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# Information Technology and Libraries

## September 1987

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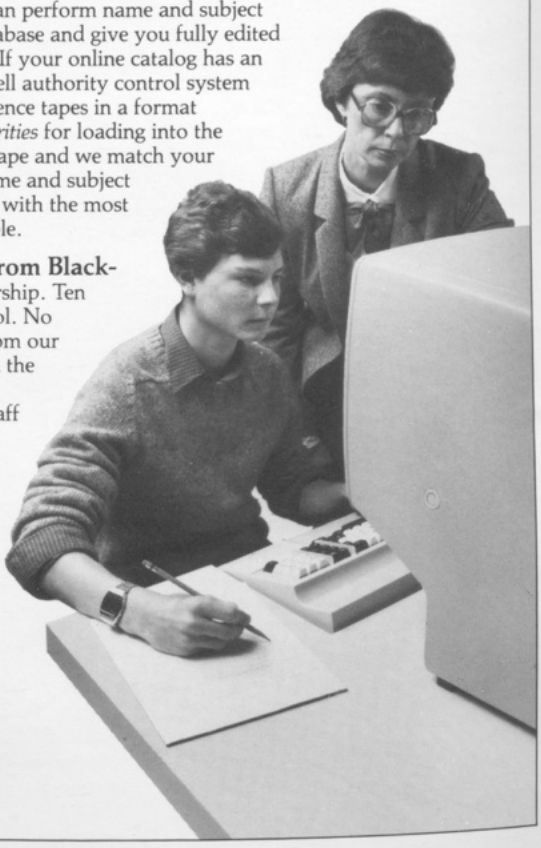

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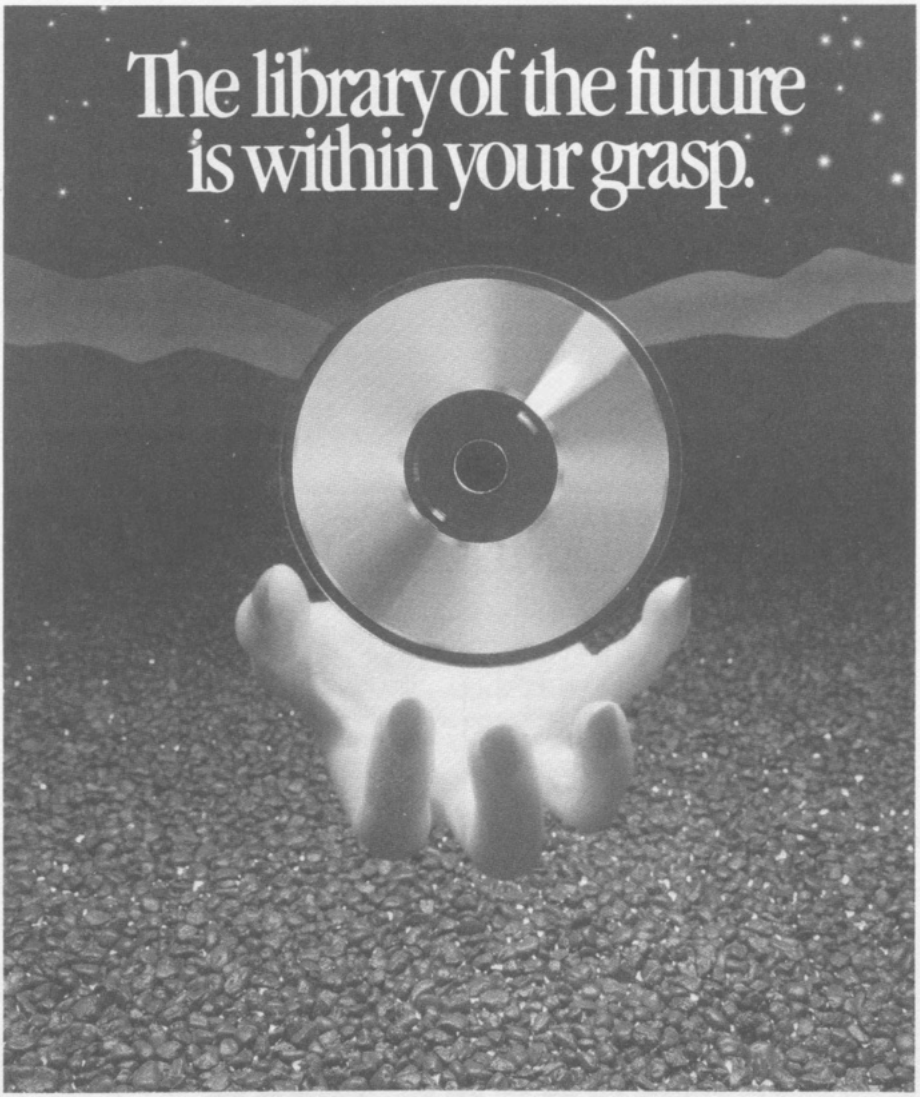

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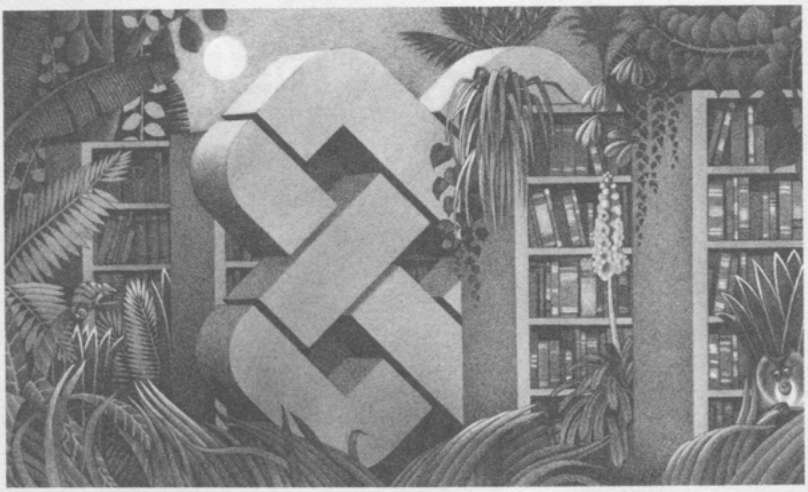

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# Computerized Guides to Journal Selection

**Roy Rada, Joyce Backus, Thomas Giampa, Christina Gibbs, and Subash Goel**

*The selection of documents to be included in an information retrieval system determines many other characteristics of the system. While the factors relevant to the journal selection process remain only partially understood, this paper provides evidence that bibliometric and expert system tools can contribute to the journal selection process. Three studies are presented that take advantage of computer technology to help characterize journals. In one study, authors in highly respected journals are shown to publish more often in other highly respected journals. It is assumed in the second study that the importance of a journal's topic can be related to the universal growth or decline in the number of articles on that topic; the authors try to predict the importance of a journal's topic based on this growth or decline. In the third study, a set of rules was collected from journal selection experts, implemented in a rule-based expert system, and tested. The expert system that is being built could take advantage of the bibliometric data from the first two studies, as well as more direct input from experts.*

## INTRODUCTION

In an Information Retrieval Service (IRS), documents and queries are parsed into some standard form from which matching of document to query can be done.[1] This paper will focus on a few computerized guides to the selection of documents that enter the IRS. There are major practical, often financial but sometimes also technical, limits to which documents any given IRS can hold.[2]

Within the life sciences alone there are several IRSs, and each has its own method of selecting journals. *Chemical Abstracts* tries to be comprehensive within the domain of chemistry. *BIOSIS* and *Excerpta Medica* have staff members who survey the available documents and make choices based on loosely defined criteria. The number of subscriptions, or circulation, of a journal is a factor in some decisions, and the elusive notion of quality is important.[3] The Institute for Scientific Information applies its expertise in citation analysis to defining important journals as those that are frequently cited,[4] but a host of other document selection criteria is also taken into account.[5]

A variety of quantitative tools has been used in the determination of journal quality.[6] Citation analysis has been repeatedly

Roy Rada is Editor, *Index Medicus*, National Library of Medicine, and Joyce Backus is with the Public Services Division of the National Library of Medicine. Thomas Giampa, Christina Gibbs, and Subash Goel are all with the Department of Electrical Engineering and Computer Science at George Washington University.

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recommended as a tool for journal selection.[7,8] One analysis of documents notes that the appearance of a colon (:) in the title of a document suggests scholarly content.[9] Some argue that bibliometric tools are inadequate for journal selection and that the complexity of the selection task necessitates the direct input of experts.[10] Nevertheless, even in the interpretation of expert input, quantitative or statistical methods may be invaluable.[11]

In this paper, the difficult problem of defining journal importance is partially circumvented by assuming that the journals in *Abridged Index Medicus (AIM)* are, in general, "more important" than journals only in *Index Medicus*. Patterns of publication by authors will be investigated as a predictor of a journal's *AIM* quality. The frequency with which authors publish will be shown to be, in and of itself, an unreliable barometer of such quality; but when frequency is further decomposed so as to indicate the types of sources in which an author publishes, it then proves remarkably suggestive of the *AIM* quality of the journals in which the author publishes.

This paper also explores patterns of index terms for articles in journals. The hypothesis was that desirable journals would be indexed into topics whose frequency of usage was growing worldwide. The experiment with the index terms at the National Library of Medicine was not able to support this hypothesis.

An attempt to understand further what factors are important in journal selection has led to the design of an expert system, which incorporates some of the heuristics that experts use when evaluating journals. It allows for input from programs that make bibliometric assessments of journals but largely relies on the human evaluation of certain journal features.

While common guidelines to journal selection might include citation impact factors or library usage data, the experiments described in this paper relied on information from the National Library of Medicine's online system and from its journal selection experts. These experiments are not meant to be comprehensive of the tools that could be important in journal selection. Nevertheless, the results are interesting in and of themselves, and efforts to harness more information to support journal selection decisions are continuing.

## *INDEX MEDICUS*

### History of Journal Selection

*Index Medicus (IM)* is an index to the biomedical literature published monthly by the National Library of Medicine (NLM);[12] decisions regarding the content of *IM* have always been an NLM concern. With a few exceptions, until 1964 journal selection decisions were made by one person, usually the head of the Indexing Section, but efforts were continually made to provide some rationale for the inclusion or exclusion of articles. The issue of for whom the library was indexing was also raised, especially as it concerned journals devoted to didactic presentations or case reports. Attempts were made to suggest guidelines or criteria that could be considered when selecting articles; however, these attempts usually reiterated a concern with the inclusion of *quality* articles (without defining *quality*) and admonishments as to what should not be indexed.[13]

In 1964, due to the recognized impact of *IM* on the selection of journals for acquisition by other medical libraries and the need to select quality titles as well as to maintain a good subject balance, an ad hoc panel was charged with a review of titles owned by NLM. The review was guided by the following criteria for journal selection:

1. Sponsorship by a professional organization of recognized status in a given discipline or subject area.
2. Sponsorship by a national academy or institute.
3. Existence of an active editorial board consisting of knowledgeable and critical referees with high professional standing.
4. Regular contributions by leaders in the subjects to which the journals address themselves.
5. Strict adherence to an established format in presentation of methodology, tables, graphs, references, and other data.
6. Publication policy that prohibits promotional, parochial, or secular approaches.[14]

Currently, NLM employs the services of experts, who apply criteria like those listed above in evaluating journals.

Of the more than 2,700 journal titles covered in *IM*, 117 are additionally represented in AIM. The introduction to *AIM* states that:

> The selection of the journals was made by the Library with guidance from a group of consultants consisting of physicians, medical editors, and medical librarians. Consideration was given to the quality of the journals, usefulness of journal content for the medical practitioner, and the need for providing coverage of all fields of clinical medicine.[15]

*AIM* journals are meant to be a subset of the best clinical, all-English, commonly available *IM* journals. This definition will be examined further in another section.

### MeSH and MEDLARS

MEDLARS is the term used to encompass some twenty bibliographic databases produced by NLM; *MEDLINE* is the specific database of journal articles largely covered by *IM*. Each article in *MEDLINE* is indexed by assigning terms from the Medical Subject Headings (MeSH), which exists primarily to link semantically related terms and to provide sufficient hierarchical structure to allow the conduct of generic searches.[16] MeSH has about 14,000 terms in an eight-level tree, where nodes are biomedical terms and edges represent "broader than" relationships. Millions of documents have been encoded into MeSH; thousands of queries encoded into MeSH reach MEDLARS each day from users around the world.

## PATTERNS OF PUBLISHING

### Frequency and Distribution

The popular dictum in academia is "publish or perish."[17] By implication the authors best fit to survive in academia are those who publish the most. Extending this notion to the assessment of journals, one might expect that the "more important" a journal, the more frequently the authors in it publish. To test the hypothesis, "the more important a journal, the more frequently its authors publish," both

1. the notion of "importance" and
2. author publication frequency

need to be defined.

A sample of journals from *AIM* was compared to a sample from *IM*. Each journal in *IM* (and thus also *AIM*) is classified by NLM into one or two topics from a set of 179 major topics in MeSH. The experiment first involved arbitrarily selecting four topics in the area of clinical medicine from this list, since AIM focuses on clinical medicine. The four topics were (1) Surgery, (2) Medicine, (3) Pediatrics, and (4) Pathology. Two to four journals were then randomly selected from *AIM* and from *IM* for each of the four topic areas (see figure 1).

For each journal, ten articles were randomly selected, and then the frequency with which the first author of each article published (that author's postings frequency) was determined through a query to *MEDLINE*. The collection of data for the four topics shows the average number of articles per author in *MEDLINE* to be 10.6 for *AIM* journals and 8.56 for *IM* journals (see figure 2). The difference is not statistically significant, and the frequency of author publication is not directly correlated with whether the author publishes in a journal indexed for *IM* or *AIM*.

While *AIM* and *IM* authors publish with similar frequencies, *AIM* journals are generally better known, and therefore some authors would rather publish papers in an *AIM* journal. The next hypothesis is that authors in *AIM* journals publish more often in other *AIM* journals, than authors in *IM* journals publish in *AIM* journals. Recall that both sets of journals were on the same clinical topics. Among authors in *AIM* journals, the average number of articles published in *AIM* journals is 4.74, while that average is 5.86 in non-*AIM* journals (see figure 2). On the other hand, among authors in non-*AIM* journals, the average number of articles in *AIM* journals is 1.04, while the average is 7.52 in *IM* journals. The ratios of these averages is consistent with the preceding hypothesis. The extent to which an author in an *AIM* journal publishes in *AIM* journals is, in general, much greater than the extent to which an author in an *IM* journal publishes in *AIM* journals.

### Journal Features Further Examined

In the preceding section *AIM* journals were compared to clinical *IM* journals. The

| Surgery | |
|---|---|
| *AIM* | *IM* |
| *Amer Jr Surgery* | *Canadian Jr Surgery* |
| *British Jr Surgery* | *ACTA Chirurgica Belgica* |
| *Archives Surgery* | *ACTA Chirurgica Jugoslavica* |

| Medicine | |
|---|---|
| *AIM* | *IM* |
| *Amer Jr Medical Sciences* | *Boletin Asociacion Medica Puerto Rico* |
| *New England Jr Med* | *Primary Care Clinics Office Practice* |
| *Jr Clinical Investigation* | |

| Pediatrics | |
|---|---|
| *AIM* | *IM* |
| *Amer Jr Diseases Children* | *European Jr Pediatrics* |
| *Jr Pediatrics* | *Indian Jr Pediatrics* |

| Pathology | |
|---|---|
| *AIM* | *IM* |
| *Amer Jr Pathology* | *ACTA Pathologica Japonica* |
| *Archives Pathology & Laboratory Med* | *Amer Jr Forensic Med Pathology* |
| | *Applied Pathology* |
| | *Pathology Research & Practice* |

*AIM* means *Abridged Index Medicus*, and *IM* means *Index Medicus*

*Fig. 1. List of Journals Used in Study of Author Publication Patterns.*

introduction to *AIM* states that "Each issue contains citations from 117 English-language journals, representing a subset of one month's input into the National Library of Medicine's computer-based MEDLARS (Medical Literature Analysis and Retrieval System)."[18] This bias toward English-language journals can also be addressed. Of the twenty-one journals previously examined, all but three are published entirely in English; furthermore, in two of those three journals about half the articles are written in English. Nevertheless, if the data from the above three journals are entirely excluded from this study and the analysis reperformed, the conclusions are the same. In other words, when restricted to exclusively English-language journals, the authors in *AIM* journals still have a significantly higher ratio of *AIM/IM* publications than do those in *IM* journals.

*AIM* also states that "In some fields, where there are more high-quality journals than could be included in the bibliography, consideration was given to the availability of the journals to the American practitioner."[19] Availability is directly proportional to journal circulation. To further constrain the sample of *IM* journals so as to better match the selection criteria for *AIM*:

1. Journals that were under the topics Medicine and Pathology and pub-

| *AIM* Journals | | | |
|---|---|---|---|
| Field | Postings | | |
| | *AIM* | *IM* | Total |
| Surgery | 142 | 113 | 255 |
| Medicine | 169 | 104 | 273 |
| Pediatrics | 62 | 91 | 153 |
| Pathology | 101 | 278 | 379 |
| TOTAL | 474 | 586 | 1060 |
| articles per author | 4.74 | 5.86 | 10.60 |

| *IM* Journals | | | |
|---|---|---|---|
| Field | Postings | | |
| | *AIM* | *IM* | Total |
| Surgery | 19 | 127 | 146 |
| Medicine | 52 | 181 | 233 |
| Pediatrics | 10 | 96 | 106 |
| Pathology | 33 | 424 | 457 |
| TOTAL | 114 | 828 | 942 |
| articles per author | 1.04 | 7.52 | 8.56 |

The *t* value shows no significant difference between the 1,060 total postings originating with *AIM* authors and the 944 total postings originating with *IM* authors. However, the difference in where the authors publish is significant, as the difference in *AIM* postings (474 and 114) is significant.

*Fig. 2. The Data for* AIM *and* IM *Journals in Four Fields Is Summarized.*

lished in the United States were selected from the *List of Journals Indexed in Index Medicus.*[20]

2. Those journals for which a circulation value was available in *Ulrich's International Periodicals Directory*[21] were compared.

Examination of the circulation data for these *AIM* and *IM* journals showed a much larger circulation for *AIM* journals.

*IM* journals published in the United States and with circulations higher than at least one of the *AIM* journals on the same topic were studied next. The difference is small between the number of *AIM* publications by authors from *AIM* journals and the number of *AIM* publications by authors from high-circulation *IM* journals (see figure 3). In this study, the *AIM* journal authors had an average of 5.40 papers in *AIM* journals, while the high-circulation *IM* journal authors had an average of 5.55 papers in *AIM* journals.

To further explore the relationship between author publication patterns and journal circulation, four low-circulation *IM* journals published in the United States were selected; in these journals, authors published on the average only 0.75 papers in *AIM* journals (see figure 3). Authors in high-circulation *IM* journals published an average of 5.55 papers in *AIM* journals, while authors in low-circulation journals published only 0.75 papers in them. The *AIM* authors themselves averaged 5.40 papers in *AIM* journals. These results suggest that further study of the relationships between *AIM* journals and journal circulation would be worthwhile.

| *AIM* Journals | | | |
|---|---|---|---|
| Journal Name | Postings | | |
| | *AIM* | *IM* | Total |
| *Amer Jr Medical Sciences* | 69 | 41 | 110 |
| *New England Jr Med* | 37 | 20 | 57 |
| *Jr Clinical Investigation* | 63 | 43 | 106 |
| *Amer Jr Pathol* | 48 | 223 | 271 |
| *Archives Pathol & Laboratory Med* | 53 | 55 | 108 |
| TOTAL | 270 | 382 | 652 |
| articles per author | 5.40 | 7.64 | 13.04 |

| *IM* High-Circulation Journals | | | |
|---|---|---|---|
| Journal Name | Postings | | |
| | *AIM* | *IM* | Total |
| *Cleveland Clinic Quarterly* | 16 | 43 | 59 |
| *Clinical Symposia* | 35 | 104 | 139 |
| *Amer Jr Surg Pathol* | 76 | 83 | 159 |
| *Laboratory Investigation* | 95 | 198 | 293 |
| TOTAL | 222 | 428 | 650 |
| articles per author | 5.55 | 10.70 | 16.25 |

| *IM* Low-Circulation Journals | | | |
|---|---|---|---|
| Journal Name | Postings | | |
| | *AIM* | *IM* | Total |
| *Comput Biology Med* | 0 | 26 | 26 |
| *Delaware Medical Journal* | 6 | 21 | 27 |
| *Pediatric Pathol* | 19 | 93 | 112 |
| *Amer Jr Forensic Med Pathol* | 5 | 43 | 48 |
| TOTAL | 30 | 183 | 213 |
| articles per author | 0.75 | 4.57 | 5.32 |

The average number of *AIM* papers per author from *AIM* journals is 5.40; from high-circulation *IM* journals, 5.55; and from low-circulation *IM* journals, 0.75.

*Fig. 3.* AIM *Journals Contrasted with High- and Low-Circulation* IM *Journals.*

## TOPIC PATTERNS AND COVERAGE

As a field grows in importance one might expect that the number of articles describing it would grow and that the MeSH terms describing it would be used more often in MEDLARS. An experiment that examined the genetics terminology in MeSH supported this suspicion. Terms in the molecular genetics subtree, such as *oncogenes*, have recently increased dramatically in usage, while terms concerning traditional population genetics have not. This is consistent with the growing interest in molecular genetics. How could one take advantage of this information from patterns of MeSH terms over time to help determine the importance of a journal's topic area? The following hypothesis is advanced: Journals that are perceived as important by journal selection experts have articles associated with MeSH terms of increasing usage. To test this hypothesis four journals were chosen from *IM* and rated by NLM consultants.

In determining whether a journal was associated with MeSH terms of increasing usage, an algorithm was used to collect data. The algorithm went through several loops in the course of collecting about 1,200 data points. This involved not only four journals, five randomly chosen articles in each journal, and all the MeSH terms used to index each article (about ten MeSH terms per article) but also reference to each of six files in *MEDLINE* (1983 to present, 1980–82, 1977–81, 1975–76, 1971–74, 1966–70). The growth of a term across files was defined, and then the growth for a journal across files was defined. The data collection and analysis showed that the journals of growing importance according to the growth of MeSH terms were not the same journals that the experts said were important.

The lack of support for the hypothesis, that journals perceived as important by journal selection experts have articles associated with MeSH terms of increasing usage, prompted a closer look at the usage patterns of MeSH terms in indexing. As an area of science grows in research interest, so does the occurrence of the terminology of that research area.[22] The hypothesis to be advanced here says that this same trend occurs with indexing terms. As an area of medical research becomes popular, the MeSH terms in that area become more frequently posted or used by indexers to characterize articles in MEDLARS. As an area of the vocabulary becomes more frequently used, concepts that have no appropriate index terms within the current thesaurus may appear. More specific terms should then be added as the broader terms acquire more and more postings.[23]

The first examination of the vocabulary involved random identification of 15 terms from MeSH and another 15 from the list of 147 new terms added to MeSH in 1986. The "broader than" terms for each of these 30 terms were obtained; the average number of postings for each group of "broader than" or parent terms in *MEDLINE* was determined. The difference between the averages was not significant statistically. Based on this sample, the new terms were not necessarily added under "broader than" terms that have a significantly higher number of postings than other terms in the thesaurus.

The next characteristic examined was the number of postings for a cluster of terms related to a sample of existing terms and one of new terms. These clusters consisted of all the "broader than" and "narrower than" terms of the selected term. The hypothesis that terms were added to areas of increased research interest suggested that the postings for an entire cluster increase in a way that corresponds to the addition of terms to MeSH. The total postings for the clusters of five randomly selected existing terms and five randomly selected new terms were extracted. Again, there was no statistically significant difference between the average number of postings for an existing term's cluster and the number of postings for the cluster of a newly added term. In the third experiment, the postings frequencies of the same terms examined in the previous experiment were now also plotted across time. There was no significant difference between the change over time in "broader than" versions of new terms and other terms.

The above study tried to show that patterns of increasing usage of MeSH terms in-

dicate the growth of interest in certain areas of biomedicine. The examination focused on the relationship between terms newly added to MeSH and the postings frequency of terms closely related to it. The negative results of the experiments suggest that the methods by which sections of MeSH are chosen to be augmented do not take into account the usage patterns of existing MeSH terms in those sections. The difficulty of finding patterns in MeSH postings frequencies suggests that MeSH-related data will not be useful in evaluating journals for selection.

## EXPERT SYSTEM

### Framework

The knowledge about journals seems to break into two types: facts and opinions. The facts include such things as the language of the articles and the sponsor of the journal and could be gathered from inspection of the journal. Harder to ascertain are things such as the reputation of the authors and publishers and whether the case reports provide enough cases to show trends. These qualities require experienced judgement.

Transferring the human expert's years of experience in scientific journal selection into a symbolic form that a computer could manipulate would be a knowledge engineering task; a program that embodies some of that expertise is the topic of this section. The computer's performance can then be evaluated to see how closely its "opinion" conforms to the expert's opinion. An iterative cycle of refining the program's knowledge and evaluating its performance is begun. In this way, useful expert system programs have been developed, although not for journal selection.[24]

One way to evaluate the qualities of a journal would be to grade it on some scale, say 1 to 100. Then rules of thumb could be arrived at experientially: if the composition of the journal scores above 70 and the authors of the journal score an 80, then the journal is given a 77. This leads to creating a system of rules that could be applied to the evaluation of a journal. A major reason for writing rule-based expert systems is that human experts usually find it intuitively appealing to express their domain knowledge in terms of rules.[25]

Rule-based systems for solving problems are built around rules that have an "if" part and a "then" part:

*If* condition$_1$ and . . . and condition$_n$
*Then* action$_1$ and . . . and action$_m$.

A rule is said to be triggered when all its conditions are satisfied by data in the working memory; the triggering of the rules is controlled by the inference engine. A rule is said to be fired when its "actions" have been performed. To build the Journal Expert Selector (JES), a software tool called OPS5 was chosen. This tool has been used to develop large expert systems that help configure computer orders and is the subject of a textbook.[26]

To properly construct an expert system one typically needs to work closely with the domain experts; in this case, the NLM journal selection experts helped develop rules meant to capture their expertise. One critical step is to choose conditions that occupy the "if" part of the rules. The main conditions for JES are divided into four groups (see figure 4):

1. composition of journal,
2. producers of journal,
3. information in articles, and
4. authors of articles.

