features. Weighted-scoring allows distinction to be made as to the relative importance of different features, but according to Matthews, "This approach suffers because there is no way to establish a meaningful and understandable relative value among the desired items, and, in addition, there is no way to incorporate the system-life costs for each vendor."³² In an attempt to solve this perceived deficiency, cost-effectiveness ratio divides the total systems cost of each vendor by the sum of the weighted-scoring score. The least total cost technique looks at all present and ongoing costs of each system

and assigns a dollar value to each feature, allowing dollar comparison of all components. No one of these evaluation methodologies is clearly the best way to evaluate software packages. Evaluation should incorporate all of them.

Garogian includes a lengthy discussion on evaluation with many practical examples.³³ Before the product and the vendor are evaluated, she advises examining possible hardware or software constraints. The software must be compatible with the computer and peripherals in use, and possible software constraints such as operating system and programming language must be identified. If these things do not pose a problem in the individual situation, the software characteristics can then be evaluated.

Among the characteristics of the software that should be evaluated are the following:

- How easy is it for users to interact with the program?
- Instruction manuals should allow interaction with the program. If not, will the vendor provide training?
- Do modifications need to be made, and, if so, do they require a programmer?
- Will you receive new versions (releases) of the program as they become available?
- Does the system have expansion capabilities (e.g., modules)?
- Is complete and accurate documentation included?³⁴

Evaluation of the vendor is also important. Gargogian recommends answering the following questions about the vendor in the evaluation process:

- How long has the vendor been in the software business?
- Does the vendor maintain a research and development program directed at the constant enhancement of the product you are considering?
- Does the vendor have an active user group?
- Can the vendor provide references for the companies who use the software you contemplate using?
- Can the vendor offer other packages that interface with the one you want?
- Does the vendor provide technical support?

- Can the software be purchased "on approval"?

- Is there a warranty or some sort of maintenance agreement?³⁵

Tenopir advises formalizing the evaluation process by using some sort of form or checklist to ensure consistency with the weighted-scoring technique. Major areas that should be examined and rated in the evaluation include:

- vendor or producer
- software constraints and flexibility
- query language
- security
- output capabilities
- input capabilities and procedures
- documentation
- training
- hardware constraints
- costs.

Specific concerns to be considered in the evaluation are discussed under each area.³⁶

Datapro Research Corporation includes information on general evaluation of application software in their *Applications Software Solutions*. They too urge use of a standard questionnaire and rating form to ensure consistent evaluation. They break evaluation into a two-stage process—first evaluation on a technique basis, then comparing the "survivors" on a "management basis, including cost, timetable and risk."³⁷

Datapro recommends paying close attention in the evaluation to the following considerations:

1. comparison of the capabilities of the package with user requirements;
2. hardware constraints that may affect use of the package;
3. software constraints such as operating system, compiler;
4. throughput timing, ease of installation, ease of operating, clarity of operating instructions;
5. ease-of-use;
6. maintainability (including documentation, programming language);
7. flexibility of the package in meeting changing needs and growth.

Site visits and benchmark tests or demonstrations are emphasized.

Other authors give hints to help with evaluation of microcomputer software without providing the level of detail in

Caroogian, Tenopir, and Datapro. Kelley urges evaluators to preview the software if possible, look for reviews in computer magazines, and tap the experience of both vendors and professional colleagues.³⁹ *MIS Week* advises securing modification rights and paying careful attention to negotiating performance guarantees.⁴⁰

Blair emphasizes the vendor-user relationship. He says to look for such things as the ability to get software updates, a vendor hot line for customer questions, or a company newsletter. He recommends seeing the package run on a hardware configuration identical to yours if possible (with at least a demonstration) and buying a copy of the documentation before buying the software.⁴¹

Emard stresses building a relationship with the computer store that sells software and evaluating the store just as you would a software package. (This approach will work with general-purpose software, but library-specific packages are generally not sold through the computer stores.) He also discusses at length the importance of documentation, suggesting the following evaluation criteria:

- Is the manual of appreciable length?
- Are there any illustrations and detailed examples?
- Is the documentation organized in a coherent fashion?
- Is there an index?
- Are "cheat sheets" enclosed (i.e., cards that summarize system commands)?
- Is there a glossary?⁴²