### Implementation and Evaluation

The control strategy invoked in JES takes the value of the first clause of each rule into account during a conflict resolution stage that allows the programmer to group the rules effectively. There are also certainty factor calculations made with each rule: the total certainty for any one journal cannot exceed 1.0. Each group of rules (one for each of the four groups above) can make a maximum contribution of 0.25 to the value of a journal. Before a rule can fire, a certainty has to be associated with each condition in its "if" part (a *yes* answer to a question is translated into a certainty of 1, a *no* into a 0). Each rule has an attenuation factor that dictates how much the "if" part should influence the "then" part. The majority of rules (see figure 5) take evidence directly from the human expert ("the journal has a quality editorial board" or "the authors are recognized in their field") and make a conclusion about a particular context, such as "producers value multiplied by attenuation of 0.25." Some rules (see fig-

**Questions to be Asked for Each Journal, Grouped by Category**

1. Composition of journal
   a. articles submitted for peer review? (yes-no)
   b. language of articles? (English, non-English, both)
   c. does author provide English abstract? (yes-no)
   d. circulation open to public? (yes-no)
   e. does the format adhere to acceptable standards regarding tables, references, quality of photographs, organization of papers? (0–1)
2. Producers of journal
   a. journal affiliated with a major professional organization, national academy, or institute? (0–1)
   b. editorial board composed of recognized professionals? (0–1)
   c. publisher has reputation for producing quality journals? (0–1)
   d. sponsored by a drug company or other commercial enterprise? (yes-no)
3. Articles contain significant information
   a. scientific papers convey the results of original experiments? (0–1)
   b. case reports provide enough cases to show trends? (0–1)
   c. reviews synthesize the literature on a topic? (0–1)
   d. references pertinent? (0–1)
4. Authors of articles
   a. authors affiliated with recognized institutions? (0–1)
   b. authors recognized in their fields? (0–1)
   c. authors have appropriate formal training? (0–1)

The value in parenthesis indicates whether a numeric score between 0 and 1 should be assigned to the question or whether a restricted symbolic answer, such as yes-no, should be made.

*Fig. 4. Features That Must Be Collected from a Person before the Expert System JES Can Run in Forward-Chaining Mode.*

ure 5), however, operate exclusively on the conclusions of other rules, such as the one that sums the conclusions from rules in the four contexts and prints the results on the screen. JES contains thirty rules that are grouped into related tasks or contexts, each of which acts on one particular part of the overall problem. In operational mode, an expert would interact with JES and indicate the degree of belief in each particular journal attribute.

To test the meaningfulness of JES, several tests were run on fictitious journals. The three journals ($J_1$, $J_2$, and $J_3$) in the first test were designed to see the effect on the final certainty factors of journals with high, low, and medium scores. All the attributes of $J_1$ had high scores; $J_2$ had medium scores in all categories; and $J_3$, low scores in all categories. JES recommended acceptance of $J_1$, rejected $J_3$, and deferred action on $J_2$ until more information could be found.

The fictitious journals ($J_4$, $J_5$, $J_6$) in the second test were designed as follows:

$J_4$—low scores in the "articles quality" category but high scores in all other categories,

$J_5$—unknown values in half of the features, and

$J_6$—high scores in the "articles quality" category but low scores in all other categories.

All three journals were placed on hold by JES for lack of conclusive information. The results showed that low scores in one group could offset high scores in all others and, conversely, one set of high scores can save a journal from rejection. Several other tests done on other fictitious journals basically supported the ability of JES to do what it was expected to do. The attenuation factors on rules need refinement, but amending these factors in JES rules should be straightforward.[27]

## DISCUSSION

The document selection process is a crucial one. The current mechanism for selecting journals for indexing at the NLM relies heavily on input from a small group of phy-

```
IF
        there is a goal to evaluate the composition and
        the journal is peer reviewed and
        the circulation is open to the public and
        the language is English

THEN
        make a fact class object of type composition with attenuation=0.14.
```

```
IF
        there is a goal to evaluate the producers of a journal and
        the journal has a quality editorial board and
        the journal is not sponsored by a commercial enterprise

THEN
        make a fact class object of type producers with attenuation=0.25
```

```
IF
        there is a fact named authors and
        there is a fact named articles and
        there is a fact named producers and
        there is a fact named composition

THEN
        add the four certainty factors and
        write on the terminal the name of the journal and its score and
        remove the four facts from working memory.
```

The first two apply directly to the evidence from the expert for each journal, while the third is a rule that operates on the results from other rules.

*Fig. 5. Three Sample Rules for JES.*

sicians and librarians. A variety of changes to the mechanism are being considered, and this study reflects some of the effort toward exploring the role that the computer might play as an assistant. Two basic modes of computer assistance have been considered: bibliometric and knowledge-based; both methods have shown some promise. The extent to which they will or will not become part of the normal operation remains to be seen. In the meantime, a number of interesting questions have been raised and some answered in the course of this study.

One of the most popular bibliometric tools is citation analysis. Although MEDLARS does not store the references made by the articles it covers, it does include the author names, journal name, and MeSH keywords for each of five million

journal articles. The bibliometric studies done here take advantage of this information in MEDLARS. To say whether one journal is better or worse than another for a particular audience, it is necessary to have a measure of quality. For the purposes of this paper, *AIM* has been taken as the arbiter of quality: *AIM* strives to cover a limited number of the best, clinical, English-language journals that are readily available.

From the journals in *IM* and *AIM* on four clinical topics, twenty-one were arbitrarily selected. There was no significant difference in the total number of papers cited in *MEDLINE* for authors from either the *IM* or *AIM* sample, but the places that an author published followed a clear pattern. *AIM* authors published more often in *AIM* journals, while *IM* authors appeared more often in *IM* journals that are not in *AIM*. When the *IM* sample was restricted to English-language journals, the results remained the same. However, the authors in certain, high-circulation *IM* journals proved to have similar publication patterns to the authors in *AIM* journals.

While author publication patterns might relate to journal quality, the librarian choosing journals must also make decisions about other questions, such as which topics are of growing and of declining importance. To help answer such questions, usage patterns of MeSH terms were examined. As a topic—e.g., molecular genetics—grows in importance, one would expect that the frequency of usage of those MeSH terms in MEDLARS would increase. Likewise, journals that focused on topics that were indexed into MeSH terms of rapidly growing usage might be expected to be journals in areas of importance. Attempts to experimentally support this expectation were unsuccessful. Subsequent analyses of these results and the MeSH history have shown that, in fact, there are so many idiosyncratic reasons for changes to MeSH that it cannot be relied upon as a fine indicator of changes in the focus of biomedical science.

The new tools offered by artificial intelligence in the form of expert systems may be viable aids to the journal selection process. Accordingly, a lengthy dialog with the experts was undertaken by those familiar with expert systems technology. A set of rules was devised and tested, and the expert system performed reasonably well as a first prototype. The experts themselves were, however, generally reluctant to accept the possibility of any formal codification of their knowledge. This view is typical in situations where the experts have long practiced an art without needing to justify in detail the decisions rendered during that practice. The expert system would need more rules and a delicate adjustment of the attenuation factors on each rule before it could be useful in practice. This is one of the focuses of future work by this group. In particular, a learning program developed for another expert system[28] is being applied to rules developed for journal selection. If the bibliometric tools could be adequately refined, they might serve as one of the sources of input to the expert system.

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# Behind Bars in the Library: Northwestern University's Bar Code Project

**Helen H. Spalding, Rolf H. Erickson, and Bruce A. Miller**

When Northwestern University Library made the decision to implement the NOTIS 4 Circulation System and switch from the use of punched book cards to bar-coded labels, a linked series of decisions were made about which collections to bar code and how the labels should be applied.

## WHAT SHOULD BE LABELED AND HOW?

In analyzing where costs could be cut or delayed in the labeling process, top priority for labeling was placed on those collections with the heaviest circulation; they totalled 1.3 million items.

A quick telephone survey revealed that staff in other libraries who had bar coded their collections had applied up to seventy-five bar codes, per hour, per person. However, many of these libraries had applied "dumb" labels (without call numbers) to each book and, at the point of checkout, created the item record and noted its bar code number. Application of "smart" labels (with call numbers) would take much more time. Staff would need to examine the call number on the label and carefully match it to the call number of the book on the shelf. The possibility of similar call numbers, mismarked spines, and books that were misshelved or missing from the shelves would increase the need for attention to detail when applying preassigned labels.

After simulating a matching procedure, a standard of sixty labels per hour per person was used to estimate the personnel time needed to bar code the most heavily used collections. The total time required—25,000 person hours—was clearly an impossible task (with limited funds) if help had to be hired.

The goal was to label the collections, using the time of the existing staff as little as possible, and to maintain the collections' availability for use. Closing the library for the duration of the project was not an option. Moreover, it was humanly impossible for any person to match bar codes to books with any degree of accuracy for more than two hours at a time and more than four hours a day. Scheduling a half-day of each staff member's time for the project every day would have required two months and hampered library services.

So it was decided to hire work-study program students, using a $20,000 university appropriation, for about 5,000 person hours of labeling and to ask library staff to work three two-hour shifts a week for five weeks. This would provide the needed hours. The balance of work would be done by Circulation staff as time was available.

Recognizing the potential for damaging the staff morale under these circumstances, certain parameters were established for the use of staff. It was agreed that all levels of staff had to participate and that it would be important for the project to be viewed as a university library *team* project. Support staff would be working side by side with librarians and administrators, and no segment of the staff would be singled out for

Helen H. Spalding is Associate Director of Libraries, University of Missouri–Kansas City; Rolf H. Erickson is Head, Circulation Department, Northwestern University Library; and Bruce A. Miller is with NOTIS.

the less desirable tasks.

To support this positive team effort, the participating staff would need to be numerous enough to make considerable progress toward the project's goal, but there should not be so many people that they could not be given meaningful work, nor should they fall hopelessly behind in regular assignments. The Music and Science/Engineering libraries' staffs would be exempt from the central project in the Main library and asked to bar code their own collections on their own schedules.

Once the staffing of the project had been decided upon, planning proceeded rapidly. Press releases, staff announcements, and advertisements for student employees were drafted. Recognizing that the bar coders would make noise, the planned publicity included information intended to prepare the university community for some unavoidable inconveniences.

It was found that teams of two were able to work more efficiently than persons working alone. A team averaged four bar code labels a minute, double the budgeted rate; but the project's estimate of two per minute was not revised, in order to allow for slower workers, difficult shelving areas, and quality control. To be sure that the bar code label was matched to the correct book, one team member would be asked to read aloud the call number on the book spine, while the other member selected the correct label, read the call number in response, and applied it to the book.

It was further agreed that thorough planning, training, and supervision would make the disruption in the staffs' schedules easier for both the staff and students who would be bar coding. A slide presentation illustrating the procedures and anticipated problems one might find on the shelves was prepared. Extra footstools were ordered so that reading and reaching the top shelves would be easier. Progress in stack sections would be charted by coloring in an 8-foot-long "thermometer" and enlarged library floor plans. Announcements of the progress would also be published in the library staff newsletter. Supervisors, with various supplies—such as tissue, premoistened wipes for cleaning hands, and colored flags identifying problem categories—would be present in any area being bar coded to answer questions and offer encouragement.

Two-hour shifts were scheduled Monday through Saturday at 9–11 a.m., 11 a.m.–1 p.m., 1–3 p.m., and 3–5 p.m. and Sunday, 1–3 and 3–5 p.m. It was estimated that up to sixteen teams could work in one section of the library without running into each other and that if only one section at a time was bar coded, the disruption for patrons would be contained within one area for a short time. Once the teams moved on, library users could be assured that their favorite spot was completed and that they would not be disturbed again.

In mid-January 1984, a test run of printed bar codes was sent to the library before the entire order was filled. Unfortunately, the call numbers were printed so small that it was decided to shorten the bar code number printed in Arabic below the bar code and to heighten the call number above the bar code, so that both were relatively legible on the 5/8-inch-high label.

This created a new problem. Using a larger call number meant that those of more than twenty-three characters would not print on one line. A special order was made for 3/4-inch-high bar code labels with the long call numbers printed on two lines—the special order was to precede all other production.

The extra-long numbers required some extra planning. Although they would be in call number order, they would match books located throughout the building and would need to be applied to the books before the teams came through with the regular-sized bar codes in call number order.

Open meetings were called for all library staff in February 1984, and background information was presented. Questions and suggestions were solicited; appreciation of staff service was expressed.

## REFINING THE PLAN

Beginning in late February the completed slide show was being used for training, the signs and progress charts were ready, and supplies for the teams were assembled. The press releases and advertisements appeared in the university newspaper in March and April.

A committee had spent the month of February detailing procedures for identifying problems and their resolution. They prepared a work flowchart, assigned responsibilities, and designed a multicolored flag system to identify the "snag" categories. The staff in the Circulation, Catalog, and Serials departments, who would need to review and correct the problems coming down from the stacks, would be exempted from working in the stacks with the bar code teams. No more than 3 percent error was anticipated, due to the thorough inventory the longtime automated circulation system had provided. But it was realized that even 3 percent would represent a lot of labor when translated into 39,000 problem books. It was deemed too time-consuming to keep manual statistics during the project: estimates of the number of problems would be made periodically.

One experienced Circulation Department employee would be responsible for the 9 a.m.–1 p.m. shifts, and one for the 1–5 p.m. shifts during the staff project. Senior student employees in Circulation would supervise the evening and weekend shifts. Others were designated as backups during coffee breaks and absences of the regular shift supervisors.

Additional staff selected for supervisory training would assist during the first week of the staff project, when almost 200 people would be loose in the stacks, sticking labels in books. These supplementary supervisors had solid experience with the call number system, shelving procedures, and collections.

In the meantime, all staff received directions and a confirmed schedule of where and when to report.

The coding of the 5,000 bar codes with long numbers, which preceded the major project, yielded useful information. Because the bar codes appeared in all selections of the collection, problems specific to various areas were identified. For example, works in the Greek and Roman classics and by Goethe and Shakespeare are so complicated to shelve and so often used that they are frequently out of order. It was thus decided to assign special teams of experienced catalogers to bar code these sections. Serials Department staff were to be assigned to sections containing high percentages of serials.

By the end of March, the project of applying the bar codes with long call numbers was completed. The error rate of 1 percent proved to be far lower than had been anticipated: 99 of 100 items encountered on the shelves had a matching preassigned label.

## GOING FOR IT

Having survived the unexpected but invaluable March trial run of long labels, the project planners felt ready for the all-out staff effort to begin in April. One hundred and fifty staff members reported for training and the first scheduled shift; two staff members with dust allergies volunteered to work at the card catalog on shelf-list snags.

Each team picked up sheets of bar-coded labels from a previous team and continued on in call number order. The staff participated enthusiastically and many enjoyed working with those with whom they ordinarily had little contact. For those whose tasks offered few occasions to work in the book stacks, the bar code project resulted in their greater appreciation for the complexity of the stack operations performed by the Circulation Department. All were sadly impressed with the deterioration that many books had suffered due to age, use, or poor quality of paper and bindings.

A concept difficult to grasp in the beginning was that no bar codes could be discarded, even if they were defective or damaged. Until the linked item records were created later in the year, the only record of the relationship between a unique bar code number ("smart" bar code) and a book was the bar-coded label itself, with the book's call number printed on it.

The five weeks of staff participation sailed by. To the amazement of the project planners, the teams bar coded at rates at least twice what had been estimated. The speed was a result of concentrated hard work and minimal misshelving. The supervisors worried that as people whizzed along, they would be making more errors, but it was impossible to slow the teams to a dignified two labels a minute. Most were able to label four to five books each minute.

With far more labeling being accomplished by the teams than had been antici-

pated, it was clear that not only would the funds budgeted for hourly assistance complete the project but that support could be given to problem resolution as well, and one or two people from each shift were assigned to the Circulation work area to help with snags and to bar code returning books. (At the beginning of the project, the Circulation staff had envisioned that they might need to box and store the thousands of volumes coming down with problems.) With this added help, the returning and "problem" books were moved out of the department in tandem with the work in the stacks, though the additional shelves were a godsend.

To everyone's surprise, the error rate was slightly lower than it had been in the trial run. It stabilized *below* 1 percent, and most of those errors were problems that the workers did not create but discovered on the shelves. About one-half were misshelved books to be matched to their bar-coded labels or bar-coded labels for books that the teams could not locate; the remaining half of the problems were spine and/or book-pocket label errors.

One type of problem that had not been fully anticipated was the "no bar code" category. It was clear that a few books with no punched cards in the pockets had been missed in the original conversion from which the "smart" labels were generated later. But why others, with correct punched cards and correspondingly correct shelf list cards, had no bar codes was a mystery until an experienced staff member remembered an inventory tape that had been lost in 1971 and only partially reconstructed. "Wrong bar codes" constituted another category of problem; these were bar codes with call number errors copied from errors in the punched cards that generated the inventory tapes.

There were the inevitable few books in the stacks that had been withdrawn earlier from inventory and had found their way home. These were referred to a bibliographer for reinstatement or discarding. A few books from other branches had also crept into the stacks; quick shelflist checks resolved these. Some turned out to be miscataloged; some had duplicate call numbers or other problems. In all, there were perhaps a dozen categories. When the bar coders made errors, they did so by putting the wrong label on the book, usually because of the close similarity of two call numbers.

The staff closely monitored the daily progress noted by the coloring in of the rising thermometer beside the staff elevator and the library floor plans on a wall outside the staff lounge. Of the 1.3 million labels to be applied, well over half were completed after the five-week push.

All staff who completed their thirty hours received letters of appreciation from the university librarian. Another form of thanks was an all-staff wine and cheese party on the last day of the five-week push. All seemed appreciative for the equity with which their time was scheduled and accounted.

## WINDING UP

After May 11 completion of the project fell solely on the Circulation staff and the students who remained. With a greatly reduced work force, coupled with the normal increase in work that is always to be expected at the end of spring quarter, the average number of bar codes applied per day fell drastically; so too did the number of snags resolved.

Reports received regularly during the summer quarter revealed that the bar coding projects in both the Music and Science/Engineering libraries were progressing faster than envisioned. Instead of Main library having to transfer bar code workers to these branch libraries to complete the work there, it soon became obvious that the two branches would be fully labeled before Main was.

A few librarians, who had been unable to complete their thirty-hour commitments to the bar code project before May 11, served out their time in the Circulation Department's work area. They were most welcome because they were well trained and could resolve snags without much supervision; with their unexpected arrival, the goal of keeping up with problems was realized.

On July 31 the circulation librarian in the Music library announced that Music had won the race to be the first library fully bar coded; having labeled 76,300 items,

their project was completed. On August 5 the Science/Engineering librarian gleefully reported his phase completed, with 161,000 labels affixed. The staff of the Main library's Circulation Department finished its last bar code sheet on August 17, adding a count of 1,085,415, for a total 1,322,715 bar coded items.

The remaining 50,000 codes were consolidated on the sheets on which the bar codes arrived, then placed in three-ring binders on a work counter in the Circulation Department, where they would be easily accessible to all staff. Most of the 50,000 were for charged items, although not all of the books that were charged out needed bar codes, of course, since some had been charged out after the project began and had bar codes affixed before they left the building. Returned books to be shelved in areas already bar coded were checked for codes before they were shelved. A fast rule from the first day was never to shelve an uncoded book in a room currently being bar coded or where coding had been completed.

Offers were made by the library staff to bar code collections in faculty offices—and a few faculty accepted the offers. Some faculty grumbled at the inconvenience placed on them, but most cooperated cheerfully.

The decision was made to charge and renew all books on the new circulation system and discharge from the old system, rather than convert all charges immediately. This eased the programming work load, but it meant having to use both systems, checking two files for circulation information on an item until the conversion was complete.

By the end of June the old system contained only long-term charges, about 2,000 items charged to library departments, 9,000 charged to faculty, and 9,000 to study carrels.

These charge categories were left until the end of summer, because staff knew from experience that the number of books charged would be at the lowest point in the year. The staff in library departments were asked to bring their books to Circulation for bar codes, faculty charges were converted from lists generated by the old system, and the bar code sheets were taken to the carrels where books needed coding.

When school resumed in late September, the conversion was complete. After classes began, the circulation departments met their publics with wholly bar-coded collections and a fully operational system. Moreover, the project came in under budget.

## SUMMARY

Northwestern University Library's lengthy experience with an automated circulation system was a rare asset, for it enabled the library staff to conceptualize and comprehend the differences between the old and the new, making planning, reorganization, and project implementation smoother.

Extra time was taken in the planning stages of the bar code project to test and change the size of the call numbers printed on the labels and to apply the larger labels. These precautions paid off in the structure provided the staff when they donated time to the project. By then, supervisors were well versed in the mysteries to be uncovered in the stacks, and the staff were well prepared through training. The most pronounced benefit was in the extensive organization of the work flow through which problems funneled. A month of practice had enabled the Circulation Department to prepare shelves, forms, and workers for the onslaught to come.

It was crucial to involve a variety of people in the planning process. Their ability to present the bar code project to their colleagues as a positive act, done out of pride in the library and its goals, made a difference in how the staff approached it. Thorough training and supervision also were keys to the project's success.

The positive cooperation exhibited between the library and the university and among the library staff was necessary for a project of this magnitude to have been accomplished in so little time. The aftereffects of the project were a sense of team achievement and a positive presentation of a new system to the public. ■■

# The ABN Database: Sampling Strategies for Collection Overlap Studies

**Maxine K. Rochester**

*In Australia a centralized online bibliographic network, the Australian Bibliographic Network (ABN), was established in 1981. The study reported here explored the potential of three approaches to sampling the ABN database files for determining collection overlap among Australian libraries. The three approaches were (1) sample of entries from the ABN microfiche catalog, (2) random sample of entries in the bibliographic file, and (3) check of items from a subject bibliography against the holdings file. It was concluded that sampling of the ABN files offers excellent potential for collection overlap studies.*

Australia has a small population, sixteen million, living on a large continent with great distances between population centers. A long tradition of cooperation, regionally and nationally, among Australian libraries, geographically isolated from each other and from the library and publishing activities of the Northern Hemisphere, has led to the development of library networks. One of these is the Australian Bibliographic Network (ABN), located at the National Library of Australia in Canberra.

ABN is a national online bibliographic service based on a cooperative shared cataloging facility. It was launched in 1980, becoming a publicly available service in late 1981. The database is a combination of records from many sources. There is the original cataloging contributed by Australian participants and national agency bibliographic records, accumulated since the late 1960s and early 1970s, from the Library of Congress, the United Kingdom, Canada, New Zealand, and Australia.

The software used is that of the Western Library Network (WLN). The database products include MARC records on magnetic tape, individual and union microfiche catalogs, catalog card sets, book labels, new title lists, printed bibliographies, and, from 1986, down-line loading. Charges for use are made on a cost-recovery basis and depend on whether the user is a full participant or a dial-up customer. Charges for leased communication lines and training are equalized across the network.[1]

The network began with six participating libraries; by the end of March 1986, there were 108 full participants and 328 dial-up customers. Database participants come from every state and territory in Australia and represent libraries of all types. The size of the major database files were as follows:

| | |
|---|---|
| Bibliographic file | 4,279,337 |
| Holdings statements | 4,234,385 (for 1,831,576 titles) |

ABN's use as a cataloging tool is seen as the top priority by participants. Future developments are planned to include the capability for ordering library materials online,

Maxine K. Rochester is Senior Lecturer in Librarianship, Centre for Library & Information Studies, Canberra College of Advanced Education, Australia.

a WLN online interlibrary loan system, and access to other information systems.

## COLLECTION OVERLAP

The ABN Forward Plan states that one of the aims of the network is the support of resource sharing among Australian libraries. The study reported here was carried out in 1985; it explored the methods that could be used to sample the database to determine the collection overlap among participant libraries and the management information that might be obtained by analyzing these samples. There are three aspects of collection overlap studies:

- Overlap—Titles held by several libraries
- Unique—Titles held by only one library
- Gap—Titles not held by any library.

### Sampling Methods

Three approaches were used to sample the ABN bibliographic and holdings files. The first approach used a random sample of entries from the ABN microfiche catalog of March 1985. The second was based on a random sample of entries in the bibliographic file, using the unique identifying number. Where appropriate, the sample items were then checked in the holdings file. Both these approaches use methodologies long employed in checking library and union catalogs to determine the duplication of collections among libraries.[2] The third approach was based on a check of monograph items from a subject bibliography against the holdings file. Checking bibliographies or lists against holdings files has often been used in collection evaluation. This method was employed by the Research Libraries Group to check levels of collecting notified by libraries to the RLG Conspectus and also for overlap studies.[3] The first approach will determine only unique and duplicated titles, while the others will address duplicate and unique items as well as those not held.

The first approach sampled the March 1985 ABN microfiche catalog, which is a single, main-entry union list of monographs and nonbook materials for which holdings information has been reported to ABN. It is a subset of the ABN file for all those records that have had holdings reported. The number of individual main entries, with holdings information included, was 1,015,000.

The ABN file sampled online, using approaches 2 and 3 in October 1985, contained

3,790,145 book, serial, and nonbook records in the bibliographic file
3,463,007 holding statements
105 participants

### Limitations of Study

There were several problems with the use of the ABN database for collection overlap studies at the time of the study: the small number of libraries currently reporting holdings to the database and the few retrospective files included, the multiple copies held by individual libraries that are not always shown in holdings information attached to records, and the few serial holdings included in the database. Also, because the network is interested in bibliographic rather than content entities, merging takes place only for entries that are bibliographically the same. Thus there is no merging of entries for the same title published in different countries, e.g., U.K. and U.S.A., or the same title published in different formats, e.g., hardcover and paperback.

There are also several problems with the sampling methodologies and sample sizes used for the three approaches. The first approach, taking a sample of entries from a union catalog, is not free of bias; there are the problem of only partial reporting of holdings by contributing libraries and the problem of variations in the application of catalog rules. The first problem applies to the ABN database; the second should not occur. The duplication of entries with differing bibliographic details but substantively the same content will mean that these items have an extra chance of being sampled.[4] A basic sample of only 200 items was taken due to time constraints. A sample was selected from page numbers 1 to 72,682 of the ABN microfiche catalog using a table of random numbers. Only one column was taken from each page to prevent bias from clumping of entries.

The second approach used a random

sample of entries taken from the ABN bibliographic file of October 1985. For a population size of more than 100,000, a sample size of 400 should give the findings a confidence limit of 95 percent, with a precision of + 5 percent.[5] Systematic sampling works well, provided there is no ordering of items within the population. A sample of 400 items was taken for this preliminary study: as there may be ordering of items in the ABN database, a larger sample should be taken in the future as an attempt to avoid bias. If there is variability in the database, it is difficult to decide on a minimum number to sample.

The third approach made use of an external list to check the October 1985 bibliographic and holdings files. The difficulties here revolve around choosing an acceptable list. A small sample of items from a bibliography should give an idea of this approach's usefulness.

## ANALYSIS OF DATA FROM THE THREE SAMPLES

It is usual in collection overlap studies to explore the phenomenon by analyzing the items sampled by categories such as subject and language. Selecting categories useful for analysis, the items in the three samples included format, language, country and date of publication, type of publisher, and subject. Some of the categories, such as language, could be expanded for larger samples. Eleven subject areas were chosen, taken from those used by William Gray Potter in a study of collection overlap and diversity in the Illinois Library Computer System.[6]

Results for the first approach are not presented, as they are similar to those of the second and came from a smaller sample. The results for the second approach, a sample of 400 items from the ABN bibliographic file, are given in table 1. Of the 400 records sampled, 155 records (39 percent) had holdings attached, while 245 items (61 percent) were not held by reporting libraries. Of the 155 items with holdings reported, 7 were serials. For the other 148 items, 375 locations were reported. A good scatter of locations in various states was reported for those items with multiple holdings. Single holdings were reported for 79 items.

The analysis of the sample obtained from the database, together with the items held and not held, reveals the kind of information that can be obtained for collection overlap studies. It is emphasized that—with a small sample and at this early stage of the ABN database—the sample may not reflect reality. This approach would be an appropriate one to use with a larger sample when more holdings are reported by Australian libraries: it not only provides information on overlap but also on unique titles and on those not held among reporting libraries.

The third approach involved determining holdings by checking the monograph items listed in a small subject bibliography against the holdings file. The bibliography used was that given in a recent book by Michael Basseches, *Dialectical Thinking and Adult Development* (Norwood, N.J.: Ablex, 1984). A bibliography in a theoretical area of psychology was chosen as suitable for exploring the potential of the ABN database for determining collection overlap, because previous studies have shown the importance of monographs in this subject area, the interdisciplinary nature of the materials required, and the need for older as well as current materials.

The bibliography covered eight pages and contained the types of citations shown in table 2.

The 142 monograph items were checked online in the ABN database in October 1985 (the serial titles were not searched because of the small number on the database at the time). Of the 142 items searched on ABN, 137 were in the form of books; five were theses. Nearly all monograph items cited were in English; six were in French. Of the 142 monograph items checked against the ABN database, participant holdings were noted for 128 items, a hit rate of 90 percent.

An analysis of items with holdings information attached showed that, as one would expect, most items, 91 percent, cited in the American work were published in the U.S., 5.5 percent were published in the U.K., and 4 percent elsewhere. Most, 78 percent, were trade publications; the rest were uni-

*Table 1. Analysis for Approach 2: Random Sample of Entries from ABN Database*

| Categories | ABN Database Records (400) % | Held (155) % | Not Held (245) % |
|---|---|---|---|
| Format | | | |
| Books and pamphlets | 82 | 86 | 79 |
| Serials | 9 | 5 | 12 |
| Theses | 3 | 2 | 3 |
| Other | 6 | 7 | 6 |
| Language | | | |
| English | 75 | 87 | 68 |
| French | 6.5 | 6.5 | 6.5 |
| Other | 18.5 | 6.5 | 25.5 |
| Country of Publication | | | |
| Australia | 10 | 23 | 1 |
| United Kingdom | 14 | 21 | 8 |
| United States | 40 | 21 | 45 |
| Other | 37 | 23 | 46 |
| Date of Publication | | | |
| Before 1900 | 2.5 | 3 | 2 |
| 1900–1970 | 23.5 | 27 | 21 |
| 1971–1980 | 49 | 43 | 53 |
| 1981– | 24 | 27 | 22 |
| No date | 1 | – | 2 |
| Type of Publisher | | | |
| Trade | 54 | 63 | 48 |
| University press | 3 | 6.5 | 1 |
| Nonprofit organization | 24 | 19.5 | 27 |
| Government and official | 18 | 11 | 22 |
| Unpublished theses | 1 | – | 2 |
| Subject Categories | | | |
| Arts | 5 | 6 | 4 |
| Economics and business | 11.5 | 8.5 | 13 |
| Literature in English | 8.5 | 8.5 | 9 |
| History | 13 | 11 | 14 |
| Law | 11 | 12 | 11 |
| Life sciences | 9.5 | 9 | 10 |
| Non-English language and literature | 9 | 9 | 9 |
| Philosophy and religion | 5 | 6 | 5 |
| Physical sciences | 12 | 14 | 10 |
| Social sciences | 14.5 | 15 | 14 |
| Other/undetermined | 1 | 1 | 1 |

versity press, 19.6 percent; not-for-profit organization, 1.6 percent; and government publication, 0.8 percent.

The located items encompassed a wide time span: 1900–1970, 46 percent; 1971–1980, 47 percent; and, from 1981, 7 percent. A subject analysis of the items with holdings was made. As would be expected,

*Table 2. Approach 3: Bibliography*

| Format | Number | Percentage |
|---|---|---|
| Monograph items, including theses | 142 | 66 |
| Journal articles | 46 | 22 |
| Unpublished papers | 22 | 10 |
| Other | 3 | 2 |

the majority belonged to the social sciences, but there was a wide scatter in other subject categories.

The total number of libraries reporting holdings for the 128 items was 1,148, an average of 9 libraries for each item. Only 9 items were held by only 1 library, and, of these, 7 were older publications (published in 1970 or earlier). A good scatter of locations in various states was found for those items with multiple holdings. The large amount of overlap in holdings found for this bibliography reflects the number of academic libraries contributing retrospective holdings information to ABN. The 2 items with the highest number of libraries reporting holdings, 26 each, were Harvard University Press publications from 1979 to 1982. This may reflect the number of reporting libraries with standing orders for these publications.

The analysis of the information collected from checking the ABN bibliographic and holdings files for the entries in the psychology bibliography shows how useful the database already is for locating copies of monograph items. American theses and government publications (which may be held in separate collections in libraries), accessed by University Microfilms or Superintendent of Documents identifying numbers and unreported to ABN, will cause problems for users. The extent of holdings overlap shown by checking the psychology bibliography against ABN is an inevitable reflection of the duplication in teaching subjects in Australian academic institutions. The small size of the sample checked from the subject bibliography and the early stage of the ABN database mean that the results may not reflect the reality of collection overlap among contributing libraries.

## FINDINGS FROM THE THREE SAMPLING APPROACHES

The three approaches taken to sampling the ABN database produced snapshot views of different aspects of the database. The picture obtained by sampling the total bibliographic file revealed a complex database: a group photograph of items in a great variety of formats, languages, and countries of publication. The snapshot obtained by isolating those items with holdings attached from the bibliographic file mirrored the larger file. An important addition to the holdings information during 1985 was the inclusion of more serial holdings records.

Already 39 percent of the items sampled from the bibliographic file in October 1985 (approach 2) had holdings notified by at least 1 of the 105 participant libraries. The small number of retrospective holdings entered and the short time that current cataloging has been contributed would lead to an expectation of a smaller percentage of coverage. William Gray Potter observes, from findings of collection overlap studies, that "the extent of collection overlap is dependent upon the age, size, and type of libraries involved in that the probability of overlap increases with the size of the library and decreases when the libraries compared are of different age or type."[7] The ABN participant libraries exhibit great variety in type and age, thus displaying greater diversity in their collections and giving a high number of locations for the samples of items taken from the bibliographic file.

The studies of collection overlap reported by Potter show that among a group of libraries, a large number of titles will be held by a single library. Proportions of from 50 to 86 percent unique titles have been reported.[8] Using approach 2, it was found that 51 percent of holdings were for unique titles.

Approach 3, checking the monograph and thesis items in a subject bibliography against the holdings file, gave a different picture of the database. This revealed that only 10 percent of items in this format in the bibliography had not already been reported as held by an Australian library, giving a hit rate of 90 percent. The usefulness of the database for locating copies of monographs is already apparent: only four monographs were not included in the bibliographic file, revealing the usefulness of the database when verifying information for reference purposes.

This high hit rate is especially impressive, as 46.5 percent of monograph items cited in the bibliography were published in 1970 and earlier, whereas sampling of the ABN database in October showed 26 percent of noted holdings dated 1970 and ear-

lier. In this psychology bibliography, 91 percent of monograph items were shown as published in the U.S.A., whereas the sample of the bibliographic file with holdings attached showed 33 percent of the file published there.

The high proportion of materials produced in the U.S. is attributable to the higher number of items published annually there than in the other countries contributing national bibliographic records. Also, some records for U.K. publications, added to the database by means of British National Bibliography records, *may* have been replaced by Library of Congress records for publications produced jointly in both countries. British National Bibliography records have been added from 1971; Library of Congress records for books added from 1968; serials, since 1973; films, since 1972.

One would expect Australian libraries to be buying materials published in Australia, as well as from the U.K. and the U.S.A. Australia is the third largest book export market for U.K. publishers, behind the U.S.A. and the European community, and the third largest book export market for American publishers, behind Canada and the U.K.[9] This also accounts for the bias in holdings towards materials in English.

The survey of Australasian library selection procedures carried out in 1984 by Kay MacLean of James Bennett Pty., Ltd. showed that 55 percent of responding libraries spent 26 to 40 percent of their budgets for monographs on U.K.-published material. More public libraries reported spending a higher proportion of their budget on U.K.-published material than other types of libraries. Also, over half the libraries reported spending less than 1 percent of their budgets for monographs on foreign-language material; 40 percent spent 2–10 percent; and 6 percent, 11–25 percent.[10]

The MacLean survey also showed the common selection tools used by various kinds of Australian and New Zealand libraries: the most frequent selection source used by all types of libraries was the alerting service from publishers. Perhaps this explains the high proportion of trade and university-press publications sampled from the holdings file, compared to the proportion of trade and university-press publications in the total database, and the small proportion of nontrade literature shown to be held by Australian libraries, compared to the proportion in the total database.

## CONCLUSION

It was concluded that the ABN database offers excellent potential for collection overlap studies. The first approach provides information on overlap and unique titles only but is the cheapest and easiest method of sampling ABN—the other approaches involve charges for online access. The second approach provides information on the three aspects of collection overlap studies, namely overlap, unique, and gaps in collections. Thus the second approach is the preferred option. If the subject aspect is most important, the third approach provides information on overlap, unique, and gaps in collections for a particular subject area. Experience with the three methods of sampling shows that they provide easy, cost-effective approaches to sampling the database for collection overlap studies; they would also allow analysis of the degree of duplication between pairs or groups of libraries.

The small samples taken for this study, together with the current limitations of the ABN database for collection overlap studies, namely, the small number of participants and the small number of retrospective holdings reported, mean that no conclusions concerning collection overlap in Australian libraries can be drawn. The study has confirmed the ease of carrying out collection overlap studies using an online database, namely ABN, and provided experience in the subtleties of overlap studies. In the future, when the database has more participants, large-scale studies should be carried out to gather data for resource-sharing purposes.

We can see the contribution that information obtained from larger samples might make to management decisions on the union-catalog aspect of the database. Thus, a recommendation from this study would be to take in library participants with strong holdings in economic and business materials; the subject profile of holdings re-

ported by Australian libraries was lower than the database profile in this area. Also, the first languages used by large minority groups of Australians, namely Italian and Greek, are poorly represented in holdings reported to the database. Again, selection of new participant libraries would help boost the holdings in this area. As is already happening, libraries of different ages and types should be encouraged to become participants in order to increase the diversity of holdings reported to ABN.

A further recommendation is that Australian libraries report their government publications and these holdings to ABN. These are important sources of information in many fields, and user studies show that they are hard-to-locate items. The addition of bibliographic data for individual items in large microform sets, where these are already available in machine-readable form, might encourage participant libraries to add holdings information for these sets and give better access. With the advent of online public access catalogs (OPAC) for databases, locations for these materials will be even more important for the invisible users of such catalogs accessing the database from their home or office computers. They will not be coming to libraries to receive guidance about hidden assets—if an item is not listed with holdings information attached, it may be assumed to be unavailable in Australia.

Of course, one recommendation would be that further studies should investigate item availability in the libraries reporting holdings to ABN. There is not always a close match between physical and theoretical access to library materials. It has already been recommended that sampling of the database needs to take place on a regular basis. As the ABN database grows in size and strength, results of such studies will give important information for collection building and resource sharing. The enhancement to ABN software that enables isolation of holdings information by state will permit easier regional assessment of library resources as the number of participants in each state and territory increases. Samples of the ABN database taken either by random sample of entries or by checking subject bibliographies against the database would provide the information needed for decisions by Australian libraries about cooperative collection development and evaluation. If further studies show that the percentage of unique title holdings remains as high as the 51 percent found here, cooperative collection development schemes may not be needed.[11] In conclusion, the development of online databases such as ABN provides the potential for easily gathering the management information necessary for decisions about union catalogs, interlibrary loan networks, and cooperative collection development in Australia.

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# Determining the Minimum Number of Online Terminals Needed to Meet Various Library Service Policies

**Raymond G. Taylor, Jr.**

As library administrators and trustees examine the potential advantages and costs of converting from card to online catalogs, the determination of the optimal number of public access terminals is among the many problems with which they must deal. Common sense, as well as actual practice, suggests that three independent variables will play a significant role in making such a determination. One is the rate at which patrons arrive at the catalog (arrival rate). Another is the length of time an average patron will remain on a terminal (used to compute a service rate). The third variable, important but often disregarded in preliminary calculations, is the service policy of the library, which might address the following sorts of questions: Shall patrons be expected to wait for the availability of a terminal? If so, for how long, on the average? Given an acceptable length of average wait, what proportion of the time will the library administration tolerate a longer wait?

In recent years the library science literature has included several excellent reports on how to determine the minimum number of terminals needed to satisfy a given policy. For example, Tolle, Sanders, and Kaske, in a brief summary,[1] and Tolle, in an extensive monograph,[2] explained a method for determining the minimum number of terminals needed if users were to wait one minute or less, 90 percent of the time, during peak periods. Their work was based on a mathematical paradigm from operations research commonly known as the queuing model. The "minimum number of terminals" problem is especially well suited to the requirements of the queuing model, both in terms of the mathematical assumptions involved and in terms of empirical evidence.[3-7]

Borgman and Kaske tested the number of terminals needed to satisfy three policies, each of a different type. Again, the queuing paradigm was used.[8]

The purpose of the present paper is to expand the utility of the queuing model by providing the library administrator with an opportunity to compare the number of terminals required for each of sixteen different service policies. Although no such comparison now exists in the literature, such comparisons could be made by practitioners using formulas provided in the operations research literature by Tolle,[9] by Knox and Miller,[10] or by others. However, the calculations required by such formulas are exceedingly tedious and error-prone. They are unlikely to be undertaken except by the most persistent or the most technically oriented administrator.

Each of the sixteen tables that follow shows the minimum number of terminals required for a given service policy. Those policies fall into two groups. The first four pertain to the average time a client will wait for an available terminal. In those four situations, no reference is made to cases wherein clients wait either slightly longer or much longer than the average

Raymond G. Taylor, Jr., is Professor, Educational Leadership and Program Evaluation, North Carolina State University, Raleigh.

*Table 1. Minimum Number of Terminals, Given Average Wait Time Less Than One Minute*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 8 | 5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |
| 1 | 13 | 7 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 |
| 1.5 | 19 | 10 | 7 | 5 | 5 | 4 | 3 | 3 | 3 | 3 |
| 2 | 24 | 13 | 9 | 7 | 6 | 5 | 4 | 4 | 3 | 3 |
| 2.5 | NFS | 15 | 10 | 8 | 7 | 6 | 5 | 4 | 4 | 4 |
| 3 | NFS | 18 | 12 | 9 | 8 | 6 | 6 | 5 | 5 | 4 |
| 3.5 | NFS | 20 | 14 | 11 | 9 | 7 | 6 | 6 | 5 | 5 |
| 4 | NFS | 23 | 16 | 12 | 10 | 8 | 7 | 6 | 6 | 5 |
| 4.5 | NFS | NFS | 17 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |
| 5 | NFS | NFS | 19 | 14 | 12 | 10 | 9 | 8 | 7 | 6 |

*Table 2. Minimum Number of Terminals, Given Average Wait Time Less Than Two Minutes*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 7 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| 1 | 13 | 7 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 |
| 1.5 | 18 | 9 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 2 |
| 2 | 23 | 12 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 2.5 | NFS | 14 | 10 | 8 | 6 | 5 | 5 | 4 | 4 | 3 |
| 3 | NFS | 17 | 12 | 9 | 7 | 6 | 5 | 5 | 4 | 4 |
| 3.5 | NFS | 20 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 4 | NFS | 22 | 15 | 11 | 9 | 8 | 7 | 6 | 5 | 5 |
| 4.5 | NFS | 25 | 17 | 13 | 10 | 9 | 7 | 7 | 6 | 5 |
| 5 | NFS | NFS | 18 | 14 | 11 | 9 | 8 | 7 | 7 | 6 |

*Table 3. Minimum Number of Terminals, Given Average Wait Time Less Than Three Minutes*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 7 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| 1 | 12 | 6 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 |
| 1.5 | 17 | 9 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 |
| 2 | 22 | 12 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 2.5 | NFS | 14 | 10 | 7 | 6 | 5 | 4 | 4 | 4 | 3 |
| 3 | NFS | 17 | 11 | 9 | 7 | 6 | 5 | 5 | 4 | 4 |
| 3.5 | NFS | 19 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 4 | NFS | 22 | 15 | 11 | 9 | 8 | 7 | 6 | 5 | 5 |
| 4.5 | NFS | 24 | 16 | 12 | 10 | 8 | 7 | 6 | 6 | 5 |
| 5 | NFS | NFS | 18 | 14 | 11 | 9 | 8 | 7 | 6 | 6 |

time. By contrast, the last twelve refer to the probability of having to wait more than $x$ number of minutes for an available terminal, but those twelve policies do not address average wait time.

For all sixteen tables, the maximum number of terminals considered was twenty-five. *NFS* appears in the body of the table when "no feasible solution" was available. That is, for such cells, the number of terminals required would have been greater than twenty-five; indeed, in some such cases, the number of terminals would have been very large.

All applications of the queuing model require that two of the independent vari-

*Table 4. Minimum Number of Terminals, Given Average Wait Time Less Than Five Minutes*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 7 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| 1 | 12 | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| 1.5 | 17 | 9 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 |
| 2 | 22 | 11 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 2.5 | NFS | 14 | 9 | 7 | 6 | 5 | 4 | 4 | 3 | 3 |
| 3 | NFS | 16 | 11 | 8 | 7 | 6 | 5 | 4 | 4 | 4 |
| 3.5 | NFS | 19 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 4 | NFS | 21 | 14 | 11 | 9 | 7 | 6 | 6 | 5 | 5 |
| 4.5 | NFS | 24 | 16 | 12 | 10 | 8 | 7 | 6 | 6 | 5 |
| 5 | NFS | NFS | 18 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |

*Table 5. Minimum Number of Terminals, Given 99% Probability of Waiting One Minute or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 11 | 7 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 3 |
| 1 | 18 | 11 | 8 | 7 | 6 | 5 | 5 | 4 | 4 | 4 |
| 1.5 | 24 | 14 | 10 | 8 | 7 | 6 | 6 | 5 | 5 | 4 |
| 2 | NFS | 17 | 12 | 10 | 8 | 7 | 6 | 6 | 5 | 5 |
| 2.5 | NFS | 20 | 14 | 11 | 10 | 8 | 7 | 7 | 6 | 6 |
| 3 | NFS | 23 | 16 | 13 | 11 | 9 | 8 | 7 | 7 | 6 |
| 3.5 | NFS | NFS | 18 | 14 | 12 | 10 | 9 | 8 | 7 | 7 |
| 4 | NFS | NFS | 20 | 16 | 13 | 11 | 10 | 9 | 8 | 7 |
| 4.5 | NFS | NFS | 22 | 17 | 14 | 12 | 11 | 9 | 9 | 8 |
| 5 | NFS | NFS | 24 | 19 | 15 | 13 | 11 | 10 | 9 | 8 |

*Table 6. Minimum Number of Terminals, Given 90% Probability of Waiting One Minute or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 9 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| 1 | 15 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 3 |
| 1.5 | 20 | 11 | 8 | 6 | 5 | 5 | 4 | 4 | 3 | 3 |
| 2 | NFS | 14 | 10 | 8 | 7 | 6 | 5 | 4 | 4 | 4 |
| 2.5 | NFS | 17 | 12 | 9 | 8 | 7 | 6 | 5 | 5 | 4 |
| 3 | NFS | 20 | 14 | 11 | 9 | 7 | 7 | 6 | 5 | 5 |
| 3.5 | NFS | 22 | 15 | 12 | 10 | 8 | 7 | 7 | 6 | 5 |
| 4 | NFS | 25 | 17 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |
| 4.5 | NFS | NFS | 19 | 15 | 12 | 10 | 9 | 8 | 7 | 6 |
| 5 | NFS | NFS | 21 | 16 | 13 | 11 | 10 | 9 | 8 | 7 |

ables, arrival rate and service rate, must first be found. Such determinations should be made from observation, if at all possible. Certainly, arrival rate will vary widely from facility to facility; among other factors, the potential number of users and the size of the institution will affect arrivals. On the other hand, the service rates reported in the literature might be used as a temporary surrogate if no locally derived data is available and if one of the available rates was obtained from a library of known similar type. Although the service times used to compute service rates, as reported in the literature, range from approximately two to twelve minutes, they appear to clus-

*Table 7. Minimum Number of Terminals, Given 80% Probability of Waiting One Minute or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 8 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| 1 | 14 | 8 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 |
| 1.5 | 19 | 10 | 7 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 2 | 24 | 13 | 9 | 7 | 6 | 5 | 5 | 4 | 4 | 3 |
| 2.5 | NFS | 16 | 11 | 9 | 7 | 6 | 5 | 5 | 4 | 4 |
| 3 | NFS | 18 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 3.5 | NFS | 21 | 15 | 11 | 9 | 8 | 7 | 6 | 5 | 5 |
| 4 | NFS | 24 | 16 | 13 | 10 | 9 | 8 | 7 | 6 | 6 |
| 4.5 | NFS | NFS | 18 | 14 | 11 | 10 | 8 | 7 | 7 | 6 |
| 5 | NFS | NFS | 20 | 15 | 12 | 10 | 9 | 8 | 7 | 7 |

*Table 8. Minimum Number of Terminals, Given 99% Probability of Waiting Two Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 11 | 7 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 |
| 1 | 17 | 10 | 7 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 1.5 | 23 | 13 | 9 | 7 | 6 | 5 | 5 | 4 | 4 | 4 |
| 2 | NFS | 16 | 11 | 9 | 7 | 6 | 6 | 5 | 4 | 4 |
| 2.5 | NFS | 19 | 13 | 10 | 8 | 7 | 6 | 6 | 5 | 5 |
| 3 | NFS | 21 | 15 | 12 | 9 | 8 | 7 | 6 | 6 | 5 |
| 3.5 | NFS | 24 | 17 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |
| 4 | NFS | NFS | 19 | 14 | 12 | 10 | 9 | 8 | 7 | 6 |
| 4.5 | NFS | NFS | 20 | 16 | 13 | 11 | 9 | 8 | 7 | 7 |
| 5 | NFS | NFS | 22 | 17 | 14 | 12 | 10 | 9 | 8 | 7 |

*Table 9. Minimum Number of Terminals, Given 90% Probability of Waiting Two Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 8 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| 1 | 14 | 8 | 6 | 4 | 4 | 3 | 3 | 3 | 2 | 2 |
| 1.5 | 20 | 11 | 7 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 2 | 25 | 13 | 9 | 7 | 6 | 5 | 4 | 4 | 4 | 3 |
| 2.5 | NFS | 16 | 11 | 9 | 7 | 6 | 5 | 5 | 4 | 4 |
| 3 | NFS | 19 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 3.5 | NFS | 21 | 15 | 11 | 9 | 8 | 7 | 6 | 5 | 5 |
| 4 | NFS | 24 | 16 | 12 | 10 | 9 | 7 | 7 | 6 | 5 |
| 4.5 | NFS | NFS | 18 | 14 | 11 | 9 | 8 | 7 | 6 | 6 |
| 5 | NFS | NFS | 20 | 15 | 12 | 10 | 9 | 8 | 7 | 6 |

ter around a time of one user per five or six minutes and have a tighter range than arrivals.[11-14] The reader is cautioned, however, that search time (per item) and session length (per user) are obviously two very different statistics; unfortunately, it is often not made clear in the literature which of these statistics is being reported or used as a service rate. The session length is the relevant factor in determining the minimum number of terminals needed, although one might reasonably assume a positive correlation between search time and session length.