Boss also stresses the importance of complete documentation, even with inexpensive packages. He concludes that modifications are difficult to make without good documentation, and new employees can be trained more rapidly if the documentation is good.⁴³

Matthews gives suggestions to help librarians become wise microcomputer-software shoppers. He advises reading the microcomputer literature, but be sure to insist that all jargon be explained by vendors and ask them to show you how desired features work rather than just asking if it can be done. Reading and comparing vendors' literature and software manuals will also help in the evaluation process.⁴⁴

Dowlin believes that "service is the most important element in selecting a system. This service should not only cover hardware repair and maintenance, but should include software assistance and handholding. It is extremely important to have a reliable, *and interested*, local dealer."⁴⁵

Norris and Marincola's "Guidelines for Developing an Online In-house Database through a Commercial Vendor" are also applicable to evaluation of prewritten software or turnkey systems. Under "Selecting a Vendor," they advise comparing:

- cost
- system/software capability
- support mechanisms
- responsiveness
- organizational features
- customer satisfaction.⁴⁶

All of these authors emphasize the importance of the vendor and the documentation—two things that are often overlooked in practice. They also recognize the importance of the opinions of colleagues and users of the packages. Personal contacts at conferences, user groups, and vendor lists of installations are all essential to the evaluation process.

Other recommended evaluation criteria vary but usually include such things as hardware constraints, how the various features of the software meet your needs, expandability, and the opinions expressed in reviews or by colleagues.

Evaluation is not a simple process. It involves time and rigorous application of consistent criteria. Datapro summarizes the problems with evaluation of applications software:

Package evaluation is hard—each package has hundreds, even thousands of features. No two packages are alike, or even close. Each has its strengths and weaknesses. It becomes mind-boggling to compare packages in a rational way.⁴⁷

Rational evaluation is not impossible, however, and can be done successfully if the proper commitment of time is made. If evaluation seems too difficult or time-consuming, it is also possible to get help in this phase. Hayes emphasizes that the "consultant's advice will be of even greater value than ever before, since the array of al-

ternatives will be vastly increased and the complexity of effect upon the library deeper."⁴⁸

There are a growing number of both library and software consultants who can aid in software evaluation. Also, there are now many workshops being offered by SLA, ASIS, graduate library schools, and others on the identification and evaluation of software for in-house databases.

SOFTWARE DESCRIPTIONS AND REVIEWS

Printed descriptions and reviews of specific software packages help in the evaluation process. Several new journals now feature reviews of microcomputer software for in-house databases. (These journals are reviewed by Tenopir and Beisner.)⁴⁹ Two periodicals that are dedicated to microcomputers in libraries often contain descriptions and reviews of software. *Small Computers in Libraries (SCIL)* has been published monthly since 1981. It is in a newsletter format with short software reviews often written by librarians who are using the packages for their own applications. SCIL is up-to-date and easy to read and is especially strong in descriptions of DBMS software adapted to library use. It is a valuable tool in the evaluation of microcomputer software for library applications. *ACCESS: Microcomputers in Libraries* is a quarterly journal that includes articles on software and library applications among its longer subject-oriented articles. Unlike SCIL, it publishes programs as well as software reviews.

Other journals include information about software for database and other library applications for all types and sizes of computers. *Software Review* (v.1, no.1, Feb. 1982) "seeks to provide an overview of software products and the way they can be used in library and educational settings."⁵⁰ Software reviews are lengthy and intermixed with substantive articles on all aspects of library and education software management. The two Online, Inc., magazines, *Online* and *Database*, now often contain descriptive information about microcomputer software. Blair's "Micro Magic" column often features information

on database applications development and software. His columns and articles are consistently well written and easy to understand. Online, Inc., is actively expanding its coverage of microcomputer applications. *Library Hi Tech*, first published in the summer of 1983, includes a column on library software.