Arrival rate, as in the tables below, is defined as the number of users arriving at the

*Table 10. Minimum Number of Terminals, Given 80% Probability of Waiting Two Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 8 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 |
| 1 | 13 | 7 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 |
| 1.5 | 18 | 10 | 7 | 5 | 4 | 4 | 3 | 3 | 3 | 3 |
| 2 | 24 | 13 | 9 | 7 | 6 | 5 | 4 | 4 | 3 | 3 |
| 2.5 | NFS | 15 | 10 | 8 | 7 | 6 | 5 | 4 | 4 | 4 |
| 3 | NFS | 18 | 12 | 9 | 8 | 6 | 6 | 5 | 4 | 4 |
| 3.5 | NFS | 20 | 14 | 11 | 9 | 7 | 6 | 6 | 5 | 5 |
| 4 | NFS | 23 | 16 | 12 | 10 | 8 | 7 | 6 | 6 | 5 |
| 4.5 | NFS | 25 | 17 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |
| 5 | NFS | NFS | 19 | 14 | 12 | 10 | 9 | 8 | 7 | 6 |

*Table 11. Minimum Number of Terminals, Given 99% Probability of Waiting Three Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 10 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 |
| 1 | 16 | 9 | 7 | 5 | 4 | 4 | 3 | 3 | 3 | 3 |
| 1.5 | 22 | 12 | 9 | 7 | 6 | 5 | 4 | 4 | 3 | 3 |
| 2 | NFS | 15 | 10 | 8 | 7 | 6 | 5 | 4 | 4 | 4 |
| 2.5 | NFS | 18 | 12 | 9 | 8 | 7 | 6 | 5 | 5 | 4 |
| 3 | NFS | 20 | 14 | 11 | 9 | 7 | 6 | 6 | 5 | 5 |
| 3.5 | NFS | 23 | 16 | 12 | 10 | 8 | 7 | 6 | 6 | 5 |
| 4 | NFS | NFS | 17 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |
| 4.5 | NFS | NFS | 19 | 15 | 12 | 10 | 9 | 8 | 7 | 6 |
| 5 | NFS | NFS | 21 | 16 | 13 | 11 | 9 | 8 | 7 | 7 |

*Table 12. Minimum Number of Terminals, Given 90% Probability of Waiting Three Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 8 | 5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |
| 1 | 14 | 7 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 |
| 1.5 | 19 | 10 | 7 | 6 | 5 | 4 | 3 | 3 | 3 | 3 |
| 2 | 24 | 13 | 9 | 7 | 6 | 5 | 4 | 4 | 3 | 3 |
| 2.5 | NFS | 15 | 11 | 8 | 7 | 6 | 5 | 4 | 4 | 4 |
| 3 | NFS | 18 | 12 | 9 | 8 | 6 | 6 | 5 | 5 | 4 |
| 3.5 | NFS | 21 | 14 | 11 | 9 | 7 | 6 | 6 | 5 | 5 |
| 4 | NFS | 23 | 16 | 12 | 10 | 8 | 7 | 6 | 6 | 5 |
| 4.5 | NFS | NFS | 17 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |
| 5 | NFS | NFS | 19 | 14 | 12 | 10 | 9 | 8 | 7 | 6 |

catalog per minute. An arrival rate of 4 is four per minute, while a rate of .5 is one arrival every two minutes, and so on. Service rate is also defined on a user-per-minute basis; that is, service rate is the reciprocal of service time. A service rate of .2 per minute means, on the average, a user will stay on the terminal for five minutes.

It is extremely important, when solving the "minimum number of terminals" prob-

*Table 13. Minimum Number of Terminals, Given 80% Probability of Waiting Three Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 7 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| 1 | 13 | 7 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 |
| 1.5 | 18 | 10 | 7 | 5 | 4 | 4 | 3 | 3 | 3 | 2 |
| 2 | 23 | 12 | 8 | 6 | 5 | 4 | 4 | 4 | 3 | 3 |
| 2.5 | NFS | 15 | 10 | 8 | 6 | 5 | 5 | 4 | 4 | 3 |
| 3 | NFS | 17 | 12 | 9 | 7 | 6 | 5 | 5 | 4 | 4 |
| 3.5 | NFS | 20 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 4 | NFS | 22 | 15 | 12 | 9 | 8 | 7 | 6 | 5 | 5 |
| 4.5 | NFS | 25 | 17 | 13 | 10 | 9 | 8 | 7 | 6 | 5 |
| 5 | NFS | NFS | 19 | 14 | 11 | 10 | 8 | 7 | 7 | 6 |

*Table 14. Minimum Number of Terminals, Given 99% Probability of Waiting Five Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 10 | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| 1 | 15 | 8 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 |
| 1.5 | 21 | 11 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 2 | NFS | 14 | 9 | 7 | 6 | 5 | 4 | 4 | 4 | 3 |
| 2.5 | NFS | 16 | 11 | 9 | 7 | 6 | 5 | 5 | 4 | 4 |
| 3 | NFS | 19 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 3.5 | NFS | 21 | 15 | 11 | 9 | 8 | 7 | 6 | 5 | 5 |
| 4 | NFS | 24 | 16 | 12 | 10 | 8 | 7 | 7 | 6 | 5 |
| 4.5 | NFS | NFS | 18 | 14 | 11 | 9 | 8 | 7 | 6 | 6 |
| 5 | NFS | NFS | 20 | 15 | 12 | 10 | 9 | 8 | 7 | 6 |

*Table 15. Minimum Number of Terminals, Given 90% Probability of Waiting Five Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 8 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 |
| 1 | 13 | 7 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 |
| 1.5 | 18 | 10 | 7 | 5 | 4 | 4 | 3 | 3 | 3 | 2 |
| 2 | 23 | 12 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 |
| 2.5 | NFS | 15 | 10 | 8 | 6 | 5 | 5 | 4 | 4 | 3 |
| 3 | NFS | 17 | 12 | 9 | 7 | 6 | 5 | 5 | 4 | 4 |
| 3.5 | NFS | 20 | 13 | 10 | 8 | 7 | 6 | 5 | 5 | 4 |
| 4 | NFS | 22 | 15 | 11 | 9 | 8 | 7 | 6 | 5 | 5 |
| 4.5 | NFS | 25 | 17 | 13 | 10 | 9 | 8 | 7 | 6 | 5 |
| 5 | NFS | NFS | 18 | 14 | 11 | 10 | 8 | 7 | 7 | 6 |

lem to use arrival rates from peak periods only. Further, if it is observed that service rates change between peak and off-peak periods, then both arrival and service rates should be measured during those periods of most intense use. In the annotations given in the references below, a fairly consistent set of peak times is reported.

There are several important technical assumptions that apply to the queuing model

*Table 16. Minimum Number of Terminals, Given 80% Probability of Waiting Five Minutes or Less*

| Mean Arrival Rate | Mean Service Rate | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| Rate | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1 |
| .5 | 6 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| 1 | 11 | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| 1.5 | 16 | 8 | 6 | 4 | 4 | 3 | 3 | 2 | 2 | 2 |
| 2 | 21 | 11 | 7 | 6 | 5 | 4 | 3 | 3 | 3 | 3 |
| 2.5 | NFS | 13 | 9 | 7 | 6 | 5 | 4 | 4 | 3 | 3 |
| 3 | NFS | 16 | 11 | 8 | 7 | 6 | 5 | 4 | 4 | 4 |
| 3.5 | NFS | 18 | 12 | 9 | 8 | 6 | 6 | 5 | 4 | 4 |
| 4 | NFS | 21 | 14 | 11 | 9 | 7 | 6 | 6 | 5 | 5 |
| 4.5 | NFS | 23 | 16 | 12 | 10 | 8 | 7 | 6 | 6 | 5 |
| 5 | NFS | NFS | 17 | 13 | 11 | 9 | 8 | 7 | 6 | 6 |

and to the distribution of arrival and service rates. These assumptions are well documented in the literature and are not repeated here. However, the reader should keep in mind that both of these rates refer to averages. For example, even though the arrival rate may be 2 per minute, there will be minutes during which no user will arrive and other minutes in which many users will arrive. It is precisely this probabilistic variability that complicates the queuing model.

In tables 1–16, arrival rates were allowed to vary from 5 per minute to 1 every two minutes. Service rates varied from 1 every ten minutes to 1 per minute. For each table, the arrival and service rates were calculated in ten intervals each, yielding 100 cells.

In generating the above tables, the author selected a band of arrival rates, service rates, and number of terminals that generally spanned the values reported in the literature.[15] However, if the reader needs tables for a different range of rates or terminals, the author would be pleased to make the table generator available. It runs on a 512K PC in less than forty-five minutes, does not require a math coprocessor, and is sufficiently documented to allow an experienced programmer to change the rate and terminal parameters. All tables produced by the generator are based on a single-phase, multichannel model, assuming negative exponential interarrivals, Poisson service times, infinite source, and infinite capacity.

## REFERENCES AND NOTES

1. J. E. Tolle, N. P. Sanders, and N. K. Kaske, "Determining the Number of Online Catalog Terminals," *Information Technology and Libraries* 3:261–64 (Sept. 1983). This article is a summary of a longer report by the same three authors to the National Science Foundation, "Terminal Requirements for On-line Catalogs in Libraries," (Dublin, Ohio: OCLC Online Computer Library Center, Inc., June 1982). Based on research conducted at Ohio State University in fall 1981, peak periods were determined by using reference desk statistics. Logs were made of beginning and ending times of card searches and beginning times of online searches, plus transactions from the online system. The table of minimum required terminals assumed a service policy of waiting in the queue one minute or less, 90 percent of the time.
2. J. E. Tolle, *Public Access Terminals: Determining Quantity Requirements* (Dublin, Ohio: OCLC, 1984). Tolle provides a complete and technical treatment of arrival and service times and a slightly less complete treatment of the relationship between service policy and number of terminals. Formulas necessary for such calculations are included. For the technically oriented library manager, this monograph is the best reference available on the "number of terminals" problem.
3. Ibid.
4. C. Sage, and others, "A Queuing Study of Public Catalog Use," *College & Research Li-*

*braries* 42:317–25 (July 1981). The authors checked arrivals at the Iowa State University library to determine peak periods: Monday and Tuesday were high days; 1–3 p.m. were peak times (particularly 2–2:30). Chi-square was used to verify Poisson fit. They wrote, "Low correlations between regularly gathered statistics (circulation statistics and door counts) and catalog arrival rates suggest rather strongly that these former statistics are not good surrogates to predict catalog arrival rates and use" (p.324).

5. B. Lipetz, "Catalog Use in a Large Research Library," *Library Quarterly* 42:129–39 (Jan. 1972). This study at Yale compared satisfaction and use of card and computerized catalogs. Their peak days, in order, were Tuesday, Wednesday, Monday. Peak times were observed from 2 to 4 p.m., with lesser peaks at 11 a.m. and 7–8 p.m. Their arrival rates ranged from 1.3 to 1.9 per minute, averaged over a day. Certain peak periods were observed at the end of a holiday or recess.
6. W. A. Knox and B. A. Miller, "Predicting the Number of Public Computer Terminals Needed for an On-line Catalog: A Queuing Theory Approach," *Library Research* 2:95–100 (Spring 1981). An excellent, brief introduction to the use of queuing theory in the "number of terminals" problem. Formulas, but no tables, are provided. Peak times are reported for Northwestern University (10–11 a.m., 1–2 p.m., Monday through Saturday; plus 7–8 p.m. Sunday through Thursday). A very good discussion of service-time determination is included as it pertained to their method (result: 6.6 minutes mean time).
7. C. L. Borgman and N. K. Kaske, "Determining the Number of Terminals Required for an On-line Catalog through Queuing Analysis of Catalog Traffic Data," as in J. L. Divilbiss, ed., *Public Access to Library Automation; 17th Clinic on Library Applications of Data Processing* (Champaign-Urbana: Univ. of Illinois, 1981). They calculated peak period demands and determined the probability of finding a terminal idle, the mean waiting time in queue, and the mean queue length for one to eight terminals. Three policies were applied: (1) at least one terminal free 90 percent of the time, (2) fewer than $x$ number of users in queue, and (3) average wait of one-half minute or less.
8. Ibid.
9. J. E. Tolle, *Public Access Terminals.*
10. Knox and Miller, "Predicting the Number of Public Computer Terminals."
11. Ibid. Knox and Miller reported a service rate of 6.6 minutes.
12. Lipetz, "Catalog Use in a Large Research Library."
13. C. W. Moore, "User Reactions to Online Catalogs," *College & Research Libraries*, 42:295–302 (July 1981). Moore reports average search times for four libraries at the University of Toronto to be two, five, five, and eight minutes.
14. J. Specht, "Patron Use of an Online Circulation System in Known-Item Searching," *Journal of the American Society for Information Science* 31:335–46 (Sept. 1980). The author discusses failure rates for known-item searching in both card and online systems at DePauw University. He also reported a service rate of 5.3 users per hour per terminal.
15. There were two exceptions to this general rule. One was that Tolle, Sanders, and Kaske allowed up to thirty terminals; the other was that Moore reported one library as having a twelve-minute mean service rate. ■■

# Automated Invoice Processing at the National Library of Medicine

**Dianne E. McCutcheon and Martha R. Fishel**

*The development of the automated invoice processing feature of the National Library of Medicine's Master Serials System is described. The approaches taken to file design, standardization of formats, and quality control of data are explained. Details of the batch processing of invoice data from tapes and the use of an online data entry screen for payment posting are included.*

The National Library of Medicine (NLM) controls its serials processing operation through an automated system referred to as the Master Serials System (MSS). Invoice processing was the last feature of the MSS to be implemented. The major hurdles to implementing automated invoice processing were (1) a concern that the automated system be at least as accurate as the manual one and (2) the problems inherent in handling widely varying machine-readable invoice formats from subscription agents. By using a combination of features of INQUIRE, the database management system software under which the MSS operates, NLM successfully moved from a manual invoice processing system to a totally automated one.

INQUIRE, a product of Infodata, Inc., has extensive information retrieval, report generation, and database maintenance features. Each INQUIRE file consists of records that are composed of several information units or fields. Any number of fields can be indexed for easy retrieval, but regardless of indexing, all data in an INQUIRE file are accessible by sequentially scanning all records in the file. INQUIRE also provides a means of relating logical records in different physical files, both in searching and in output. In the case of the MSS, an automatically generated, nine-digit title control number is the link, or the one common field, contained in each of its ten files.

## DESCRIPTION OF THE MASTER SERIALS SYSTEM

The files of the MSS are (1) SERIALS (bibliographic data); (2) SUBS (subscription data); (3) JAF (indexing authority data); (4) GAPS (missing issues); (5) FILM (data on microfilmed issues); (6) BINDING (binding history and instructions); (7) CHECKIN (current receipt and claim data); (8) BINDITM (individual bound volume data); (9) LOCATOR (location symbols for over 150 U.S. medical libraries, which appear in SERLINE); and (10) SERHOLD (summary holdings for over 2,200 U.S. medical libraries, from which LOCATOR is built). The MSS was designed in 1974, and with the exception of CHECKIN and SERHOLD, all files were operational by 1977. Using a combination of elements from the ten files and the powerful INQUIRE information-retrieval and report-generating capabilities, NLM is able

Dianne E. McCutcheon and Martha R. Fishel are members of the Technical Services Division, National Library of Medicine.

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to produce subscription orders, back issue orders, binding pull slips, claims, shelf markers, call number labels, four serial reference publications, and union lists at the state and regional levels, among other products. The MSS serves in-house serial control needs and provides the basis for the SERLINE file, which is produced monthly for public access on NLM's online services network.[1-3]

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- number of copies
- date ordered
- beginning volume and year of order
- information about disposition of the piece after it is received in the library (e.g., routing and shelving location)
- invoice data

New orders, changes to existing orders, and cancellations are pulled from the SUBS file weekly and sent to subscription agents and publishers. Statistical and other reports are produced from this file.

## AUTOMATED INVOICE PROCESSING

From 1975 to 1983, NLM controlled its serial purchase accounts by manually posting invoices into dealer "posting" books containing lists of currently received serial titles and the associated subscription data arranged by procurement source (i.e., subscription agent or publisher). As invoices were received, the line-item information was written into the posting books for the corresponding order. The manual invoice processing procedure, which required staff to verify, post, check, and review each line item in an invoice, was not only tedious, but also led to inaccurate records.

By 1983 the Data Management Supervisor (DMS), a significant enhancement to INQUIRE software, allowed simultaneous online maintenance by multiple users. This enhancement allowed NLM serials staff to develop a means of loading invoice data from dealer-supplied tapes and of making minor corrections to the data online after the tapes were loaded. Additionally, in order to eliminate the need for the manual "posting" books, the staff created a mechanism for adding the invoice posting from nonautomated dealers directly to the online file.

NLM's SUBS file contains fields that allow the storage of invoice number, amount paid for the item, publisher's list price, year(s) covered, volume(s) covered, date posted, and a notes field for each posting. NLM receives invoice data on magnetic tape from six major dealers. The record formats of five of NLM's dealers differ from each other and from the SUBS invoice fields; their records have to be reformatted before they can be added to SUBS. A sixth dealer creates tapes according to NLM's specifications for the SUBS fields, permitting a direct load of its records.

To accomplish the reformatting, interim INQUIRE files are used, each with a field definitions table (FDT) matching the tape specifications, field names, and record lengths of a particular dealer's records. During a tape load each record can be read against the FDT and parsed into fields in order to create a more SUBS-compatible INQUIRE record from each dealer record.

Extraneous data, such as a condition code for air or surface delivery, that cannot be loaded into SUBS are loaded to the temporary file but excluded at a later stage of processing.

Using INQUIRE multifile capabilities during data loading, it is easy to verify that the dealer invoice numbers in the interim file are not already posted in the SUBS file. If an invoice number is found, it is an indication that the invoice data has been added already, and no further processing is done for that invoice.

If the invoice number is not found, the procurement source and order number for

each invoice line item are matched against the corresponding record in SUBS. If the order number in the invoice tape record does not match an NLM order record, the system generates an exception list of incorrect order numbers. If the order number is valid, a second check is done to ensure that the procurement source in the SUBS record matches the dealer whose invoice tape is being processed. If the procurement source and dealer do not match, another exception list is generated.

A batch query run against validated records in the interim file selects fields from the temporary INQUIRE records to be added to SUBS (e.g., invoice number, price, etc.). In the final step these data are added to the SUBS record in a batch-update process. The temporary dealer file is reused to process the next invoice tape (see figure 1).

After all validated invoice data have been added to SUBS, a proof list of invoice data is generated. This list is formatted to resemble the actual invoices. All line-item charges from each invoice are listed in alphabetical order by title. All posting data for the current and previous invoices are also listed for each title. This allows the person verifying the invoice data to see the history of recent payments for the order. Bibliographic, order, and current receipt data from the SERIALS, SUBS, and CHECKIN files are printed out for each title. Staff in the subscription unit verify this list against the original invoices and resolve any dis-

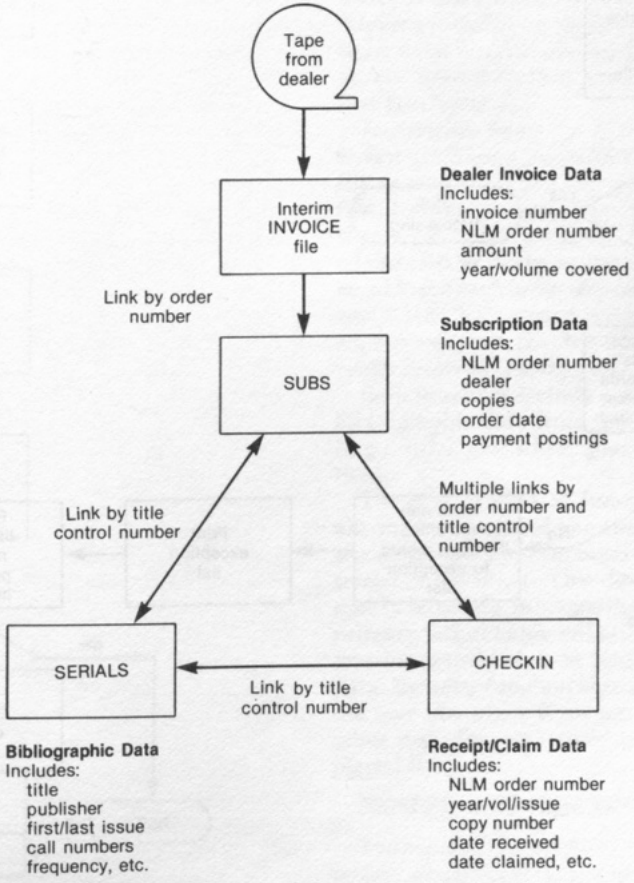


*Fig. 1. Relationships between Interim Invoice File and Selected Files of the Master Serials System.*

crepancies. They also review the lists of records not loaded because of incorrect procurement sources, unmatched order numbers, invoices for cancelled titles, etc. Corrections are made through the online system (see figure 2).

## ONLINE PAYMENT POSTING

The tape loading process works well for materials received from dealers who are capable of supplying machine-readable invoices, but about 15 percent of NLM's subscriptions are with agents who do not provide machine-readable data, and another 18 percent are ordered directly from publishers. In order to store the payment data for these invoices in the SUBS file, it was necessary to devise a method for simultaneous online posting. The online system is also used to correct any problems arising from the batch loading of dealer data as described above.

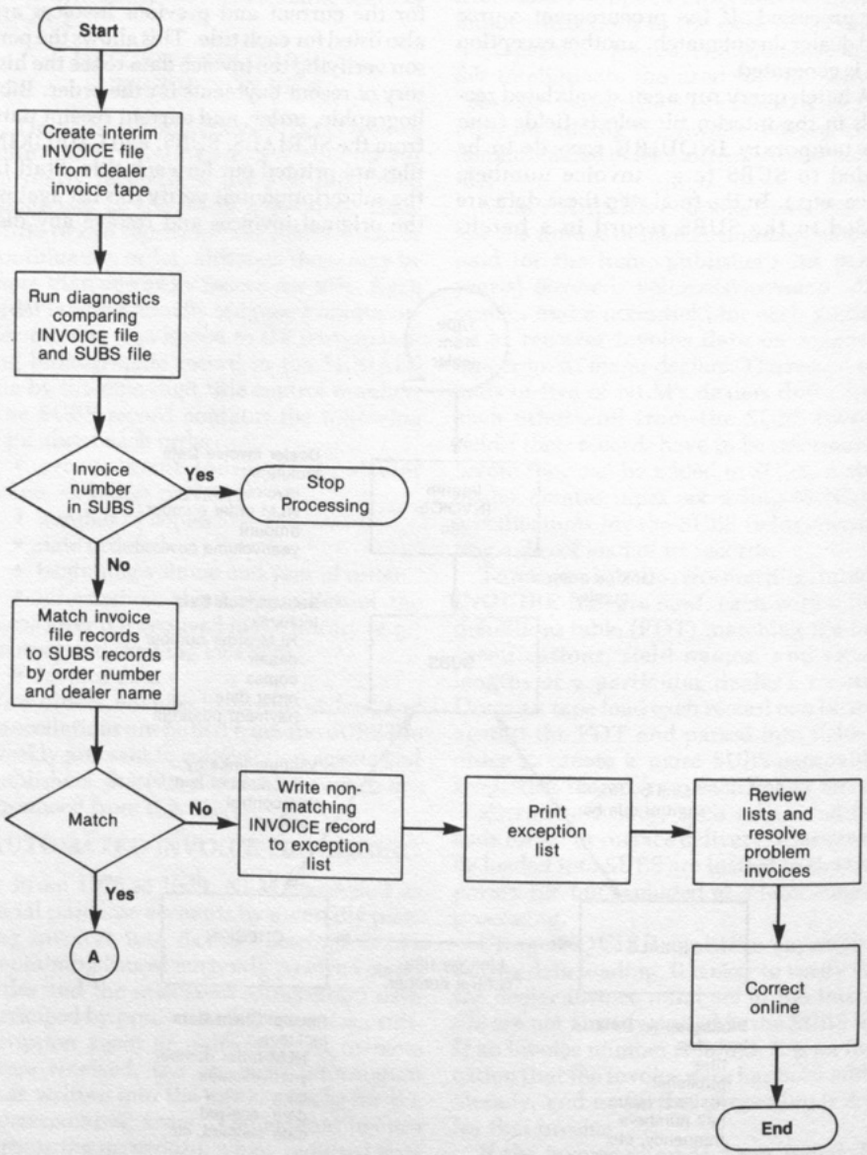


*Fig. 2. Work Flow for Automated Invoice Processing.*



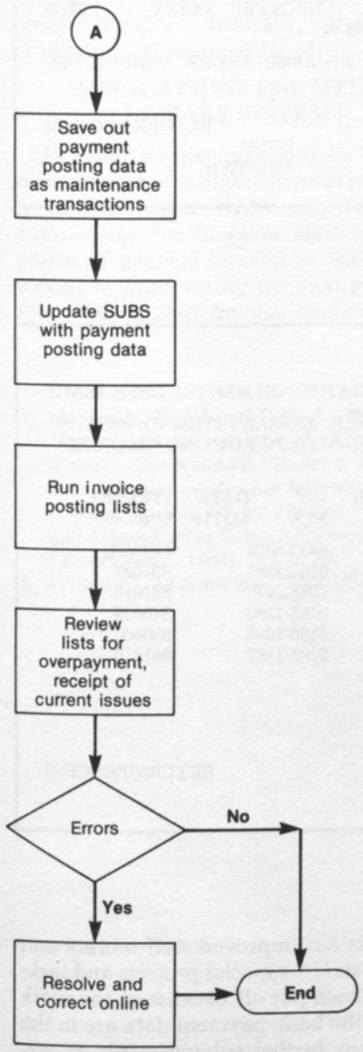


*Fig. 2. Continued.*

The invoice data is accessed through a system that uses the ACT1 screen formatting package and specially written PL/1 programs allowing simultaneous online access to the SUBS, SERIALS, and CHECKIN files. The system includes online validation of many fields, such as dealer name, country of publication, etc. Using this online system, a SUBS record can be retrieved by a variety of access points: title search key and keyword combination, the nine-digit title control number (for the serial title), call number, ISSN, order number, or the SUBS file item number. The invoice number was not made directly searchable through these online functions.

There are two functions available for maintenance of order records: the SUBS function and the POST function. In searches using the SUBS function, the data relevant to updating the subscription (e.g., order date, number of copies, procurement source, special routing, etc.) are displayed first (see figure 3).

In searches using the POST function, a screen containing the fields from the SUBS file necessary for posting invoices appears first. Its function is to allow for online addition of invoice data directly into the SUBS record. Up to thirty separate postings can be added to each order record. The most recent CHECKIN record is also displayed as a quick reference that the title is being currently received (see figure 4).

Both functions include a display of basic bibliographic data from the SERIALS file (e.g., title, publisher, place of publication).

The POST and SUBS functions are actually mirror images of one another with the second screen of one function being the first screen of the other. This design permits a user to select the function that best fits the primary task at hand: either input or maintenance of order data or posting of invoice data. By using function keys on a terminal, the user can move from one panel to the other regardless of which screen was displayed first.

## BENEFITS TO NLM PROCESSING

The benefits derived from the implementation of automated invoice processing have been substantial. In six months NLM

```
TI:  AMERICAN JOURNAL OF MENTAL DEFICIENCY
PL:  WASHINGTON                    PUB: AMERICAN ASSOCIATION ON MENTAL DEFICIENCY
SEQ: A24465000    ORDER: S077212    SOURCE: XXXXX    ITEMNO: 00028799
PREVD: XXXXXX    COPIES: 2    PROCURE: P    TYPE: S
  REPEAT          SHELVING          ROUTING
  00001           REF               COLL
  00002           COLL              COLL
  00003
  00004
  00005
  00006
  00007
  00008
ORDDTE:  830917    BEGIN:  1984—
                          ACTION:  COPYCHANGE    CHECKER:  XXXXXX    PRICE
SNOTES:  IM ROUTING CHANGED TO DIRECT ORDER 6-13-84

AD: AMERICAN ASSOCIATION ON MENTAL DEFICIENCY, 5101 WISCONSIN AVE NW, WASHINGTON
DC 20016

                                                              RETURN/PROCESS
F1/POST                  F4/BIB1      F6/CANCEL      F7/UP
F2/NEXT ORDER            F5/JAFI                     F8/DOWN
```

*Fig. 3. SUBS Panel.*

```
  TI:  AMERICAN JOURNAL OF MENTAL DEFICIENCY
  PL:  WASHINGTON                    PU: AMERICAN ASSOCIATION ON MENTAL DEFICIENCY

  ORDER:    S077212  COPIES: 2  SEQ:A24465000  SOURCE: XXXXXX  ITEMNO: 00028799
  PREVD: XXXXXX      FR: BM      BEGIN: 1984—  SNOTES: IM ROUTING CHANGED
TO DIRECT ORDER 6-13-84

  REC MONTH  YEAR    VOL       ISSUE      OTHER  INP   DATE    ITEMNO
    S NOV    1986    0000091   000000003         XXX   861119  00266493

  REPEAT  CURINV        CAMT    CYEAR  CVOL  COTHER      CDATE
    00001  751227       13500                0184/1284   831027
    00002  414887       -4500                CREDIT      831016
    00003  867573       10000                0185/1285   840629
    00004  042079       10000                0186/1286   850906
    00005  202073000212 11000                0187/1287   861010
    00006
    00007
    00008
    00009

    F1/SUB      F5/BIB1      F6/CANCEL      F7/UP                RETURN/PROCESS
                                            F8/DOWN
```

*Fig. 4. POST Panel.*

went from a system that demanded approximately forty hours of staff time to process a major renewal invoice of 600 items to one that requires eight to ten hours for a staff member to review machine-processed data for the same invoice. The elimination of tedious tasks has improved staff morale and has freed staff for special projects and tasks that had been put off because of the work load. All the basic payment data are in the file and any further enhancements or corrections to the data can be done through on-

line access or batch-processing jobs. In addition, NLM's posting records have gained in consistency and accuracy. Since the invoice data are linked to the CHECKIN file, staff who are processing payments can cross-check receipt of journals and flag items for claiming if necessary. With machine-readable data, detailed management reports can be produced on serial expenditures, projections can be made for budgeting purposes, or analyses of costs for various types of journals can be done easily. This automation project substantially increased the speed, accuracy, and flexibility of invoice processing at NLM.

## IMPLICATIONS FOR OTHER LIBRARY SYSTEMS

Although its specific approach to implementation of automated invoice processing is not transferable, NLM's experience with automating this function illustrates some points of general interest to libraries involved in automating internal processes. First, automated invoice processing can work, and it does save time. Libraries with existing automated systems and large numbers of subscriptions purchased through dealers are probably most likely to profit from automating this activity. Costs and benefits will obviously vary according to local circumstances. The approach used by NLM demonstrates the applicability of database management systems to library automation problems and shows the value of interim "throw-away" files to handle variations in input data. In addition, NLM's implementation of automated invoice processing is another evidence that acceptance of a less than 100% solution to a problem can facilitate rapid development of highly useful systems. By lowering its expectations regarding standard input from dealers and the level of automated verification of data necessary or desirable, NLM achieved rapid development of a significantly more efficient system which provides a reasonable basis for future enhancements.

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2. William J. Willmering, "CHECKIN for Indexing: NLM Serial Control System," in *Projects and Procedures for Serials Administration*, ed. Diane Stine (Ann Arbor: Pierian Pr., 1985), p.277–86.
3. Martha R. Fishel, "National Biomedical Serials Holdings Database (SERHOLD)," *National Library of Medicine News* 39:1–4 (1984). ■■

# The Little Giant: The IBM Series/1 in Library Applications

**Donald D. Hendricks and Glenn Manino**

*There is a dearth of information on the use of the IBM Series/1 minicomputer in libraries, yet a survey of the literature documents many applications in information gathering, processing, and dissemination. The installation described here shows the versatility of this machine configuration; many different systems can be added to make it a comprehensive library system. The communications capabilities, so important in a library and a campus setting, are defined. Finally, the cost factors, which seem reasonable by comparison with other systems, are identified. This entire installation may be of interest to medium-sized or small libraries.*

During the late 1970s it became obvious to the staff at the Earl K. Long Library, University of New Orleans (UNO), that a drastic change in our automated systems was overdue. The circulation system, based on the IBM 357 punch card mechanism, was still operating but subject to continual breakdown and repair. We found that a repairer of a certain maturity was required; people new to the company were not familiar with the device and had to seek assistance with repairs. Parts were hard to obtain—some were only available by cannibalizing from other locations. The company gave us warning a year or so in advance that it could no longer provide maintenance or assure parts availability after a certain date. With these developments at hand, we began to seek other solutions.

## BACKGROUND

Since UNO is a relatively new school founded in 1958 and had, from the beginning, adopted and grown up with IBM equipment, that was our initial area of exploration in the equipment field. The vice-chancellor for administration (who pays the bills) was a strong advocate of this company. We knew that we would have to depend on the administrative computer center for large jobs, as we had in the past.

There were opportunities to adopt alternative methods. We were invited to join two other local university libraries in an automation consortia. This group was interested in a turnkey circulation system; UNO's portion of this installation would have cost $80,000, in addition to communication lines over a nine-mile distance. The projected system was a "locked box" that provided only the circulation function.

After intensive investigation that included a trip to the vendor's headquarters, we decided this system would not suit our purposes. This decision was not based on cost: funds for major improvements of this nature were still available before the oil crisis. Rather, we wanted a system we could control, one that would articulate with the IBM 4331 in administrative data processing, and one that was comprehensive. All the common functions had already been automated, and we felt that moving them onto new equipment would be faster and

Donald Hendricks is Dean of Library Services, and Glenn Manino is Technical Coordinator of Library Automation, Earl K. Long Library at University of New Orleans.

cheaper than trying to work with turnkey units. After much investigation of other systems, we decided to install an on-site IBM Series/1.

Series/1, first introduced in 1977, is a product term used to describe a family of processors, hardware, and communication links. The computers were designed to handle general-purpose, commercial, and sensor-based applications in a multiprogramming environment. Series/1 offers a modular approach to system construction, so that it can be tailored to match precise needs for equipment, programs, and services. There are attachment features that allow the connection of a wide range of non-IBM terminals and equipment, but an IBM PC can be readily used as an adjunct device. Five different processors are available, and a host of additional add-ons can be acquired.

## GENERAL USE

A survey of the library, business, and technical literature (at that time, circa 1980, and recently) revealed no articles about the use of the Series/1 in libraries. It was comforting, however, to note the plenitude of articles about this machine in business and technical applications. Over 100 articles were reviewed, and it was even more reassuring to note the extent to which the IBM corporation itself uses the Series/1 in manufacturing and inventory control.

Articles such as "Manufacturing Control System at IBM Tracks Product Movement through Semiconductor Line"[1] and "IBM Uses TWIN for Warehouse"[2] describe, respectively, the control of a production line and a parts warehouse inventory. Twelve articles documenting IBM's internal use of the Series/1 were noted in this review.

The versatility of the Series/1 is demonstrated by the scope of applications represented in the literature. Uses noted in more than 100 articles included the following areas: advertising agencies; airlines; automobiles; banks (including ATMs); credit agencies; cookie manufacturing; chain stores; energy control (including IBM's New York building); grain elevators; insurance companies; law enforcement; medical fields; restaurants; security systems; shoemaking tools; and a stock exchange.

The power of the Series/1 as a communicating computer is also demonstrated in the literature, as eight articles specifically addressed that point, and several are noted as examples.

The H. J. Wilson Company, a department store chain, uses a surveillance system that allows a single operator to simultaneously monitor the company's seventy-nine showrooms. A Series/1 is used to handle both message and security traffic.[3] The State Farm Insurance Company provides data processing services to agents on a centralized basis from twenty-five regional offices; the customized program runs on a modified IBM Series/1.[4]

The Chrysler plant in Windsor, Ontario, has a factory information system that provides communication between maintenance and manufacturing by using a host IBM Series/1. All major plant systems, such as robots and conveyors, are electronically linked to the information system.[5] Delta Air Lines' (Atlanta, Georgia) central-site network system is used to control and manage its national network of 400 leased lines and more than 3,000 modems. Travel agents are supported with leased lines, each of which supports 10 to 12 sites, and eleven Series/1s located throughout the U.S. are used as remote concentrators; one Series/1 can support up to 192 sites.[6]

These brief excepts from the literature demonstrate its wide variety of uses; they also underscore the solid strength of the Series/1 family as a communicating minicomputer, capable of serving multiple queries in a local or national setting—these are certainly important aspects of a library campus network. A complete copy of these citations and abstracts can be supplied upon request.

Two publications from IBM give overviews of the structure and capability of the Series/1. *The Small Computer Concept* covers the organization of its internal design and format as well as its instructional mode and the interfacing of user devices.[7] Although it is a sales brochure, *Series/1 Digest* contains helpful descriptions of the full range of products and software available.[8]

## INSTALLATION

We purchased a minicomputer to form

the nucleus of a bar-coded circulation data collection system. Since the budget and the immediate needs were small, we started with the smallest of the Series/1 processors. The 4952 model C was purchased with two 8-inch diskette drives, a dot-matrix printer, CRT terminal, and 64 kilobytes of main storage. We also purchased a bar code printer and a wand-type bar code reader.

The existing mechanical circulation system collected data by punching checkout records onto cards (or at least it did so about 80 percent of the time). The rather dubious data were transported to the administrative campus computer (an IBM 4331 mainframe), where the cards were read and the circulating book file was updated. Printed lists were returned to the library, which were out of date almost while they were being printed.

The Series/1 was going to replace the faulty mechanical system with a more reliable bar-coded, computerized one. We generated ID and call number labels and placed them on about 50,000 of the most frequently circulated books. Then, programs were written to collect data from the scanner attached to the checkout terminal and place records onto diskette. The diskette, full of (reliable) data, was transported to administrative data processing, and the circulation lists were produced as usual.

Of course our small, diskette-based system was not yet up to keeping all circulation and patron records online. It was an improvement just to replace the mechanical system with one that worked.

To accomplish this computerized conversion required that we attach and operate the bar code printer (non-IBM) under Series/1 control, connect the bar code scanner to the checkout terminal, create a diskette in a format compatible with the 4331 diskette reader, and read diskettes created by that machine. Since the Series/1 was an unknown quantity prior to its delivery, the development of this system was somewhat of an adventure.

Unlike the personal computers that abound in office settings, the Series/1 cannot be taken out of the box, plugged in, and made to function after a few afternoons of part-time tinkering. In fact, the machine cannot be plugged in at all until IBM is called out to "install" it: switches are set on circuit boards, peripherals are attached, and hardware records are kept. It is incongruous to see a highly trained technician spending hours concentrating on a two-foot-square computer, referring to a half-dozen oversized hardware manuals. One gets the (accurate) impression that the Series/1 is the tip of an enormous iceberg of technical support and service. This view was confirmed when the system manuals started to arrive: they comprised about twenty volumes totaling more than 6,000 pages.

Among the three operating systems we could have selected, we chose the one known as the Event-Driven Executive (EDX), which comes with a language (EDL); a set of standard utility programs (disk copy, file dumps, etc.); and a program preparation facility that enabled us to write our own programs. EDL is fairly powerful and easy to learn, although its assembly-language flavor may give the novice programmer some difficulty. Many other languages are available for the Series/1, including BASIC, FORTRAN, COBOL, PASCAL, and PL/1; however, since EDL is cheap, compact, and powerful we decided to stay with it.

The EDX system is a multitasking DOS: several terminals can be running different programs concurrently and without interference. With a little effort, independent programs can be made to communicate with each other and share system files and other resources. This forms the basis of an online environment.

Although the Series/1 can be purchased with small internal storage and without a hard disk, it should not be considered in the ranks of the personal computer; its design is more along the lines of a large, mainframe machine.

For example, the operating system must be customized ("generated") for the exact mix of hardware and software features to be included. An understanding of the hardware and, to some extent, the machine philosophy, is required to "gen" an operating system successfully. An experienced programmer with a background in large machines will not have a problem with the concepts involved, but understanding the

specific steps required to get a Series/1 up and running will be hard won. IBM offers courses covering the necessary topics, and these are recommended. It is possible to avoid the cost of this training by "hitting" the manuals and using some initiative. In our case we started small, and immediate changes to the system were not required. Those users anticipating large initial systems will find formal training more important.

The Series/1 is designed so that it can be modularly expanded to almost any size the user might require. Our original 4952 processor has since been replaced by the 4956, which quadrupled the storage and processing speed. We have attached a line printer, numerous terminals, a modem, tape drive, and 300 megabytes of disk storage. One of the main strengths of the Series/1 is its ability to communicate with a wide variety of other equipment: figure 1 illustrates our complete machine configuration and shows the variety of non-IBM components that can be accomodated by the Series/1 processor.

By plugging the appropriate "feature card" into the processor, the user may communicate in any one of the following popular line disciplines: synchronous data link control (SDLC); binary synchronous communications control (BSC); asychronous communications control (ACC). Our system relies mostly on the simple asychronous type that permits us to connect basic ASCII CRT terminals from several different manufacturers. We are also connected to the university's administrative data processing center via a modem using the BSC line discipline.

## SOFTWARE

While there are a number of software packages available from IBM for such specialized commercial functions as text editing, managing supermarket energy or chain pharmacies, and a dozen or so others, any general data processing installation us-

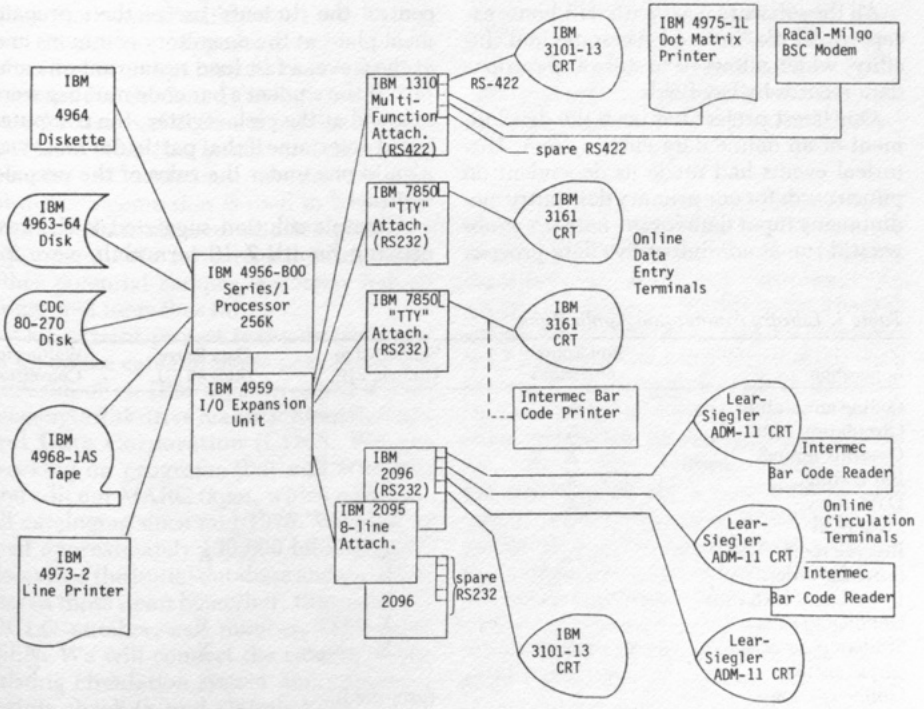


*Fig. 1.*

ing a Series/1 will likely need at least one full-time programmer to write specific applications.

As we increased the size and power of our hardware, we also developed more complex software applications. The addition of a 64-megabyte hard disk to the original system gave us the extra speed and storage needed for the online circulation project. We now use three terminals to check books in and out, levy fines, maintain patron names and addresses, generate overdue notices, and so on. All records are instantly updated at the moment of checkout or return, so there is no longer a two- or three-day time lag to contend with.

Working in concert with the main online circulation program are eighteen other programs that do the statistical data capture, maintenance, and other housekeeping functions required. Table 1 lists several of the major systems now being run on the Series/1 as well as those planned for future conversion; this table gives a summary overview only, as each system is comprised of numerous individual EDL programs.

All the software was written in-house except for IBM's "indexed access method" facility, which allows us to store and retrieve data records by key fields.

Our latest project has been the development of an online data entry system. Historical events had made us dependent on punch cards for our primary data entry medium: any input data for the numerous jobs we still run at administrative data processing had to be physically carried to that installation in the form of card decks. Once we connected a telephone modem to that shop, however, we realized that data punched directly into the Series/1 could be transmitted to the central site.

Our data entry system permits the use of terminals rather than expensive keypunch machines. The screen prompts the operator for fields by name and validates the field by type (alpha, numeric, etc.) and length. Data files may be verified, searched, corrected, copied, and erased. After a period of parallel testing, our keypunch machines will be retired at a significant savings, since the entire system uses only about 10 percent of our total Series/1 resources.

## OTHER PROJECTS

The ability of the Series/1 to communicate with a variety of devices makes it easy to develop systems that solve specific problems. An example will illustrate this.

The director of Student Housing wondered if the bar-coded student ID might replace the cardboard punch card used to control the students' use of their prepaid meal plans at the dormitory commons and at the Cove, a fast food restaurant on campus. If the student's bar code number were scanned at the cash register, the computer could determine if that particular meal was a valid one under the rules of the prepaid contract.

A simple solution suggested itself: two existing Zenith Z-19 terminals were in-

*Table 1. Library Automation Applications*

| Application | Run Entirely on Series/1 | Submitted to Host via RJE | Data Entry Done on S/1 | Waiting for Conversion |
|---|---|---|---|---|
| Online circulation | X | | | |
| Circulation stats | X | | | |
| Overdue notices | X | | | |
| Bar coding | X | | | |
| Data entry | X | | | |
| Meal plan | X | | | |
| Reserve room | | X | X | |
| Purchase orders | | X | | |
| Interlibrary loan stats | | X | X | |
| Cataloging stats | | X | X | |
| Student payroll | | X | X | |
| Serials listings | | | | X |
| Online catalog | | (projected) | | |
| Serials check-in | | (projected) | | |

stalled at the commons and the Cove respectively. Each terminal has it own Intermec bar code reader attached, and communication with the Series/1 in the library occurs over two 4-wire phone circuits installed for this purpose.

The bar code readers and terminals operate with the RS-232 electrical interface, which works reliably over distances less than a few hundred feet. To power the signal over the several thousand feet from the commons and the Cove to the library, inexpensive Inmac line drivers are used.

Both terminals need access to the same meal plan master file, which contains an entry for each valid meal plan patron along with other data such as the type of meal contract (eight, ten, or fifteen meals per week); optional expiration date; restriction flags; and so on. The facilities of EDL make it possible for programs to run concurrently at the commons and the Cove without interference and to share the meal plan master file. Each week a statistical report detailing meal plan activity is printed.

The system, operational in a few weeks' time, has worked reliably. A small charge per transaction supports the system and provides a computerized meal-tracking package for Student Housing that would cost thousands of dollars if purchased from a vendor. This charge also creates a small amount of welcome income for the library—income that is used to buy additional terminals and smaller pieces of equipment. We have had inquires from other potential campus customers but no additional users thus far.

Our current project is the development of an online catalog, made possible by the addition of an IBM tape drive and a 240-megabyte disk drive manufactured by Control Data Corporation (CDC). We are working on programs that will translate and edit our MARC tapes, which represent all cataloging since mid-1976. We plan to load approximately 130,000 bibliographic items into the initial database and expect to search those items by author, title, subject, OCLC number, call number, ISSN, and ISBN. We will connect the catalog to the existing circulation system and provide a serials check-in and claiming facility as well.

It is worth mentioning that CDC makes several Series/1-compatible peripherals. Recent brochures have announced a cassette device for making quick disk file backups; a line printer; space-saving, large-volume disk storage; and 1- and 2-megabyte processor storage cards. Aside from CDC' own line of Series/1 equipment, there is a thriving trade in used and reconditioned peripherals and processors. H & A Computer Products in San Francisco has many different models of reconditioned processors and other devices at much less than the original list price. These devices must be inspected by IBM when installed if they are to be placed under an IBM maintenance contract, but this process is generally routine. Be aware, though, that older processors may have a significantly higher maintenance-contract cost than newer models. This is not to say that they may break down more than newer models—it's just IBM's way of encouraging users to buy the newest technology. It has been our experience that Series/1 equipment simply does not break down: in five years of virtually continuous operation we have never had a machine failure, with the exception of a malfunction in two of our terminals. (We no longer "knock wood" when we tout our repair record. This is true confidence.)

## COST

It is very hard to estimate the cost of a Series/1 shop because of the modular nature of the machine and the variety of vendors providing reconditioned equipment. In general, new processors cost in the $10,000 range, while older ones may be had for a few hundred dollars. A 4956 processor with integrated 30-megabyte disk, a diskette, and 1 megabyte of RAM storage may be closer to $20,000. Printers cost from $2,500 for the dot matrix variety to $12,000–$14,000 for a new 400-line-per-minute printer. (Ours was $6,000 used and works perfectly). Allow about $600 for each terminal port, whether buying a single-line card such as the #7850 teletypewriter adapter or a multiline such as the #1310 multifunction attachment or the #2095-2096 pair. Terminals cost from $400 to $800 each. Tape is about $10,000 (for the IBM 4968-1AS, suitable for rapid disk

backups and slow to moderate record-by-record processing); 64 megabytes or less of hard disk will range from $4,000 to $10,000, while the 200-megabyte capacity drives run from $12,000 to $16,000. Again, only by contacting several vendors can one get an accurate idea of the cost of a shop that will suit specific needs.

Maintenance represents another cost that will vary widely depending on what is being maintained and who is doing it. Generally, mechanical devices such as printers and tape drives will cost more per month to maintain than purely electronic processors, communication cards, memory, and the like. A broad rule of thumb might be to expect maintenance to cost 1 percent of the total system price per month (i.e., for a $50,000 system, expect to pay $500 per month). IBM provides high quality service, but other vendors (Sorbus, for example) have access to all IBM parts and information and can generally provide the same service for less money.

Finally, IBM has introduced two personal computer models that incorporate Series/1 processors. The System Unit 5170 models 495 and 496 are basically IBM PC/ATs capable of running Series/1 programs. The models contain, respectively, a 20-megabyte hard disk and a 30-megabyte disk with either 512K or 1024K maximum RAM storage size. A wide variety of communication options are available, including RS232, RS422, BSC, and SDLC. Operating speed is slower than the larger, dedicated Series/1 models, and there are limitations and restrictions on the type and number of communication ports. While this machine would not replace a faster and more completely configured Series/1, it might be ideal in a distributed data processing environment in which the System Unit communicated with a host Series/1, while having the capability of running Series/1 programs independently for a limited number of users.

## PERSONNEL COST

The cost of staffing a Series/1 installation will vary almost as much as the cost of the hardware and for the same reason: there are many variables to consider in selecting both the number and experience-level of personnel. A small department consisting of a single processor and only one or two applications might run well with only a part-time or shared employee. More equipment, requiring operator intervention, will need a dedicated employee. If the unit is called upon to develop complex online applications, an experienced programmer and/or programmer/analyst will be needed. Data entry personnel will be required if the Series/1 is to perform batch data processing. The salary of a junior-level programmer/operator may run from $12,000 to $15,000 per year, while an experienced programmer/analyst may expect from $25,000 to $35,000. Data entry persons will cost from $10,000 to $14,000 per year.

The record of personnel costs since the major thrust of upgrading the in-house automation effort started in 1980 is shown in table 2. A second professional (at the apprentice level) was hired this past year; the technical staff consists of two individuals.

The recent fiscal experience in Louisiana certainly is reflected in table 2; the lack of raises is merely from restriction of funds, not from any lack of appreciation for progress. Students in computer science were used as night-shift computer operators at the administrative computer center. Now

*Table 2. Personnel Costs, 1980–87*

| | Professional | Technical | Student | Total |
|---|---|---|---|---|
| 1980–81 | $20,000 | $21,195 | $1,114 | $42,309 |
| 1981–82 | 22,197 | 23,941 | 1,276 | 47,414 |
| 1982–83 | 26,197 | 25,106 | 1,682 | 52,985 |
| 1983–84 | 26,197 | 27,581 | 3,603 | 57,381 |
| 1984–85 | 29,700 | 28,226 | 4,656 | 62,582 |
| 1985–86 | 30,900 | 28,912 | 1,610 | 61,422 |
| 1986–87 | 49,004* | 28,912 | 900 | 78,816 |

*Another professional was added during this period.

that remote entry has evolved, our need for this level of assistance has diminished.

Current personnel costs for the Series/1 department described in table 2 total almost $79,000, which includes one senior programmer/analyst, one apprentice programmer, and two data entry persons.

In summary, the Series/1 has proven itself to be a cost-effective, reliable machine. It has allowed us to implement projects that would be impractical to pursue without having such computing power on site. For less than $75,000, we have developed an online circulation system, a data entry system, and efficient remote job entry to the central administrative computer, and we have the prospect of a totally online catalog with a serials check-in and claiming facility.

Since IBM continues to offer new Series/1 processors and peripherals, we expect that the machine will be supported for many years to come. Five years ago, when we were all puzzling over the potential of this small box with its 64K and its diskette drives, we could not have realized the extent to which it would grow. Now that we are aware of its potential, we expect the next five years to be a time of greater productivity for our little giant.