Three recent monographs include information about specific software packages for microcomputer-based in-house databases. Grosch's *Minicomputers in Libraries* and Rorvig's *Microcomputers and Libraries* both describe Warner-Eddison's Imagic software, Cuadra Associates' STAR, and the Cooperative Library Agency for Systems and Services' (CLASS) Golden Retriever. (Rorvig's description of Golden Retriever is actually a description of the CLASS serials control package, Checkmate, one of many errors in his text.) Grosch's book is about minicomputer systems but includes these micro packages. Woods and Pope's *Librarian's Guide to Microcomputer Technology and Applications* has information on all types of library applications of microcomputers, including software used in more than four hundred libraries. It includes users' opinions of commercially available microcomputer software. It is also a good source for identifying locally developed software that a library will share with other libraries.

Appendix B lists some of the major microcomputer software packages for the creation of in-house databases as of spring 1983. DBMS not specifically aimed at the information center market are excluded.

Proceedings of the International Online Meeting, National Online Meeting, Online, Inc., yearly meetings, Aslib conferences, and the American Society for Information Science twice-yearly meetings are other fruitful sources for microcomputer software descriptions. Increasingly, traditional library journals such as *Special Libraries* and *Library Journal* carry descriptions of microcomputer database applications.

A publication from Nolan Information Management Services is devoted to evaluations of microcomputer software for information work. *Microsoftware Evaluations* is

a compendium of evaluations solicited from current users of the software. Sample screen displays and printouts highlight the narrative reviews. This new publication should be of great help in the evaluation process.

Two new online databases, BRS/DISC (Data Processing and Information Science Contents) and DIALOG's Microcomputer Index, help with the location of general microcomputer software reviews that have been published in the microcomputer journal literature. Both cover more than thirty microcomputer periodicals.

In addition, there are a growing number of business-oriented services that scan and summarize the microcomputer literature. PrimeStar, for example, offers a monthly printed SDI service that scans most of the micro magazines, in addition to general business sources such as the *Wall Street Journal*, *Business Week*, *Fortune*, etc. *Business Systems Update* includes abstracts and citations to articles about microcomputer business systems, general software solutions, specific business solutions, turnkey systems, outside services, specific business topics, hardware news, and systems software. Articles cover all types of special applications on microcomputers, not just business applications.

Microcomputer Software Letter is another of a growing number of new publications aimed at the microcomputers-in-business market. It provides information on new business-oriented software packages, how to modify prewritten programs, and evaluations of different packages for

the same application. Like PrimeStar's service, *Microcomputer Software Letter* is a synthesis of longer articles found in the microcomputer and business literature.

CONCLUSION

Microcomputers are allowing even small special libraries and information centers to create in-house databases, but the success of the system is very dependent on the software chosen. Thanks to standardization of operating systems, availability of higher-level languages, and a growing software market, many prewritten or turnkey software packages are now available for microcomputer-based in-house database systems. These programs are complex and often more expensive than other microcomputer software. Identification of all possibilities and careful evaluation are thus important steps. Luckily, there are a growing number of consultants, directories, and reviews that can help with both of these steps.

No publication or consultant, however, can create a magic formula to allow information managers to choose the best microcomputer software package. The various new directories can be used to identify software possibilities, but a clear understanding of each situation together with a written set of specifications are necessary in order to use the tools and to evaluate the software packages. Software choice is ultimately a personal and somewhat subjective process, but there is an increasing number of guidelines and aids that can assist in this important decision-making process.

REFERENCES

1. Jeff Pemberton, "Should Your Next Terminal Be a Computer?" *Database* 4:4-6 (Sept. 1981); ———, "The Spread of Microcomputers—Fast and Wide," *Database* 5:6-7 (Aug. 1982); John B. Gordon, "Microcomputer Applications in a Corporate Headquarters Staff Environment," in *Online Micro-Software Guide and Directory, 1983-84* (Weston, Conn.: Online, 1983), p.8-15; John C. Blair, Jr., "Decision Support Systems Software; The Key to Library Microcomputer Operations," in Helen A. Gordon, ed., *Online MicroSoftware Guide and Directory, 1983-84* (Weston, Conn.: Online, 1983), p.3-7; Joseph R. Matthews, "The Automated Library System Marketplace, 1982: Change and More Change!" *Library Journal* 108:547-53 (Mar. 15, 1983).
2. Beatrice Marron and Dennis Fife, "Online Systems—Techniques and Services," *Annual Review of Information Science and Technology* 11:169 (1976).
3. Allan D. Pratt, "The Use of Microcomputers in Libraries," *Journal of Library Automation* 13:13 (Mar. 1980).