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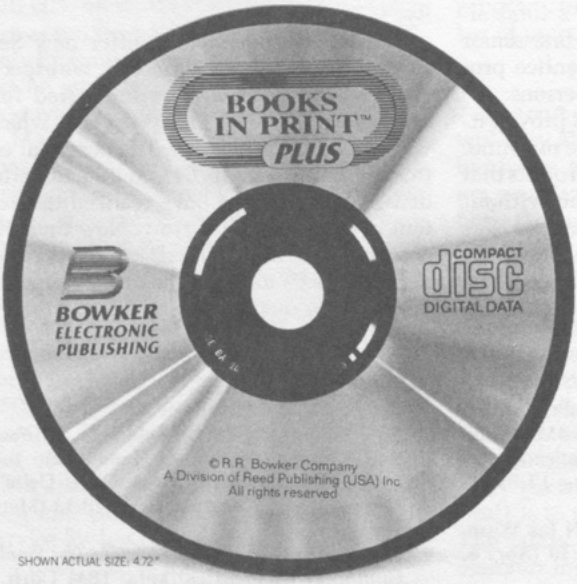

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# Communications

## Printing and the Online Catalog

**Theresa Pepin and Deborah Thompson-Wise**

### PLANNING FOR OPAC PRINTERS AT THE UNIVERSITY OF TENNESSEE

As the Working Group on Printing and the Online Catalog at the University of Tennessee–Knoxville (a Geac Integrated Library System site) recently discovered, planning for an OPAC implementation that will meet the needs of library users is no simple task. A review of the literature and poll of selected online catalog sites revealed a dearth of printer needs-assessment studies and no consensus on whether or how best to provide for printing from the online catalog.

### REVIEW OF THE LITERATURE

Although there is a substantial and growing literature dealing with OPACs, few authors give more than passing mention to the printers associated with such systems.

An extensive study sponsored by the Council on Library Resources (CLR), *Using Online Catalogs: A Nationwide Survey*, reviewed OPACs used by thirty-one libraries and queried the libraries' patrons concerning their experiences. Two of the survey's sixty questions mentioned printers. In cases where printers were provided, patrons were asked to indicate whether or not the printer was easy to use. From the count of responses to this question, the authors concluded that printers should be easy to use. The survey's second printer-related question produced what appeared to be more useful information: when asked which of fifteen additional features they would like their OPAC to have, about 30 percent of the users indicated printing.

The authors of the CLR study suggest that their survey shows that printing can help ameliorate a number of search problems, "Online printing is almost universally helpful, aiding users in increasing and reducing retrieval results, finding the right subject term, and so on."[1] However, we find it difficult to see how the provision of a printer would, in itself, assist patrons in selecting terms or modifying searches, unless it is presumed that patrons, with copy in hand, would seek help at that point in their search.

Closer examination of the table from which these conclusions were drawn would suggest that the authors suffer from poor methodology. The table relates twelve system problems reported by patrons (e.g., increasing the result when too little is retrieved is difficult, as is finding the correct subject term) and features of various OPAC systems (e.g., the ability to command Stack or to limit by date). A spurious correlation is drawn between the presence of a printer and OPAC searching success. Although the OPACs with printers may have been perceived as helpful in refining search strategy, it is most likely that users were aided by the OPAC software and that the presence of the printer was incidental.

The results of this survey become more disappointing when one sees how little else has been written on printing and the OPAC. Markey, reporting on focused-group interviews conducted by OCLC to provide "qualitative information on library patrons' and staff's needs and perceptions of online public access catalogs,"[2] passes along only one comment regarding printers: "I don't copy anything down; I just get a printout."[3] Price, in an article dis-

Theresa Pepin is Systems Librarian, and Deborah Thompson-Wise is Reference Librarian at the University of Tennessee, Knoxville.

cussing various printing options for OPAC, assumes that printing will be provided because "it is a feature much appreciated by library patrons."[4] Costs associated with hardware, service personnel, and supplies, as well as printers' degrading effects on library environments (noise and wastepaper) and their overall system performance are mentioned as factors to be considered; but, apparently, it is simply assumed that these problems must be overcome as a library installs its printers.

Given that printers are not reported as being routinely available at academic-library OPAC sites, it was disappointing that no case studies or details of decisions regarding printers were found in the literature. The Working Group was, therefore, hopeful that a questionnaire polling current OPAC sites regarding their uses of printers would provide some more specific direction to its deliberation.

## SURVEY OF SELECTED OPAC SITES

The Working Group contacted sixteen OPAC sites by telephone—13 Geac libraries with the OPAC for at least one year and three long-automated, non-Geac sites—and attempted to discover whether and why these libraries did or did not provide OPAC printers. A detailed questionnaire, devised to solicit information on the need and preferred arrangement for printing, quickly proved to be of limited value. In the course of our interviews, it became apparent that the decision to provide OPAC printers has not been guided by empirical evidence regarding their potential or actual utility but, rather, by a consideration for costs or hardware or by a philosophy of library service. In particular, established sites have added printers partly in response to demand from patrons and staff and partly as a result of studying queuing patterns but also simply as a function of the desire to provide a service of which their system is technically capable.

Thus, with very little in the way of quantitative data regarding the use of the printing facility, our discussions with librarians consisted of gathering opinions on the subject of printing in general and not nearly as much on the actual use of printers. While the interviews with librarians at the various sites provided much practical, incidental information, the evidence is largely anecdotal.

Our questionnaire did provide enough structure to enable us to chart some commonalities among the responses from the sixteen sites. From a spreadsheet of (1) the library's OPAC start-up date (ranging from 1970 to 1985); (2) the number of OPAC printers (0–36); (3) the number of staff printers (0–17); (4) centralized printing (yes/no); (5) estimated use (slight, some, moderate); (6) perceived demand (none, some, varies, moderate); and (7) major factors in decision (cost, hardware, service, demand), several statements can be made: ten of the sixteen surveyed libraries provided some form of printing for OPAC users. Of these, six sites had point-of-use printers; at four sites, fewer than six printers were available for public use. Again, of the ten, four sites provided a centralized printing arrangement for extensive bibliographic work. For the most part, libraries that offer no printing facility do not believe there is much demand; libraries that offer centralized printing do not see much use of the service; and libraries currently providing point-of-use printers report demands for more printers.

## CONCLUSION

Given the paucity of the literature and the unfounded premises of the research, the nonexistence of needs assessments, and the lack of consensus on what kinds of printing facilities are actually useful to patrons, the Working Group proposed to install a limited number of point-of-use printers (six) and to monitor printer activity so as to project future equipment purchases.

As libraries proceed to automate an increasing number of functions, and more and more pieces of hardware are offered to the public for use, it will become even more important to evaluate decisions regarding equipment purchases in the light of careful needs assessments. Further, to presume that printers are routinely warranted falls too easily into the trap of hard-copy output at a time when technological developments make several other alternatives possible, or even preferable—depending, of course, upon what the patron actually needs.

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# Managing Online Search Statistics with dBASE III Plus


**Susan C. Speer**


The activity level of a reference department is often judged by an examination of the number of online literature searches performed in a month or year. A variety of agencies—state and national government, professional, and accrediting—requests the numbers for statistical comparisons between libraries and for accreditation purposes. Maintaining statistics on the number of searches performed by vendor, purpose, or any key is a time-consuming task, usually done with hash marks and subject to a high degree of human error.

In the spring of 1986, the Health Sciences Library at East Carolina University School of Medicine developed a program for managing statistics about online literature searches. The program is written in dBASE III Plus and runs on an IBM PC/XT with 512K and two floppy drives. Not only does the program report the number of searches done, but it also calculates charges to departments and individuals and prints end-of-the-month invoices for users unassociated with the university but with standing accounts.

## PROCEDURES

Search requests are recorded in a log at the time of receipt (see figure 1). Listed


Susan C. Speer is Systems Librarian at the School of Medicine, East Carolina University, Greenville, North Carolina.


FILES: B = BRS, N = NLM, D = Dialog

PURPOSE: P = PATIENT CARE, R = RESEARCH, E = EDUCATION, M = MANAGEMENT

SENT TO: H = Hold Self, P = PCMH, D = Delivered by HSL, V = Van, US = US Mail, C = Campus Mail

| PATRON'S NAME OR LIB. SEARCH | DEPT OR STATUS | DATE REQ. | TOPIC | LIB. | DATE DONE | # | EACH FILE SEARCHED | BRS SES. NO. OR DROPPED OR BLANK | TIME IN EACH FILE | COST IN EACH FILE | PHONE | TOTAL (COST & PHONE) | PURPOSE | SENT TO | COST AND BILLING (RECORD ALL COSTS) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | ECU OR PCMH | OTHERS |
| | | | | | | | | | | | | | | | | |
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*Fig. 1. Search Log.*

data include the name of the requestor, a brief statement of the topic, date of the request, and initials of the librarian who will run it. On the back of the search request form, the librarian first records the time and cost in each file, the vendor, and when available, BRS session numbers. This is not a requirement of the system or the department but a habit most searchers have developed to allow themselves to run more than one search in a session. Later the data are transferred to the search log. Twice a week the technician enters data for completed searches into the database file. Data entry takes about one hour for recording approximately fifty searches. This batch data entry frees the microcomputer for searching and word processing.

Eliminating the log was considered. It is an extra step for the librarian, and the search request form could serve as the source document for data entry. However, the log is often checked to see if a search has been completed and, if so, if it was mailed or placed on the "hold" shelf. The microcomputer is too heavily used to allow for such ad hoc querying.

## THE PROGRAM

The main menu has four options: data entry, monthly reports, invoice printing, and exit to dBASE III. Data entry is done through formatted screens rather than the dBASE APPEND mode (see figure 2). Each screen or record in the database usually represents one line in the log book. When more than one database is searched for a particular topic, constant data such as the patron's name, department, and account are automatically carried forward to the next screen and record. Data for SDIs and manual searches are also entered and reported on the list of searches done by vendor, allowing separate monitoring.

All data are entered in capital letters for consistency. The programs are written to report data exactly as it is entered. For example, if the department SURGERY was misspelled on one record, the monthly cost report might show

*SURGERY* $110.00
*SURGREY* $15.00

If a controlled vocabulary of departments were used, the charge to *SURGREY* would not be accounted for, since it did not match data for *SURGERY*. By avoiding a controlled vocabulary list for departments and librarians, the programmer is freed from modifying the program every time a department is added or has a name change. Also, typing errors are dealt with and reported.

```
                                    ADDING SEARCH DATA
==========================================================================
  Search ID: 001
  Patron: BURLINGHAM
  Department or Status: MICRO
  Bill to (grant, account #, cash, trip, dept): MICRO
  Topic: VIRAL INFECT.

                    Searcher's initials: SS
                    Number of intellectual searches:          2
                    Turnaround time:          0

                                    System (B,D,N,M,S): B
                                    File searched: MESH
                                    Session #: 12345
                                    Time:  4.34 Cost:  3.12
                                    Purpose: E
                                    (E)ducation; (M)anagement; (L)ibrary
                                    (P)atient care; (R)esearch; (O)ther
==========================================================================
 Is this OK?
READ            ||<C:>||REFSRCH                ||Rec: 1/79          ||      ||   Caps
```

*Fig. 2. Screen for Data Entry.*

After all searches are entered for the month, the technician runs the statistics programs against the database. Monthly reports include the number of searches by vendor, by purpose, and by librarian (see tables 1–3). The librarian's report includes an average turnaround time and the number of searches performed and charged to the library. A list of charges to each account is generated, and invoices are produced for certain groups of users (see table 4).

Data are kept for one month. After discussing the possibility of keeping archival copies on floppy disks, the head of reference determined there would probably not be a need for retrospective searching or examination of the data. Archival storage is not needed for calculating annual statistics, as these are done separately by the Administrative Department.

An unexpected benefit of the database is derived from the cost data. Different departments require charges incurred by their clientele to be reported differently; the program is often modified to create reports accommodating these requests. For example, while most of the medical departments are satisfied with knowing simply how much they owe, others want to know which of their faculty members incurred

*Table 1. Number of Searches by Vendor, March 1987*

| | |
|---|---|
| BRS | 232 |
| NLM | 8 |
| Dialog | 8 |
| Manual | 0 |
| SDI | 93 |
| Other | 0 |

*Table 2. Number of Searches by Purpose, March 1987*

| | |
|---|---|
| Education | 43 |
| Library | 59 |
| Management | 9 |
| Patient Care | 21 |
| Research | 109 |
| Other | 7 |
| Purpose Unknown | 0 |

*Table 3. Report Summary by Searcher, March 1987*

| Searcher | # of Searches | Average Fill Time | HSL Searches | Cost to HSL |
|---|---|---|---|---|
| | 0 | — | 0 | 0 |
| AC | 70 | 0.27 | 0 | 0 |
| JB | 46 | 0.02 | 46 | 75.04 |
| JW | 35 | 0.17 | 6 | 10.14 |
| MS | 1 | 0.00 | 0 | 0 |
| PB | 96 | 0.30 | 6 | 10.83 |
| ZZ | 0 | — | 0 | 0 |

*Table 4. Report Summary by Department*

| Dept. | Cost |
|---|---|
| | 0.00 |
| ADM #2-66240 | 4.70 |
| ANAT #4-30491 | 8.04 |
| ANAT #5-80261 | 9.70 |
| BIOCHEM | 63.13 |
| CAHS | 10.86 |
| CARDIO | 24.89 |
| CASH | 325.14 |
| CLIN PATH | 60.67 |
| CLIN PATH #3-58180 | 60.41 |
| COHE | 44.14 |
| DEAN'S OFF | 18.16 |
| EAHEC | 55.76 |
| EMER MED | 140.18 |
| FPC-F | 85.00 |
| FPC-F #261001 | 20.94 |
| FPC-F#4-30463-2300 | 7.41 |
| FPC-F#5-00531-2600 | 0.96 |
| FPC-R | 2.80 |
| INT MED | 148.23 |
| LIB | 96.01 |
| MICRO | 60.72 |
| NURS #2-37000-2300 | 81.67 |
| OB/GYN | 59.03 |
| PATH | 32.74 |
| PCMH #613 | 1.54 |
| PCMH #629 | 8.88 |
| PCMH #842 | 7.52 |
| PCMH #871 | 12.45 |
| PCMH #903 | 7.43 |
| PCMH #904 | 19.32 |
| PCMH #91072 | 7.25 |
| PCMH #911 | 4.52 |
| PCMH #972 | 4.42 |
| PCMH #982.37 | 14.00 |
| PCMH #987 | 6.80 |
| PEDS | 82.31 |
| PHARM | 36.80 |
| PHYSIO | 6.88 |
| PSYC | 32.61 |
| RAD ON #2-78502 | 64.33 |
| RADIO | 36.43 |
| SHARED RES | 12.38 |
| SOCW #2-35200-3800 | 5.32 |
| SOCW#2-35200-3800 | 8.67 |
| SURG | 190.34 |
| SURG #10541-2300 | 8.15 |
| TRIP | 65.13 |

the charge and how much it was (see table 5). Another department wants charges for faculty listed separately from those for medical residents. With the use of the database, these requests are easily handled.

## CONCLUSION

Since we began using the program, the time needed at the end of the month to generate monthly statistics has dropped to twenty minutes of computer time. Before the program was implemented, the half-time technician recorded statistics daily but still could not get the final report ready by the fifth of each month. The program requires approximately eight hours of staff effort each month, where the manual system required at least sixteen hours. The program has not only allowed for greater productivity in the department but for better management of the billing process. And, we are able to meet our original goal of more accurate reporting of our search activities. ■■

*Table 5. Report Summary of Searches for FPC-F, March, 1987*

| Patron | Cost |
|---|---|
| DAUGHERTY, JANICE | 1.72 |
| DEWITT, DONALD | 2.36 |
| MAY, HAROLD | 1.00 |
| DEWITT, DONALD | 2.18 |
| RACZEK, JAMES | 6.33 |
| BEATY, LARRY | 10.35 |
| KERR, COLIN | 14.22 |
| NIEMAN, LINDA | 42.99 |
| HAWKINS, DAVID | 3.85 |
| THOMAS, ROGER | 20.94 |
| SYMANS, JOHN T. | 7.41 |
| BURGE, DR. | 0.96 |
| Total | 110.41 |

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# News and Announcements

### Columbia University Law Library Installs Online Catalog

Columbia University's Law Library has installed an online catalog developed by Innovative Interfaces Inc., Berkeley, California. INNOPAC is fully integrated with the library's previously implemented INNOVACQ system for acquisitions and serials control.

The catalog is updated whenever new orders are placed and serials are checked in; the library enters newly cataloged materials into the RLIN database, and these records are simultaneously transmitted to INNOPAC by means of an online interface.

INNOPAC's search statistics program will provide important collection management information. Online tracking of all searches enables the library to analyze levels of collection use and to identify where new acquisitions or catalog cross-references may be necessary.

The library has named the catalog PEGASUS and is making it available to the Columbia Law School community through a local area PC network. Links with the libraries at the New York University School of Law and the Association of the Bar of the City of New York have also been established.

Innovative Interfaces has developed and marketed library automation products since 1978; its systems can be found in more than 150 libraries. ■■

### Carlyle in Minnesota

Carlyle Systems, Inc. has been chosen to install a shared automated system for the Cooperating Libraries in Consortium (CLIC), located in the Minneapolis/St. Paul area. The system will support 150 terminals and provide access to the libraries' combined holdings of 520,000 bibliographic records and 2.5 million items. The libraries have dubbed the system CLICnet.

The system installation, to be divided into four stages, will include online catalog, circulation, cataloging input/edit, OCLC interface, authority control, acquisitions, and serials control modules. The first stage will be installed in July 1987.

Incorporated in 1969, CLIC facilitates resource sharing among seven liberal arts college libraries and one private reference library in the area. Included in the consortium are Augsburg College, Bethel College, Concordia College, Hamline University, Hamline School of Law, James Jerome Hill Reference Library, Macalester College, College of St. Catherine, and College of St. Thomas. ■■

### OCLC and RLG to Collaborate in Development of Technical Standards

Research Libraries Group, Inc. (RLG) and Online Computer Library Center (OCLC) have agreed to work cooperatively toward the development of computer-related technical standards by national and international standards organizations.

Under the agreement, OCLC and RLG will meet regularly to consider computer-related standards relevant to both organizations. Whenever there is agreement and where it is practical, a single individual will be selected from the two organizations to represent their mutual interests on standards committees, subcommittees, and similar groups. The selected representative will keep both organizations informed of relevant activities, decisions, and reports. OCLC and RLG will share the costs of this joint representation on standard bodies. ■■

### Consortium of Libraries Joins Western Library Network

Five major libraries have formed a consortium to become the ninth software li-

censee of the Western Library Network (WLN), including libraries at Columbia University, New York; University of Cincinnati; Indiana University at Bloomington; Brown University, Providence, Rhode Island; and the Metropolitan Toronto Library.

Ronald W. Jonas, director of Administrative Computing at Indiana University, was elected by consortium representatives to act as lead agent for the group. According to Don Grinstead, library automation project leader for Administrative Computing, Indiana University will coordinate consortium-related activities.

The idea of a coordinated effort is the key to the consortium, according to Grinstead. Under the plan, if one of the members has a particular problem, it would contact Indiana, which would make the proper contacts to provide a solution. This information would then be disseminated to all consortium members. "We want to share problems and fixes within the consortium," Grinstead said.

The five consortium members were customers of Biblio-Techniques, Inc. (BTI), which went out of business in late 1986. The BLIS software developed by BTI incorporates many features of the WLN bibliographic subsystem, as well as tailored database load programs.

"When it became clear that the vendor would no longer be able to support the BLIS software," Grinstead said, "all the customers gathered in Bloomington to discuss their future plans. After examining all alternatives, each customer reached the same conclusion that had drawn them to the WLN software in the first place. The functionality provided by the WLN bibliographic subsystem combined with the enhancements developed by Biblio-Techniques would enable each site to deliver a highly usable integrated library system."

Indiana is presently in the process of installing the 2.4 version of the WLN bibliographic subsystem in conjunction with the BLIS software; the other consortium members will continue to use the WLN version 2.2 software to "stabilize" their systems. Once Indiana has established its installation, they will assist the other consortium members with their migration to WLN 2.4/BLIS.

WLN, a division of the Washington State Library, provides computer-based service and products to participating members. In addition, it has licensed its software to institutions around the world. National libraries in Great Britain, Australia, and the People's Republic of China, as well as libraries at University of Illinois and University at Missouri are among current WLN licensees. ■■

### MELVYL/MEDLINE Funded for Second Year

The University of California has received a continuation grant of $183,191 from the National Library of Medicine to fund the second year of the MELVYL/MEDLINE Project. This grant covers a project period of April 1, 1987, through March 31, 1988, and brings the total amount awarded this project under a three-year Medical Library Resource Project Grant to $361,156.

The project will make the current three-year file of the National Library's MEDLINE database available throughout UC on the MELVYL online library catalog. MEDLINE provides online access to articles indexed from approximately 3,000 health science journals and is a primary source of information in the life and health sciences for research, teaching, and patient care.

The Project is being accomplished as a joint effort of the Division of Library Automation at the Office of the President and UC health sciences libraries. It will provide all UC faculty, staff, and students increased access to biomedical information and will serve as a model of online catalog service for a multicampus system that combines listings of books, periodicals, and journal articles. ■■

### Utlas M/Series 10 Local System Enhanced with Four Features

Utlas International has announced four enhancements to the M/Series 10, a microcomputer-based local system for libraries. They include doubling of database size, addition of Boolean searching, expan-

sion of networking capabilities, and addition of inventory control.

The most significant enhancement is the doubling of the database size from 50,000 to 100,000 records. The library's individual file is in full MARC format, including authority control, and the M/Series 10 database is created from this file using Utlas' production facilities. Complementing the larger database is the expansion of the networking capabilities of the M/10 to eight workstations, including seven online public access catalog workstations and one circulation workstation.

The addition of Boolean search capability allows AND, OR and AND NOT to be used in a search command, enabling a patron to be more specific by combining more than one search term.

Libraries will be assisted in managing their collections by the addition of inventory control to the circulation module. Books on the shelves are read by a portable scanner and the data loaded into the PC to be compared against the database. The inventory module then creates a printed report of all unaccounted books.

The M/Series 10 operates on an IBM PC or 100 percent compatible and is specifically designed for the small library's needs and budget—it is particularly popular with school libraries. The M/10 features an integrated online public access catalog and a circulation control module. ■■

### Introducing LS/2000 Biblio-Link

Personal Bibliographic Software, Inc., and OCLC Local Systems announce the development of LS/2000 Biblio-Link, a companion program to Pro-Cite. Biblio-Link will allow users to transfer search results from their LS/2000 system directly into a Pro-Cite database and to generate formatted bibliographies in a variety of citation styles.

With any of the indexes—such as a keyword—defined in their system, users may transfer downloaded records. Using the LS/2000 Biblio-Link, they may produce bibliographies using the American National Standards Institute (ANSI) standard for bibliographic style or using styles recommended by the American Psychological Association, Modern Language Association, *Science* magazine, *The Chicago Manual of Style*, and Kate Turabian's *Handbook for Writers of Term Papers, Theses, and Dissertations*, or any user-defined style.

Users can combine their records with manually entered records or those from other online systems using other Biblio-Link programs. Biblio-Links are currently available for OCLC, RLIN, BRS, Dialog, and MEDLARS. Once in Pro-Cite, the records can be sorted, searched, indexed, and printed according to any specifications.

Use of the Biblio-Link programs requires an OCLC M300 workstation, IBM PC, PC/XT, or PC/AT with at least 256K RAM, one double-sided diskette drive, and DOS 2.0 or higher.

The Biblio-Link software will be available this summer to LS/2000 users through the marketing department in the Local Systems Division. The cost will be $200, which includes one program diskette and a manual. Pro-Cite software is available from OCLC and Personal Bibliographic Software, Inc. ■■

# Recent Publications

*With this issue of* Information Technology and Libraries, *we begin a regular software review section. Appearing in this new section will be reviews of library-specific software written for Apple microcomputers and IBM (including IBM-compatible) personal computers and systems. Readers wishing to contribute software reviews should contact David T. Buxton, A349 Main Library, University of Arizona, Tucson, AZ 85721, indicating which hardware and operating system software they have available to them. Readers wishing to contribute book reviews should contact Karin A. Trainer, Yale University Library, 120 High St., P.O. Box 1603A, Yale Station, New Haven, CT 06520.*

## Book Reviews

***Dollars and Sense: Implications of the New Online Technology for Managing the Library.*** Ed. by Bernard F. Pasqualini. Chicago and London: American Library Assn., 1987. 118p. paper, $10 (ISBN 0-8389-3338-6). "Proceedings of a Conference Program held in New York City, June 29, 1986 [by] Machine-Assisted Reference Service Section, Reference and Adult Services Division, American Library Association."

This slim book, composed on a Wang word processor, is a compilation of conference papers focusing on the efficient use of resources (dollars) that make sense. Its twelve short papers are well distributed among the individuals directly involved in online technology. The contributors include five librarians, three industry representatives, one trade publication editor, and one educator. The aim of the book is to "widen the vision of librarians, information specialists, managers, and library administrators concerning online services in their libraries." The accomplishment of this goal will depend on the extent of the reader's familiarity with online technology.

The collection starts with an eloquent argument for a radical change in library budget priorities. B. Quint recommends shifting the emphasis from the support of traditional operations such as cataloging to fully developed "collection-access databases." The second paper (G. M. Porter) is pragmatic in its approach. It offers guidelines that are based on costs of services and on simplistic, commonsense rules of good management, such as anticipation of demands for services or availability of resources.

The next two articles offer a laundry list of different ways to save costs (M. Kesselman) and a checklist of items for consideration in selecting new services (J. J. Maloney). The impact of online services is discussed in terms of its influence on librarians' behavior (B. Nielsen) and on a variety of other library operations (R. Kroll). Nielsen's paper is the most reflective presentation in the collection. It is based on his dissertation, for which he studied the responsiveness of the librarian to the client in libraries offering free or paid online services. Using a conflict sociology model he concluded that in the libraries providing services for a fee, librarians were more responsive to their online service clients. However, they were also involved in more clerical work than the librarians offering the same services free of charge. Nielsen concludes that because of this misuse of professional staff "the fee . . . distorts the overall allocation of service provided in a general reference department." Kroll reviews the macroeconomic impact of online services on other library activities as ripple effects, among which are the changing role of the reference librarian and a need for new ways of funding online services. Those

changes affect "the library's prevailing internal philosophy toward the place of online in the library and the role of the library in society."