4. Gerald Lundeen, "The Role of Microcomputers in Libraries," *Wilson Library Bulletin* 55:184 (Nov. 1980).
5. Ibid.
6. Allan D. Pratt, "Microcomputers as Information Dissemination Tools," in *Communicating Information: Proceedings of the 43rd Annual ASIS Meeting*, V.17, eds. Allen R. Benenfield and Edward John Kazlauskas (White Plains, N.Y.: Knowledge Industry Publications, 1980), p.316.
7. M. J. Rowat, "Microcomputers in Libraries and Information Departments," *Aslib Proceedings* 34:29 (Jan. 1982).
8. Don R. Swanson, "Miracles, Microcomputers, and Librarians," *Library Journal* 107:1057 (June 1, 1982).
9. Rhoda Garoogian, "Pre-written Software: Identification, Evaluation, and Selection," *Software Review* 1:12 (Feb. 1982).
10. "Turnkey Trends," *Small Computers in Libraries* 2:5 (Feb. 1982).
11. "Software for Micros and Minis," *Library Systems Newsletter* 1:14 (Aug. 1981).
12. Ibid.
13. Mark E. Rorvig, *Microcomputers and Libraries: A Guide to Technology, Products and Applications* (White Plains, N.Y.: Knowledge Industry Publications, 1982), p.41, 101.
14. Helen A. Gordon, review of *Microcomputers and Libraries*, by Mark E. Rorvig, *Online* 6:44 (May 1982).
15. Michael R. Schuyler, review of *Microcomputers and Libraries*, by Mark E. Rorvig, *Information Technology and Libraries* 1:308 (Sept. 1982), with a reply from Rorvig: 308-9.
16. Audrey N. Grosch, review of *Microcomputers and Libraries*, by Mark E. Rorvig, *Special Libraries* 74:102 (Jan. 1983).
17. Allan D. Pratt, review of *Microcomputers and Libraries*, by Mark E. Rorvig, *Small Computers in Libraries* 2:6 (Feb. 1982).
18. David Kelley, "Software—What's Available," in Ching-chih Chen and Stacey E. Bressler, eds., *Microcomputers in Libraries* (New York: Neal-Schuman, 1982), p.66.
19. Ibid, p.67.
20. John C. Blair, Jr., "Micros, Minis and Mainframes . . . A Newcomer's Guide to the World of Computers—Especially Micros," *Online* 5:20 (Jan. 1982).
21. A. Vickery and H. Brooks, "Microcomputer, Liberator or Enslaver," *Proceedings of the Fourth International Online Information Meeting* (Oxford, England: Learned Information, 1980), p.394.
22. Rowat, "Microcomputers in Libraries," p.32.
23. Garoogian, "Pre-written Software," p.13.
24. Carol Tenopir, "Software for In-House Databases: Part I, Software Sources," *Library Journal* 108:639-41 (Apr. 1, 1983).
25. ———, "Evaluation of Library Retrieval Software," in *Communicating Information: Proceedings of the 43rd ASIS Annual Meeting*, V.17, eds. Allen R. Benenfield and Edward John Kazlauskas (White Plains, N.Y.: Knowledge Industry Publications, 1980), p.64.
26. Joseph R. Matthews, "Introduction to Micros" (talk given at the Online '82 Conference, Oct. 1982).
27. Matthews, "The Automated Library System Marketplace," p.550.
28. Jean-Paul Emard, "Software Hang-Ups and Glitches: Problems to Be Faced and Overcome," *Online* 6:18 (Jan. 1983).
29. John C. Blair, Jr., "Software Applications Packages and the Role of the Computer Applications Specialist," *Online* 5:65 (Mar. 1982).
30. Carol Tenopir, "Software for In-House Databases: Part II, Evaluation and Choice," *Library Journal* 108: 88 (May 1, 1983).
31. Joseph R. Matthews, *Choosing an Automated Library System: A Planning Guide* (Chicago: American Library Assn., 1980), p.49.
32. Ibid, p.50.
33. Garoogian, "Pre-written Software."
34. Ibid, p.18-20.
35. Ibid, p.20-21.
36. Tenopir, "Software for In-House Databases: Part II."
37. *Datapro Applications Software Solutions* (Delran, N.J.: Datapro Research Corp.), p.106.
38. Ibid, p.105-6.
39. Kelley, "Software," p.71.
40. "Step by Step Method for Software Purchasing," *MIS Week* (Oct. 20, 1982).
41. Blair, "Software Applications Packages," p.69.
42. Emard, "Software Hang-Ups and Glitches," p.20.
43. Richard W. Boss, "Software Documentation," *Software Review* 1:167 (Oct. 1982).
44. Matthews, "The Automated Library System Marketplace," p.550.
45. Kenneth E. Dowlin, "Micro Mag," *Library Journal* 107:237 (Feb. 1, 1982).
46. Carole L. Norris and Diana A. Marincola, "Guidelines for Developing an Online In-House Database through a Commercial Vendor," in *Proceedings of the Third National Online Meeting*, eds. Martha E. Williams and Thomas H. Hogan (Medford,