V. A. Anderson and D. L. Graham describe a simultaneous remote-searching method used in Oregon. E. A. Titus suggests ways of using the computer in compilations of online reference statistics. J. J. Regazzi sketches a background for H. W. Wilson Company's information-handling techniques and its electronic publishing program. J. T. King clarifies confusions associated with front ends and gateways, while D. Meglio provides sober prognosis for a future full-text, online delivery.

A wrap-up paper by J. H. Sweetland answers his own "what-does-it-all-mean" question: "the fee/free issue," the author maintains, "is finally dying its long-deserved death . . . the issue is really who pays for it, and how." He offers a brief historical explanation for this prolonged dialogue and then speculates on future trends, which may include the enlargement of the librarians' roles as teachers and consultants, easier funding, and improved technology.

The prevailing theme of the collection is justifiably optimistic. Unfortunately, a few hurdles will have to be overcome before new technology replaces the old one. Thus, for example, a desire for revolutionary changes in library management, expressed in the keynote paper, ignores the fact that today's databases cannot yet replace traditional library collections, cataloging, or construction of buildings. This in turn means that the fee/free issue is not yet dead, at least not in the majority of libraries. Then there is the problem of many users' reluctance to pay anything for online services, and of their unwillingness to use cheaper, after-hours services. The multiplicity and redundancy among commercial databases, coupled with the vendors who prefer more popular subjects and ignore important but less frequently requested information, contribute to the problems of administering online services. Furthermore, the information industry's insistence that information as a consumer product ought to be marketed by the for-profit organizations without government competition may emerge as the most chilling and long-range implication of the online technology for managing the library. This, however, is another issue, ready for another conference.

Overall, the book is written in a consistently readable English, with a number of references to the most current citations. Its emphasis on practical aspects of online technology will appeal to the intended audience. The book is of real value to novices as an introduction to the field. It also offers a good overview to others, as a number of often-dispersed facts are gathered together here. The two appendixes, prepared by members of the RASD/MARS Cost and Financing Committee on funding methods and reference services costs and budgets, provide an additional and useful outline for understanding the value of online technology. However, the very currency of the approaches—with little or no theoretical underpinning in this fast-developing field—will contribute to the book's obsolescence within the near future.

The obsolescence will call for an update of the information provided in this collection, but it will not negate it. Hence, an expenditure of $10 to purchase this book is a good and highly recommended investment.—*Joseph Z. Nitecki, University at Albany, State University of New York.* ■■

*Hafter, Ruth. Academic Librarians and Cataloging Networks: Visibility, Quality Control, and Professional Status.* Contributions in Librarianship and Information Science, no. 57. New York: Greenwood, 1986. 153p. $29.95 (ISBN 0-313-24821-4).

The first thing to know about this book is that it is not really about academic librarians or cataloging networks. It is about catalogers using networks and the changes that that relationship has wrought in the professional cataloger's job and status.

To someone concerned with the future of catalogers, Hafter's work may read like an adventure novel. It's tempting to consume it in gulps, skimming the details in order to find out what happens next. The work is worth reading carefully, however, for its descriptions and information, and for the

many bon mots suitable for reading aloud to friends or quoting in memoranda to library directors. As in an adventure novel, the protagonists find themselves in a terrible fix in the middle of the story. The ending is very modern in that catalogers may not "live happily ever after," but then again they may.

Hafter hypothesizes that library participation in bibliographic networks creates new processes for evaluating the work and status of professional catalogers, leading to deprofessionalization of the work, a shift in control from catalogers to library administrators and network personnel, new emphasis on cataloging peer groups, and differing views about quality control standards espoused by catalogers, administrators, and networks. The hypotheses are investigated primarily through interviews with catalogers and administrators at six academic libraries in California and Washington and with network personnel.

Hafter's description of cataloging conveys the atmosphere—"change, conflict, ambiguity . . . multiplicity of standards, and the need to make judgments" (p.18)—in which cataloging is performed. Her description of network operations emphasizes quality control mechanisms and traces the ways in which evaluation and standard setting are usurped by the networks.

The chapter on professionalism is less dull than many such literature reviews because it stresses specific relevancies to cataloging and catalogers. It is in this chapter that the protagonists begin to get into serious trouble. Hafter insists that use of computers detracts from the status of catalogers by making it appear that cataloging is a prosaic production activity. This prompts administrators to begin questioning the expense of the operation and to start insisting that its cost be justified by demonstrable benefits to users.

Most of the catalogers interviewed believed that their status had been adversely affected by introduction of computer technology to cataloging. They bemoaned an overall reduction in quality, attributing it to acceptance of other libraries' cataloging, to substitution of network for local standards, and to administrative pressure for quantity. Administrators increasingly saw catalogers as having too narrow a focus to make the best judgments for users, and doubted whether they should have policy control over their own work.

Finally, just as the protagonists hit bottom, there begin to be hints that although catalogers will be changed by their experience, they may still survive. Survival will come as the result of shifting allegiances among the principles, in which no faction dominates. Network error tallies challenge libraries' right to set and enforce standards for themselves; administrators' successful fight for acceptance of substandard cataloging demonstrates limits to network power; alliances between networks and catalogers in support of high-quality original cataloging establish catalogers as essential partners in evaluation and standard setting.

Hafter describes catalogers as judgmental perfectionists convinced of the value of their work and of the standards to which they adhere, who rely for approval on groups of their peers. The visibility of cataloging on a network database enhances catalogers' ability to judge each others' work, and relocates the peer group from the local department to the nation of catalogers and network personnel. Visibility makes identification of "master catalogers" possible, and networks provide a framework for bringing these catalogers together in advisory committees, enabling them to reassert their professional standing through participation in the formulation of standards.

The authoritativeness of Hafter's conclusions is not assured. Her sample is small and geographically constricted. Little systematic analysis of results is evident in the text. The catalogers interviewed seem to have been a relatively homogeneous group that may be unrepresentative of catalogers as a whole. Despite these limitations, the work is worthwhile. There have been scores of opinion pieces written about the impact of bibliographic networks on cataloging, but most have been short, superficial, and written from an administrative viewpoint. Few have probed the characteristics of catalogers other than to accuse them of perfectionism (a pejorative term), fiscal insensitivity, and organizational myopia. Few have considered networks in other than

mechanistic or statistical terms. Hafter has done both. It is possible to disagree with Hafter's conclusions, and possible to disagree with opinions expressed by her interviewees. It is not advisable, however, to dismiss them.

This short volume is a "fast read" and should not place an undue burden on any librarian's time. It is recommended for current and prospective professional catalogers, for those who administer them, no matter how remotely, and for those who teach them. As a study in the impact of one technology on one group, it could also be valuable to those studying the impact of technology on any group.—*Janet Swan Hill, Northwestern University Library, Evanston, Illinois.* ■■

***Human Aspects of Library Automation: Helping Staff and Patrons Cope.*** Ed. by Debora Shaw. Clinic on Library Applications of Data Processing, 1985. Champaign, Ill.: Graduate School of Library and Information Science, Univ. of Illinois at Urbana-Champaign, 1986. 129p. $15 plus $1 postage (ISBN 0-87845-072-6).

A collection of papers from the twenty-second annual Clinic on Library Applications of Data Processing, editor Shaw's book serves as a compact guide to automation's impact on library staff and users. A quick and interesting read, the collection ranges from a psychological study of resistance to automation to a discussion of the legal environment of library privacy. A good index makes for easy access to this broad variety of studies.

Resistance is the key word in psychologist Sara Fine's excellent opening essay, "Terminal Paralysis or Showdown at the Interface." Fine examines in turn the discovery, effect, treatment, and ultimate necessity of resistance to technological change. Bringing the psychological masterfully to bear on the automation question, she confirms that 20 percent of the library staff will in some fashion resist technology. Active and passive resistance, ambivalence, and the worsening work habits that may emerge from resistance are all here, clearly explained for the library manager, whom Fine cautions to respect resistance, try to understand it, and attempt to talk through it. She closes by underlining her main point: it is out of resistance that caution and reason may emerge, as well as that energetic tension that leads to real growth and productivity.

Marvin J. Dainoff changes the focus to the physical with his "Learning from Office Automation: Ergonomics and Human Impact," a treatise somewhat long for its substance. Concentrating on the ergonomic nature of visual and musculoskeletal strain among VDT users, Dainoff examines the adjustability, support, and provision for movement of the coherent work station. He explains functions such as focusing and adapting to varying degrees of brightness and how they can lead to eyestrain. Dainoff closes with a nod to the multitude of other ergonomic factors, such as keyboard layout, not discussed here but in his own book.

In "Personnel Considerations in Library Automation," Margaret Myers' purpose is to raise the right personnel questions that library administrators should ask throughout the entire cycle of the automation project. She wisely counsels examining the potential impacts on personnel during the earliest planning of the automation project. She examines casually, but thoughtfully, personnel aspects ranging from staffing patterns and job design to performance evaluation and management/labor relations. Her own informal survey and her awareness of the field and its literature together reveal a variety of responses to automation in the library world. On the one hand, she notes libraries' general reluctance to make significant changes to administrative structures in the face of automation. On the other, she notes new positions, eliminated positions, upgrades, and downgrades, all resulting from electronic advancement. She closes with a summary list of thought-provoking questions for the library administrator.

In "Automation Planning and Implementation: Library and Vendor Responsibilities," Jane Burke applies political savvy, common sense, and genuine human concern to every phase of the library automation planning and implementation process. In a frank and casual presentation, she en-

courages realistic acknowledgment of vendors' motivations, realistic analysis of the political and economic atmosphere surrounding the automation project, and realistic planning for staff fear and resistance. Paramount is her constant concern for staff awareness, education, involvement, and sympathy throughout the project. Admirable is her encouragement to offer common courtesy to vendors by informing them of plans and decisions; questionable is her encouragement "to protect them a bit" because of their relatively small size "in comparison to real-world companies," (p.52–53). This minor gripe aside, Burke deserves much credit for her relentless concern for the library staff throughout the automation project.

In "Panel Discussion: Reports on Staff Involvement in Library Automation," Judith A. Drescher, Christopher Syed, Barbara Shaw, and Stella Bentley each open with a statement on staff involvement in their respective libraries and then share a discursive conversation on the topic. Clearly, they agree, library directors, vendor training personnel, library staff, database managers, and systems personnel all believe that maximum staff involvement produces the best automation project. Such involvement reduces fear, develops a team approach, gives staff a stake in the system, increases the chances of catching problems early, and increases the library-wide communication necessary for a successful project. Though a transcription of a somewhat choppy panel discussion, this paper provides valuable, honest reports of real mistakes made in library automation projects.

In "Online Catalogs and Library Users," Anne Gilliland discusses user-centered variables important to the management of an online catalog. Her encouragement to observe, analyze, and adapt to the user pervades the discussion. She underlines several times the need for a user interface that accommodates all levels of users; she offers lists of methods for instruction and for use analyses. Hers is a somewhat scattered discussion, variously touching on user analysis, system promotion, online help, the user interface, the physical varieties of terminals and their settings, the option of local printing, system instruction, and COM catalog backup. This bunch of concerns is tied together, though, by the fundamental theme of concern for the library user.

In "Online Catalogs and Specialized Clienteles: Children and Youth," Susan Roman opens with the often-heard statement that today's children are more sophisticated than ever. Finding literature on the subject of children and online catalogs, she alone offers her demand that children be considered in the online catalog planning process and that terminals appear in the children's section. For the bulk of the article, her demand rings rather empty. The staff involvement in her own library reveals benefits of children's department terminals that, sad to say, emerge mostly as increased conveniences for adults. Parents won't have to walk so far; staff won't have to pull cards. But what about the kids?

Then, in her final two pages, Roman marshals her forces. Children like the bright screens; staff can remain in the department to provide more service; children are increasing their use of the catalog, requesting dial-access, asking for more interlibrary loans; the catalog encourages accurate spelling in the children; it reinforces their basic computer literacy. Now we've quickly becoming convinced.

In "Online Services and Specialized Clienteles: Handicapped and Other Populations" Leslie Edmonds reminds librarians of their legal and moral responsibilities to provide access to library services—in this case, the online catalog—to the disabled, the elderly, and the non-English speaking. She calls for appropriate physical access, suitable training, patience, awareness, and the avoidance of stereotyping and condescension. Though some of her goals—large print screens for the elderly, non-English databases for the non-English speaking, separate catalog software for the hearing-impaired and the intellectually impaired—seem sadly somewhat unrealistic, Edmonds' dedication to these special client groups in commendable.

In "Designing Effective Instructional Brochures for Online Catalogs," Mark W. Arends provides an excellent, comprehensive, explicit, and pertinent survey of brochure design for the librarian. Stressing that the common problems with library

brochures are most often not related to content but to visual presentation and readability, Arends addresses the physical aspects of instructional handouts. He includes advice on everything from title page, paper choice, and typography to format, borders, and white space. Eminently clear and sensible, Arends' piece should be mandatory reading for anyone attempting to design brochures or instructional handouts for any aspect of the library, including but not limited to the online catalog.

In "Library Privacy in Context," Jonathan Pratter attempts not to answer but to raise the difficult question of library privacy. He surveys contemporary definitions and values of privacy; explains the basic principles of fair information practices; examines the legal environment of the problem, including a critique of the ALA Policy on Confidentiality of Library Records; offers practical suggestions like purging old circulation records; and closes with a look at the implications of the computer on the library privacy question. Resting on a solid intellectual base, Pratter's paper is a good primer or refresher on the fundamental question of the confidentiality of library circulation records.

In sum, any library administrator involved in or considering a library automation project could benefit from this book. His/her awareness of the impacts of automation on staff and patrons will doubtlessly be raised to new heights. In her selection, Shaw provides a breadth of coverage difficult to surpass.—*Thomas E. Klingler, University of Akron, Ohio.* ■■

*McQueen, Judy, and Richard W. Boss. Videodisc and Optical Digital Disk Technologies and Their Applications in Libraries, 1986 Update.* A *Library Technology Reports* Monograph. Chicago: American Library Assn., 1986. 155p. paper, $25 (ISBN 0-8389-7041-9).

Optical disk and videodisc technology has exploded on the scene over the past two years, but it has been difficult to find an affordable single source to make sense out of the evolving technology. Judy McQueen, vice-president of network service at Library Systems and Services, Inc., Rockville, Maryland, and Richard W. Boss, senior consultant at Information Systems Consultants, Inc., Bethesda, Maryland, have compiled an excellent monograph which provides an overview of optical technology. Analog video program material, typical of the laser videodisc, and digital data represented as binary encoded information on media such as CD-ROM and compact audio discs are examined along with a wide variety of large-format, optical digital data disks. The report format provides a detailed yet clear explanation of each technology. There are few illustrations but those provided enhance understanding. The major purpose of the work is to update an earlier report, *Videodisc and Optical Digital Disk Technologies and Their Applications in Libraries*, released in limited quantities during 1985. Since optical systems have such immediate applications in libraries and other information settings, the authors have shown great concern with ways to use the new technology.

The authors have made a sincere attempt to assist beginners in grasping the relationships between and among systems. The advantages and disadvantages of each system presented are carefully noted. It should be noted that the spelling of videodisc with a *c* and optical digital data disk with a *k* is consistent with the practice in professional engineering and information literature. The videodisc has its roots in an analog storage device and the compact audio disc is related to the spelling of phonodiscs. Optical data disks have evolved primarily as a computer peripheral.

Librarians will be particularly interested in the descriptions of systems and information products that are specifically designed for library reference services. System integrators will be especially concerned with economic comparisons between different optical formats and their associated hardware. Any course dealing with image and information systems could be well served with this publication as a required, or optional, text. Educators and trainers will find the information on interactive videodiscs valuable.

The report is organized around the most important systems currently available, but

information is given about systems that have not yet reached the market, such as erasable optical media, which will involve a number of competing technologies. The twelve sections are divided as follows: (1) an overview of optical media and the potential for library and information applications; (2–5) videodiscs and their interactive use, digital data on the videodisc and videodisc production; (6) audio compact discs and CD-ROM; (7) videodiscs and CD-ROM as digital publishing media; (8–10) optical digital disks, optical digital products, and erasable optical media; (11) applications of videodiscs and CD-ROMs in libraries and other information settings, including digital data publishing; and (12) library and information applications of optical digital disk technology. The appendix provides useful information on the processes of converting text, graphics, images, and sound to digital form. Optical character recognition combined with scanning is also discussed. One very serious shortcoming is the lack of an index or glossary, which will probably hamper use by novices seeking to learn about the capabilities and potential of optical technologies in information and training environments. A dual-column format with a professional publishing or laser printer font would have been preferable to the full-width page of text in a standard typewriter font. Nonetheless, this publication is a must for information professionals. System prices quoted as examples change quickly, so that price estimates can't be taken as gospel.—*David W. Hessler, School of Information and Library Studies, University of Michigan, Ann Arbor.* ■■

***Smith, Milburn D., III. Information and Records Management: A Decision-Maker's Guide to Systems Planning and Implementation.*** New York: Quorum, 1986. 285p. $39.95 (ISBN 0-89930-111-8).

Smith attempts to elevate records management from a corporate support function to a key element of information systems planning and implementation. To do so, he urges records managers to become involved in the design of office automation systems, the selection of computer hardware and software, the training of office staff in computer literacy, and the implementation of automated information systems. His guide provides records managers with an overview of information processing, storage, and retrieval systems ranging from traditional, paper-based, manual filing systems to optical disks. Micrographics, electronic record keeping systems, and optical disks are discussed in some detail to familiarize records managers with the numerous options now available for creating and storing modern records.

Smith argues persuasively that records managers cannot ignore the impact of computers and other modern record-keeping technologies on their roles and responsibilities. Unless records managers play a more active part in the selection of information technology and strategic planning for systems, users and management information specialists (MIS) are likely to usurp the records managers' role in information management, retrieval, and storage. Records managers need encouragement and guidance in order to respond to the challenges of new information technologies. Modern information systems are much more complex than the traditional paper files of the past. Moreover, they create records in many different storage formats and on storage media that are much less durable than paper or microfilm.

Unfortunately, this guide fails to provide records managers with systematic methods or procedures for controlling records created in a wide variety of storage and retrieval systems. Records managers need assistance with such problems as determining retention policies and procedures for electronic records, securing appropriate storage for magnetic tapes and floppy disks, and managing optical disk systems. These areas are not discussed in the guide, which is surprisingly traditional in its approach to records management procedures. It contributes nothing new to such areas as files management, inventorying records, or establishing retention periods for corporate records because these chapters are oriented toward traditional paper-based information systems. A records inventory that does not account for records stored in computer

systems excludes a vital portion of corporate information resources.

Smith's agenda for records managers is not spelled out clearly. Records managers should be involved in the design of automated information systems because procedures for records creation, updating, retrieval, and purging usually are incorporated into the system design. Without records management involvement at the design stage, procedures for the retention and disposition of records often are overlooked by systems analysts, who are concerned primarily with the immediate need to make the system operate. In this guide, however, the important new role of the records manager is confused with a much broader range of systems design and information management activities. Records managers should participate in decisions about retention of information in automated systems, security of electronic and optical records, choice of appropriate storage media, and design of electronic filing systems. At times, however, Smith implies that overall office automation and technology planning will become the domain of the records manager. Thus his guide blurs the role of records managers and MIS rather than delineating areas of responsibility for these closely related information specialists.

The guide also suffers from poor organization. Rather than devoting separate chapters to different records storage and retrieval systems, the treatment of topics such as micrographics, optical disks, automated systems, and paper files is scattered throughout the book. These topics are not discussed in a comprehensive manner and there is considerable repetition when a storage system is presented for the second or third time. Readers who are interested in one specific type of record-keeping technology or one aspect of records management will need to cull information from several different sections of the book.

The guide also contains some serious factual errors and unorthodox definitions. Optical disks, for example, are referred to as a "permanent medium" (p.75), even though this medium deteriorates within ten to thirty years. The legal value of a record is defined as "the difference between a firm's evaluation of the record's value and the government's" (p.121). Traditionally, records have legal value if they contain information that will protect a firm in the case of litigation or prove compliance with laws and regulations. Readers who are unfamiliar with records management could be misled by such vague and unconventional terminology. Moreover, the absence of a bibliography or citations, even for the numerous charts and references to survey data, makes some of the evidence presented less than convincing.

This guide attempts to do too much. It raises a host of challenges for the modern records manager, but fails to offer concrete solutions and concise guidelines that records managers can use to address these problems. In attempting to turn the records manager into an information systems designer, Smith overlooks the unique and vital role that records managers can play in managing modern corporate information resources.—*Margaret Hedstrom, New York State Archives, Albany.* ■■

## Software Reviews

***Polaris Windows.*** Produced by Polaris Software, 613 W. Valley Pkwy., Suite 323, Escondido, CA 92025.

***Flash-Up Windows.*** Produced by Software Bottling Company of New York, P.O. Box 15, Maspeth, NY 11378.

Over the last few years, microcomputer programming has become significantly easier. Programs known as utilities have been developed to perform programming's more mundane procedures and tasks, for instance writing subprograms for windowing. Some of these utilities have become so sophisticated that a few software savants have predicted the demise of the programmer within a couple of years or so. They envision well-articulated, powerfully designed, user interfaces that will bridge the gap between programming innocence and language, with the poor programmer swept away by the current of technological simplification and change.

Whether or not such prophecy will come to pass is an open question. Undeniably, however, programming utilities now

abound and have made life easier for the programmer. Moreover, a number of innovative and forward-looking software companies have capitalized on the user interface concept to produce utilities that promise to make the nonprogrammer's life more simple and exciting, putting programming power into the end-user's hands.

The programs under review are excellent examples of such powerful yet simple utility software. Both *Polaris Rescue* and *Flash-Up Windows* provide us with well-designed and reasonably easy-to-use TSR (terminate stay resident) programs that allow the design of personalized help screens that may be accessed within any application. *Flash-Up Windows* also gives us the ability to design menus, accessible within any application, from which we may select other self-designed help screens or send strings of code to execute commands in an application program, call other windows, go to other programs, or do anything else that could be accomplished by typing in commands.

### *Polaris Rescue*

*Polaris Rescue* is a simple and straightforward utility that allows you to create help screens that document the steps and procedures used to run your application programs. The program is RAM-resident; once copied directly or in a batch file to memory it remains in memory until summoned by pressing a "hot key". Once called, the help screen will temporarily mask whatever information the application program is showing, displaying text you have entered. You may leave this screen at any time and return to your program at the point where you left it.

*Polaris Rescue* is composed of two parts: the editor, which is used to create the help screens, mark the screen pointers, assign function keys, and establish levels of security, and the RAM-resident module, which, when loaded in your PC's memory, accesses a designated help file.

*Creating a Help Screen File.* Once you have decided what information you want to place in your help screen, you enter the editor. The main menu gives you the options of copying, deleting, renaming, compressing, or creating a help file. When you create a help file you are taken to the open menu, which displays the full range of editing functions that include text editing, copying to and from other help screens, deleting help screens, importing ASCII files into help screens, and establishing passwords. A third menu, the edit pop-up, is accessed while in any editing function and provides editing and housekeeping functions directly related to the screen you are creating—setting color and margins, assigning function keys, and so forth.

A single help screen is quite easy to create in *Polaris Rescue.* You enter the editor, select the option for creating a help screen, name your file and first screen and start typing. The more difficult part is the creation of successive help screens. Here you must think in terms of Chinese boxes, going through a number of steps that are well documented in the tersely written yet clear user's guide.

Basically what you do is to create a main menu for your various help screens, assigning function keys to access each screen. For example, if you have created ten help screens that detail various steps in library research, you would create a main menu that briefly described each step and asked the user to select a function key for more information. Of course, within each help screen you may also embed additional help screens, hence the Chinese box effect.

*Using Polaris Rescue.* Since *Polaris Rescue* is a TSR program, to access your help files you must load them each time you boot the computer. To simplify this loading, you may copy your help screen files by placing a command in your autoexec.bat file or by creating special batch files. You must also experiment with the various hot keys to determine if they will interfere with commands of the particular application program within which you are using your help screens. Although I have not run into any major problems while using this program within dBase III Plus or WordPerfect, the many well-known problems of a RAM-resident utility should be considered while running such a program.

### *Flash-Up Windows*

As a RAM-resident help screen utility, *Flash-Up Windows* matches the features of

*Polaris Rescue*. Using the window editor, you may create help windows containing textual information that can then be accessed from within any application program by typing a predesignated hot key at the keyboard, directly from a programming or command language or directly from DOS or a batch file.

Yet *Flash-Up Windows* is also much more than a TSR help-screen utility. Not only can you create useful help screens, you may also design menu items that, when selected, return a string of characters to your programs as if it were typed at the keyboard. These return codes can be made to execute commands, call other windows, go to other programs, or anything else that could be done by typing in commands.

*Editing Flash-Up Help Screens and Menus*. Like *Polaris Rescue*, *Flash-Up Windows* is comprised of two parts: the window editor and the flash-up module. Within the window editor you may specify window parameters, copy windows or portions of a window, select colors, and other utility functions. To create a help window, you simply enter the editor, name your help file, select a unique flash-up key, and begin typing. At this point you may also select window parameters, color, etc. Once the information has been entered you save the file to your window library, which must be loaded into RAM every time you anticipate using the help screens.

As with *Polaris Rescue*, you may load the RAM-resident module in a variety of ways—for example, via a batch file or as a command in the autoexec.bat file. Unlike *Polaris Rescue*, however, you do not assign your help screens function keys. Instead, you give them unique key combinations which can then be displayed within an application by using the main hot key (alt-home). Additionally, *Flash-Up Windows* may be activated by sending commands from a programming language or from a DOS batch file.

*Creating Flash-Up Menus*. The most sophisticated use of *Flash-Up Windows* is undoubtedly the ability to send commands to an application program from a menu window. Because it is so powerful, it is also the most difficult part of the program with which the nonprogrammer must deal. At the simplest, the process involves the creation of batch commands that are initiated from the menu—not too difficult to understand or accomplish. Less clear are the more advanced uses of return strings to send command messages to application programs, programming languages, and printers.