- N.J.: Learned Information, 1982), p.437-38.
47. *Datapro Applications*. p.103.
48. Robert M. Hayes, "Consulting in Computer Applications to Libraries," *Library Trends* 28:396 (Winter 1980).
49. Tenopir, "Software for In-House Databases: Part I," p.639-41; Karl Beisner, "Microcomputer Periodicals for Libraries," *American Libraries* 14:46 (Jan. 1983).
50. Beisner, p.46.

APPENDIX A. SOFTWARE SOURCES

Directories Specific to Library/Information Applications

The Aslib library maintains a continuously updated list of commercially available software packages for library and information applications. Write to: The Librarian, Aslib, 3 Belgrave Square, London SW1X 8PL, England.

Cibbarelli, Pamela; Tenopir, Carol; and Kazlauskas, Edward, eds. *Directory of Information Management Software: For Libraries, Information Centers, Record Centers*. Studio City, Calif.: Cibbarelli and Associates, Inc., 1983. \$45.

Information on commercially available software for in-house databases.

Gordon, Helen, ed. *Online Micro-Software Guide and Directory*. Westport, Conn.: Online, Inc., 1983. \$40.

Directory and guide to more than seven hundred software packages for all types of information center applications.

Nolan, Jeanne, ed. *Micro Software Report: Library Edition*. Torrance, Calif.: Nolan Management Information Services, 1982. \$49.95. 2d ed., 1983.

Includes descriptions of nearly three hundred microcomputer programs of interest to libraries.

UNESCO *Inventory of Software Packages*. Tel-Aviv, Israel: National Center of Scientific and Technological Information, 1983. (P.O. Box 20215)

International software directory for information work.

General Directories: A Selected List

Auerbach Software Reports. Auerbach Publishers. 2 v. Updated monthly, looseleaf. \$475/year.

A Buyer's Guide to Data Base Management Systems. Delran, N.J.: Datapro Research Corp., 1974-. Updated annually. Selected from *Datapro 70*.

Datamation regularly surveys software packages. Of special interest to information center applications are: May 1982 "Application Software Survey," December 1981 "System Software Survey," and September 1981 "The DBMS Market Is Booming."

Datapro Directory of Microcomputer Software. Delran, N.J.: Datapro Research Corp., 1981-

Datapro Directory of Software. Delran, N.J.: Datapro Research Corp., 1975-. Updated monthly, looseleaf.

Datapro 70. Delran, N.J.: Datapro Research Corp. 3 v. \$755/year. Updated monthly, looseleaf. Guide to hardware and software.

ICP Software Directory. Indianapolis, Ind.: International Computer Programs. Semiannual. 5 v. \$65 per volume.

Minicomputer Software Quarterly. Wayland, Mass.: Applied International Management Services. Quarterly. \$48/year.

Small Systems Software and Services Sourcebook. Available from J. Koolish, Information Sources, Inc., 1807 Glenview Rd., Glenview, IL 60025. \$135; \$125 if prepaid. Describes thirteen hundred packages.

Available online:

International Software Database. DIALOG, file 232.

File Soft, BRS.

Other Useful Sources

Access: Microcomputers in Libraries. P.O. Box 764, Oakridge, OR 97463. Quarterly, \$11/year.

The Electronic Library will devote one issue to a directory of mini- and microcomputer software. Learned Information Ltd., Besselsleigh Rd., Abington, Oxon OX13 6LG, England.

Library Hi Tech. Pierian Press, P.O. Box 1808. Ann Arbor, MI 48106.

Began summer 1983 and includes information on software.

Monitor surveyed interactive online software in April and May 1982. Learned Information, Box 550, Marlton, NJ 08053.

Nolan, Jeanne. *Microsoftware Evaluations*. Torrance, Calif.: Nolan Management Information Services, 1983.

Evaluations of library-oriented microcomputer software by users.

Small Computers in Libraries. Graduate Library

School, College of Education, University of Arizona, 1515 E. First St., Tucson, AZ 85721. \$20/year.

Software Review reviews information applications software. Meckler Publishing, 520 Riverside Ave., Westport, CT 06880.

Available online:

BRS/DISC (Data Processing and Information Science).

Microcomputer Index, DIALOG, file 233.

APPENDIX B. SOFTWARE PACKAGES

GOLDEN RETRIEVER

CLASS, 1415 Koll Circle, Suite 101, San Jose, CA 95112, (408) 289-1756; or Capital Systems Group, Inc., 11301 Rockville Ave., Kensington, MD 20795, (301) 881-9400; or Gaylord, P.O. Box 4901, Syracuse, NY 13221, (800) 448-6160.

Operates on a TRS-80 Model II with three floppy disk drives or a Winchester hard disk and 64K memory. This package has been widely reviewed in the literature and is in use in many libraries. A demonstration disk can be obtained from CLASS for \$50. Software costs for a database of up to forty-five hundred records are under \$2,000.

STAR

Cuadra Associates, Inc., 2001 Wilshire Blvd., Suite 305, Santa Monica, CA 90403, (213) 829-9972.

Operates on an Alpha Micro with a hard disk. It has been described in the library literature and is a powerful and highly regarded software package. It incorporates sophisticated searching features of the large commercial systems and can accommodate large or small databases. Software price is approximately \$20,000.

BRS/Search for Micros

BRS Software Group, 1200 Rte. 7, Latham, NY 12100, (800) 833-4707.

Introduced late last year, this package is a micro/mini version of the powerful BRS/Search software. It runs under the UNIX operating system and currently runs on the Onyx and WICAT microcomputers as well as PDP/11 and VAX minicomputers. Software costs vary with the hardware configuration but are in the \$5,000-\$30,000 range.

INMAGIC

Warner-Eddison Associates, Inc., 186 Alewife

Brook Pky., Cambridge, MA 02138, (617) 661-8124.

A new CP/M micro version of the popular minicomputer software, Version 1 of Inmagic for micros was first available in April of 1983. Version 2 runs on Televideo, Superbrain, and DEC Rainbow micros; a version for the IBM Personal Computer was introduced in the fall of 1983. Cost for version 1 is under \$1,000, plus \$250 for a separate report generator.

Other microcomputer software (mostly in the \$2,000-\$3,000 range) for in-house databases include:

CARD DATALOG

DTI Data Trek, 121 W. E St., 2d floor, Encinitas, CA 92024, (714) 436-5055.

For any microcomputer with CP/M operating system, it is based on the dBase II database management system (DBMS). Also includes acquisitions, circulation, and series modules.

COMPUTER CAT

3005 W. 74th Ave., Westminster, CO 80030, (303) 426-5880.

For Apple II Plus or Bell and Howell computers.

GAYLORD System

Gaylord, P.O. Box 4901, Syracuse, NY 13221, (800) 448-6160.

For Apple II Plus computers; includes acquisitions, circulation, film booking, and the CLASS Checkmate serials system modules.

SCI-MATE

Institute For Scientific Information, 3501 Market St., University City Science Center, Philadelphia, PA 19104, (215) 386-0100.

Personal data management software for IBM-PC, Vector 3 and 4, Apple II, TRS-80 Model II with CP/M-80, \$540. (Universal Online Searcher software \$440, or both for \$880.) ■ ■



NOTICE WARNING CONCERNING COPYRIGHT RESTRICTIONS:

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material. Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement. This institution reserves the right to refuse to accept a copying order if, in its judgment, fulfillment of the order would involve violation of copyright law.