For example, menus to control systems for users, are simple to execute. A menu window "Main" could be designed to list four applications resident on a computer—word processing, DBMS, communications, DOS utilities. The return strings written to execute entry into these programs are the following:

```
wordstar:    cd \ ws<<enter>>ws<<Enter>>
communi-
 cations:    cd \ xtalk<<enter>>xtalk<<enter>>
DBMS:        cd \ dbase<<enter>>dbase<<enter>>
DOS utilities: cd \^W = DOS/
```

As you can see, a DOS-like batch file command language is being used to address the application programs that reside in their own root directories. This language is well described and documented in the user's guide. Various problems and interfaces with popular applications are also discussed in the guide. More difficult to understand and use, however, are those return strings that are executed within various programming languages. At this point we part company with *Flash-Up Windows* as a simple utility and enter territory full of assumptions and minimal documentation. Examples are given to activate a sample window file in BASIC, C, PASCAL, COBOL, FORTRAN, d-Base, and R:Base—helpful information—but, for the most part, you are left on your own.

*Comments*

*Polaris Rescue* and *Flash-Up Windows* could be extraordinarily useful for the nonprogramming librarian. As a personal tool, the help screen utilities of both programs could be used as an online means of documenting applications and library research procedures. On the interpersonal level, they could be used for basic instruction—guidelines for using the PC as a general or library-specific tool. For example, I am putting my versions of Dialog Bluesheets on a PC so that our reference department may

have online assistance when our librarians are using Crosstalk to access various online systems.

More innovative and powerful uses, especially with *Flash-Up Windows*, could also be imagined. I am experimenting with journal and author/concept hedges—predesigned search strategies—to upload while doing online searches. Perhaps files of such searches could be uploaded at the touch of specific key. Even a "hot" bluesheet could be envisioned where a menu would not only explain, for example, Dialog's *dt* = command but could execute it as well.

Again, users of either program should be aware of the problems of TSR software—its propensity to interface poorly with some application software. Neither of these programs, however, has shown any glaring problems in this regard. As for choice among them, specific features and cost may be deciding criteria. For $90, *Flash-Up Windows* allows you to use its windows to send commands to other programs and to construct help screens. For $149, *Polaris Windows* does not provide the command exporting feature but does allow the importing of ASCII files from other word processors, thus augmenting its already excellent screen-painting editor.

*Recommended System Requirements and Product Information*

*Polaris Windows*. Computer: IBM PC, PC/XT, PC/AT; COMPAQ; or any 100% IBM-compatible computer. Operating System: PC-DOS or MS-DOS 2.0 or higher. Memory: 256K for editor, 33K for RAM-resident program. Monitor: 80-column monochrome or color display. Other: Two 360K drives. Producer: Polaris Software, 613 Valley Pkwy., Suite 323, Escondido, CA 92025; (619) 743-7800. Price: $149. Copy protected: no.

*Flash-Up Windows*. Computer: IBM PC, PC/XT, PC/AT, portable; or any true compatible. Operating System: PC-DOS or MS-DOS 2.0 or higher. Memory: To create flash-up menus and windows—256K; to use the windows in a program—22K available, 20K minimum. Monitor: Any 80-column display, monochrome or color. Other: Hard drive or double density disk drive. Producer: Software Bottling Company of New York, P.O. Box 15, Maspeth, NY 11378; (718) 458-3700. Price: $90. Copy protected: no.—*Dennis R. Brunning, Arizona State University, Tempe.* ■■

## Other Recent Receipts

*Listed here are books and other publications received for review that are of potential interest to LITA members. Some of these materials may be reviewed in later issues of* ITAL.

Alberico, Ralph. *Microcomputers for the Online Searcher*. Westport, Conn., and London: Meckler, 1987. 299p. paper, $24.95 (ISBN 0-88736-093-9). "Supplement to *Small Computers in Libraries*, no. 3."

Benham, Frances, and Ronald R. Powell. *Success in Answering Reference Questions: Two Studies*. Metuchen, N.J., and London: Scarecrow, 1987. 311p. $29.50 (ISBN 0-8108-1940-6).

Cortada, James W. *Historical Dictionary of Data Processing Organizations*. New York: Greenwood, 1987. 309p. $45 (ISBN 0-313-23303-9).

Dewey, Patrick R. *Essential Guide to Apple Computers in Libraries. Volume 4, Software for Library Applications*. Westport, Conn., and London: Meckler, 1987. 153p. spiralbound, $24.95 (ISBN 0-88736-077-7).

*European Conference on Library Automation, 11–12 September 1986, Harrogate, England*. LA Conference Proceedings Series in Library Automation, no. 5. London: Library Assn. (dist. by American Library Assn. Publishing Services), 1987. 84p. paper, $15 (ISBN 0-85365-508-1). "Proceedings of the conference organised and sponsored jointly by The Library Association and CLSI."

Hensinger, James Speed. *Printers for Use with OCLC Workstations*. Westport, Conn., and London: Meckler, 1987. 161p. paper, $29.95 (ISBN 0-88736-180-3). "Supplement to *Small Computers in Libraries*, no. 4."

Intner, Sheila S. *Circulation Policy in Academic, Public, and School Libraries*. New Directions in Information Management, no. 13. New York: Greenwood, 1987. 228p. $35 (ISBN 0-313-23990-8).

Jack, Robert F. *Essential Guide to the Library IBM PC. Volume 4, Data Communications: Going Online*. Westport, Conn., and London: Meckler, 1987. 245p. spiralbound, $24.95 (ISBN 0-88736-036-X).

Kamphausen, Michael, and Peter Wiesa. *Mi-*

*crosoft Word, Includes Version 3.0: A Quick Program Reference Guide for IBM PC/XT/AT and Compatibles.* Abacus Data-Becker Book. Grand Rapids, Mich.: Abacus, 1987. 131p. $12.95 (ISBN 1-55755-002-6).

LaCroix, Michael J. *MINITEX and ILLINET: Two Library Networks.* University of Illinois Graduate School of Library and Information Science Occasional Papers, no.178. Champaign, Ill.: Univ. of Illinois, 1987. 38p. paper, $3.50 prepaid (ISSN 0276 1769).

Lazou, Christopher. *Supercomputers and Their Use.* Oxford: Clarendon, 1987. 227p. $45 (ISBN 0-19-853720-4).

*Microcomputer Software for Information Management: Case Studies.* Ed. by Mel Collier. Aldershot, Eng., and Brookfield, Vt.: Gower, 1986. 166p. $33.50 (ISBN 0-566-03555-3).

Nelson, Nancy Melin. *Essential Guide to the Library IBM PC. Volume 8, Library Applications of Optical Disk and CD-ROM Technology.* Westport, Conn., and London: Meckler, 1987. 252p. spiralbound, $24.95 (ISBN 0-88736-052-1).

Rehman, Sajjad ur. *Management Theory and Library Education.* New Directions in Information Management, no. 14. New York: Greenwood, 1987. 150p. $29.95 (ISBN 0-313-25288-2).

Schieb, J. *MS-DOS: A Quick Program Reference Guide.* An Abacus Data-Becker Book. Grand Rapids, Mich.: Abacus, 1987. 132p. $12.95 (ISBN 1-55755-000-X).

Westerfield, Wiley. *Desktop Publishing/Typesetting: A Resource Guide to Electronic Publishing.* Tips for Self-Publishers Series. San Diego: Westerfield, 1987. 154p. paper, $16.95 (ISBN 0-942259-00-9).

Westlake, Duncan R., and John E. Clarke. *Geac: A Guide for Librarians and Systems Managers.* Aldershot, Eng., and Brookfield, Vt.: Gower, 1987. 307p. $80.95 (ISBN 0-566-05215-6). ■■


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# Letters

*Editor's note: An article by Debra Stanek entitled "Videotapes, Computer Programs, and the Library" appeared in the March 1986 issue of* ITAL. *This article expressed the opinion of ALA's legal counsel concerning library use of copyrighted videotapes and computer programs. The three letters that follow represent an exchange related to this article between the law firm of Sargoy, Stein, and Hanft, representing several motion picture production and distribution companies, and Thomas J. Galvin, executive director of ALA.*

Dear Mr. Wedgeworth:

Sargoy, Stein & Hanft represents the following motion picture production and distribution companies:
Buena Vista Distribution Co., Inc.
Columbia Pictures Industries, Inc.
De Laurentiis Entertainment Group, Inc.
MGM Entertainment Co.
New World Pictures
Orion Pictures Distribution Corp.
Paramount Pictures Corporation
Twentieth Century Fox Film Corporation
United Artists Corporation
Universal City Studios, Inc.
The Walt Disney Company
Warner Bros., Inc.

This letter will set forth our disagreement with certain opinions expressed in an article written by Debra Stanek, entitled "Videotapes, Computer Programs, and the Library" which appeared in the March 1986 issue of *Information Technology and Libraries* (the "Article"); and a less detailed work comprised of guidelines jointly authored by Ms. Stanek and Mary Hutchins Reed, a partner in the law firm of Sidley & Austin, entitled "Library and Classroom Use of Copyrighted Videotapes and Computer Software" which appeared as an insert in the February issue of *American Libraries* (the "Guidelines"). Since these two papers express the opinion of legal counsel for the American Library Association and since they have been broadly disseminated to librarians for their guidance, our clients have authorized this letter in order to correct the inaccurate legal analysis and resulting misleading conclusions contained in the Article and Guidelines.

Our disagreement with the Article and the Guidelines relates to four specific issues:

1. We agree with the Article's conclusion that all performances on library premises are public performances under the Section 101 definition of "publicly." However, if unauthorized, such performances are infringing and are not protected by the "fair use" doctrine.

2. Sales of videocassettes to libraries do not imply any license to the library to perform publicly or authorize the public performance of those videocassettes.

3. Libraries which knowingly rent equipment or videocassettes to patrons for unauthorized copying or public performance are infringers; they cannot insulate themselves from liability merely by posting warning notices.

4. Educational performances in libraries must satisfy each and every requirement of §110(1) to be exempt from liability.

Public libraries throughout the United States are an important market for the public performance of our clients' copyrighted motion pictures. The loss of that market involves current harm, and a meaningful likelihood of even greater future harm. The Article and the Guidelines ignore the fact that libraries, *as libraries*, are a market for our clients' motion pictures.

*Issue 1—The Fair Use Doctrine Does Not Exempt Performances in Public Libraries.*

Before embarking on an analysis of the fair use doctrine, it is important to note that unauthorized performances of videocassettes in small private viewing booths which were part of a facility open to the public have been held to be infringements of copyright. *Columbia Pictures Industries, Inc. v. Redd Horne, Inc.*, 749 F.2d 154 (3rd Cir. 1984) *Columbia Pictures Industries, Inc. v. Aveco, Inc.*, 612 F. Supp. 315 (M.D. Pa. 1985), affirmed _____ F.2d _____, No. 85-5608 (3rd Cir. September 4, 1986) (copy enclosed). In these two cases performances identical to those which the Article asserts would be protected by the fair use doctrine were declared to be infringements of copyright—the only distinction being that the viewing booths were not

located in a library. (Curiously, these highly relevant cases were not mentioned in the Article or Guidelines).

Performances in public libraries are "public" performances under the Copyright Act. The Article agrees: "[e]ven performances in a private room in a library would be public because a library is a place open to the public". (p. 47)

However, we disagree with the Article's conclusion that public performances of videocassettes to small groups of persons in libraries would be insulated by the fair use doctrine. A close look at the analysis upon which the Article's conclusion is based reveals its weaknesses.

The fair use doctrine has been restated and codified in Section 107 as follows:

> Notwithstanding the provisions of Section 106, the fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use the factors be to be considered shall include—
>
> 1. the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
> 2. the nature of the copyrighted work;
> 3. the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
> 4. the effect of the use upon the potential market or value of the copyrighted work. 17 U.S.C. §107.

Fair Use Factor 1—"The purpose and character of the work including whether such use is of a commercial nature or is for nonprofit educational purposes."

An important issue in considering the character of the use is whether the use is "productive" or "unproductive". Only rarely are unproductive or intrinsic uses deemed a fair use. Productive uses, such as criticism or research, involve the incorporation of the copyrighted work into a creative effort by the user. The performance of a motion picture in a library is clearly an intrinsic or unproductive use. Although the Supreme Court has rejected the conclusion that no unproductive use may be considered a fair use, it held:

> The distinction between 'productive' and 'unproductive' uses remains helpful in calibrating the balance, but it cannot be wholly determinative. *Sony Corp. v. Universal City Studios Inc.* 464 U.S. 417, 455; 78 L. Ed. 2d 574, 600 (1984).

Another important issue is whether the use is "commercial or for non-profit educational purposes." Although libraries have predominantly nonprofit functions, to the extent that libraries are engaged in systematic recreational performances—particularly if a fee is imposed on the viewer of the videocassette—the library would be perceived as engaged in a limited commercial enterprise. As stated by the Supreme Court in *Harper & Row Publishers, Inc. v. Nation Enterprises*, _____ U.S. _____, 85 L.Ed 2d 588, 608 (1985).

> The crux of the profit/nonprofit distinction is not whether the sole motive of the use is monetary gain but whether the user stands to profit from exploitation of the copyrighted material without paying the customary price.

Libraries across the country pay fees to obtain licenses for the public performance of copyrighted motion pictures on library premises. Libraries cannot evade established licensing programs and erode established markets by invoking the fair use doctrine.

Fair Use Factor 2—"The nature of the copyrighted work".

The copyrighted motion pictures produced by our clients are characterized primarily as entertainment in nature, although certain motion pictures may have incidental educational or scholarship value.

This factor alone militates strongly against a finding of fair use. The scope of fair use is greater when informational type works, as opposed to more creative products are involved. "If a work is more appropriately characterized as entertainment, it is less likely that a claim of fair use will be accepted." 3 Nimmer, *Copyright*, §13.05[A] at 13-77 (1986). The library allows its theatre patrons to "go to the movies" at the library and see motion pictures which the patron might have seen in his local movie theatre or on pay cable a few months earlier.

The Article asserts that since a videocassette of a motion picture must be performed to be perceived, the performance of video-

cassettes should be analyzed like audiocassettes and records.

In this respect, it makes sense to treat videotapes like records and audiocassettes. Individuals may listen to them while in the library because Section 114 specifically limits the performance rights of an owner of copyright in sound recordings.

This statement is a distorted interpretation of the Copyright Act. Sound recordings *as such* are not protected by an exclusive right of public performance. However, if a sound recording is performed publicly without license, the performance would infringe the exclusive right to perform publicly any copyrighted music contained *in* the sound recording. Thus, neither sound recordings nor videocassettes may be performed in libraries without licenses from the owners of copyrighted music and motion pictures contained in the recordings or videocassettes.

The fact that motion pictures are available, rather than unavailable, for public performances in libraries further undermines any library's claim of fair use.

In sum, the "nature" of the work in this case—entertainment motion pictures which are generally available from the copyright owner for performance in libraries—strongly supports a conclusion that fair use is not available.

Fair Use Factor 3—"the amount and substantiality of the portion used in relation to the copyrighted work as a whole".

With respect to this factor the Article concedes that videotape performances would likely be a performance of the entire work. However, the Article fails to note that this factor alone is usually dispositive if the entire work is used. Professor Nimmer stated "In any event, whatever the use, generally it may not constitute a fair use if the entire work is reproduced." 3 Nimmer, *Copyright* §13.05 [A] at 13-78 (1986). This factor also strongly militates against a finding of fair use.

Fair Use Factor 4—"The effect of the use on the potential market for and value of the copyright."

This factor, not surprisingly, "is undoubtedly the single most important element of fair use". *Harper & Row Publishers, Inc., supra*, 85 L. Ed. 2d at 611. See also, 3 Nimmer Copyright 1193.05[A], 13-79 (1986).

Whether unauthorized library performance of videocassettes is considered commercial or non-commercial, the fact that such activity damages existing and potential markets renders such performances unfair.

Thus, although every commercial use of copyrighted material is presumptively an unfair exploitation, . . . [a] challenge to a noncommercial use of a copyrighted work requires proof either that the particular use is harmful, or that if it should become widespread, it would adversely affect the potential market for the copyrighted work. *Sony Corp., supra* 464 U.S. at 451, 78 L Ed. 2d at 598.

Since unauthorized performances on library premises directly damage the library performance market, such performances are not protected by the fair use doctrine. Copyright holders of motion pictures derive the bulk of their revenues from licensing public performances of their works. Many libraries currently obtain licenses for such performances on their premises. If deemed fair use unlicensed performances of videocassettes in libraries would destroy the library market and directly harm the owners of copyrighted motion pictures. Accordingly, the fourth factor alone mandates a conclusion that libraries cannot claim the protection of the fair use doctrine to avoid liability for unauthorized performances of our clients' copyrighted motion pictures.

As demonstrated above, analysis of the four fair use factors individually or as a group leads to the inescapable conclusion that unauthorized performances of motion pictures in libraries are public, are not immunized by the fair use doctrine, and hence are infringing acts.

*Issue 2—The Purchase of a Videocassette by a Library does not transfer to the library or its patrons the right to perform the videocassette publicly.*

One of the most fundamental tenets of copyright law is that acquisition of a copy of a work does not convey any of the exclusive rights under law other than the right to transfer the physical copy acquired.

Section 202 of the Copyright Act provides ownership.

Ownership of a copyright, or any of the exclusive rights under a copyright is distinct from ownership of any material object in which the work is embodied. Transfer of any material object . . . does not of itself convey any rights in the copyrighted work embodied in the object.

The House Report on the Copyright Act; H.R. Rep. No. 1476, 94th Cong. 2d Sess. (1976) explicitly negates the concept that a purchaser of a videotape, somehow, obtains by implication a license to perform the videotape publicly. It states at p. 79:

> Under Section 202, however, the owner of the physical copy or phonorecord cannot reproduce or perform the copyrighted work publicly without the copyright owner's consent. See also *Redd Horne*, supra at 158, *Columbia Pictures Industries, Inc.* v. *Aveco, Inc.*, _____ F. 2d _____, No. 85-5608, p. 11 (3rd Cir. 1986).

Our motion picture clients authorize the manufacture of videocassettes of certain of their motion pictures. Generally, these videocassettes are sold to independent wholesalers who in turn sell them to retail video stores or to institutions such as libraries. The videocassettes bear copyright notices and have warnings, on the packaging and on the tape itself, that unauthorized reproduction, distribution or public performance of such motion pictures constitutes a violation of federal copyright law. Usually, these video-cassettes have the additional warning "for home use only."

Our clients rely on the Copyright Act and relevant case law when they make videocassettes indirectly available for purchase by libraries. They act in the belief that libraries will abide by the law, not violate it. Libraries are free to lend videocassettes to patrons for private performances; libraries are constrained by law from performing or authorizing performances on library premises or other public places.

Therefore, we disagree with Section IB6 of the Guidelines which states:

> Even if a videotape is labelled "For Home Use Only", private viewing in the library should be considered to be authorized by the vendor's sale to the library with imputed knowledge of the library's intended use of the videotape.

*Issue 3—Libraries which knowingly rent equipment or videocassettes to patrons for unauthorized copying or public performance are infringers; they cannot insulate themselves from liability merely by posting warning notices.*

Courts have consistently held that persons who make equipment available for unauthorized duplication of tapes are infringers even when they do not supply the copy of work being duplicated. See *RCA Records v. All-Fast Systems, Inc.*, 594 F. Supp. 335 (S.D.N.Y. 1984); *Electra Records Co. v. Gem Electronic Distributors, Inc.*, 360 F. Supp. 821 (E.D.N.Y. 1973).

Similarly, the rental of equipment alone, for purposes of unauthorized public performance constitutes an infringement of copyright. As stated in *Aveco, Inc., supra*, p. 7:

> Aveco encourages the public to make use of its facilities for the purpose of viewing such tapes and makes available its rooms and equipment to customers who bring cassettes with them. By thus knowingly promoting the facilitating public performances of Producers' works, Aveco authorizes those performances even when it is not the source of Producers' copyrighted videocassetes.

Despite these and similar cases, the guidelines take the untenable position:

> Videorecorders may be loaned to a patron without fear of liability even if the patron uses the recorder to infringe a copyright.

This position is clearly contrary to law and should not be followed.

Similarly, libraries may not lend videocassettes for infringing purposes. A library which loans a videotape to anyone with knowledge it will be performed at a public place infringes the exclusive right to authorize that public performance. The House Report, supra, p. 61 is merely one basis for our opinion. It states:

> Use of the phrase "to authorize" is intended to avoid any questions as to the liability of contributory infringers. For example, a person who lawfully acquires an authorized copy of a motion picture would be an infringer if he or she engages in the business of renting it to others for purposes of unauthorized public performance.

This liability for authorizing infringing performances attaches regardless of whether the videocassette bears the warning "for home use only."

The Guidelines has a section which deals with the loan of videotapes by libraries (IC):

> Videotapes labelled 'For Home Use Only' may be loaned to patrons for their personal use. They should not knowingly be loaned to groups for public performances.

We agree with the basic concept that videotapes should not knowingly be loaned to patrons for public performances. We disagree with the limitations in the Article that only videotapes labelled "For Home Use Only", and loans only to groups are subject to that stricture. Absent authoriza-

tion, a library cannot loan *any* videocassette to *any* individual or group for public performance.

Merely posting a warning notice clearly would not protect the library when it has authorized the infringed activity. There is no basis in the Copyright Act for a different conclusion.

*Issue 4—Although the Guidelines and the Article correctly state that classroom performances must meet the requirements of §110(1) in order for the performances to be exempt, certain of the examples in section III of the Guidelines vary from these requirements.*

The Article expresses our viewpoint concisely and cogently:

> Section 110(1) specifically limits a copyright owner's exclusive performance and display rights. It states:
>
> "performance or display of a work by instructors or pupils in the course of face-to-face teaching activities of a nonprofit educational institution, in a classroom or similar place devoted to instruction, unless, in the case of a motion picture or other audiovisual work, the performance, or the display of individual images, is given by means of a copy that was not lawfully made . . . and that the person responsible for the performance knew or had reason to believe was not lawfully made [is not an infringement]" (17 U.S.C. §110(1) ).
>
> All of these requirements must be met in order for the classroom exemption of Section 110(1) to apply.

However, certain examples (See examples 3 and 5 of the Guidelines) in the Guidelines sanction performances not protected by 110[1]. For example, students who miss a classroom performance may not view a videocassette of a motion picture in a library and be within the classroom exemption, since the instructor and pupils are not in the same building or general area.

We are concerned that the Guidelines and the Article will be relied upon by libraries which will, unwittingly, commit infringing acts. We think you have a clear duty to publish this letter in *American Libraries* and in *Information Technology and Libraries* to acquaint members of the American Library Association with the views we have expressed. Failure to do may well increase the number of infringing acts by your members. We welcome an opportunity to discuss the substance of this letter with you and your counsel.—*Burton H. Hanft and Harvey Shapiro, Sargoy, Stein & Hanft, 105 Madison Avenue, New York, New York.*

Dear Messrs. Hanft and Shapiro:

Thank you for your thoughtful letter of October 2, 1986 to my predecessor, Mr. Robert Wedgeworth, Executive Director of the American Library Association. I am delighted that you have taken the time to open this dialogue with us and after discussions with our legal counsel, Mary Hutchings Reed, must conclude that our views are not irreconcilable.

I am forwarding your letter and my response to the editors of *American Libraries* and *Information Technology and Libraries* in hopes that they will indeed print your letter (the length and technicality of which may of course affect their independent decisions as to how much to publish).

The balance of this letter will attempt to clarify our positions on the points raised in your letter.

*Issue 1—The Fair Use Doctrine Does Not Exempt Performances in Public Libraries.*

Our Position is that performances which take place in a public meeting room are indeed public performances and infringe the performance right unless the classroom exception applicable to non-profit face-to-face teaching activities apply. We recognize that exception would not apply to much of public library's public service programming. While the library is a public place, we believe that private performances which may take place in carrels or the like are not public or are fair uses. Our counsel is aware of *Columbia Pictures Industries, Inc.* v. *Red Horne* and *Columbia Pictures, Inc.* v. *Aveco, Inc.* However, we believe libraries with videorecorders are more like the hotel room in *Columbia Pictures Industries, Inc.* v. *Professional Real Estate Industries*, CCH Copyright Law Rpts., Paragraph 25,901 (C.D. Cal. 1986) where the court held that performances taking place in guests' rooms with videotapes supplied by the hotel were not public. In essence, the court found that a guest's hotel room was like a substitute for his home—if the performance would be noninfringing in the hotel guest's home, it would be noninfringing in the hotel room. The court said, "Private places and private uses of video movies are not limited to homes.

***When occupied, a hotel room is private and the occupant expects and is entitled to such privacy." *Id.* at p. 20, 128. Many library patrons may not own a videorecorder or have a room at home where they can view a videotape. The library is for them a "study away from home." When occupying a library carrel, a patron expects privacy and is entitled to it under the Library Bill of Rights.

It seems to us, after consideration of the four fair use factors you cite, that such use should be considered fair. The Betamax case approved of intrinsic use of copyrighted materials for home use, which is essentially a private, non-profit use. Whether that use takes place in a person's private study or a study "borrowed" from the library does not seem to us to be an important difference. Secondly, we cannot agree that most videotapes loaned by libraries are entertainment properties—self-help and how-to's are also extremely popular, and the fair use doctrine does not require us to draw a line between entertainment and education. While normally copying an entire work is not a fair use, in the area of performance the concept is difficult to apply. Only through performance can a person enjoy the benefits of a videotaped work; the essential question is not whether the entire work is performed, but whether it is performed publicly. The last fair use factor, the effect on the market, also seems to us to favor private viewing of videotapes on the library's premises. We understand your use even though it is the loan, which if anything, would effect the market for the work, not the place where the borrower privately views it. Moreover, we should point out that libraries are themselves a huge and steady market for your client's products, and in addition provide a showcase which promotes them. Many library patrons, having previewed a videotape borrowed from a library, are more likely to then buy that video for their private collection.

*Issue 2—The Purchase of a Videocassette by a Library does not transfer to the Library or its patrons the right to perform the videocassette publicly.*

We thoroughly agree with the statement above. However, we continue to believe that *private* viewing of a videotape in a library should be governed by *Professional Real Estate Industries* for the reasons stated above. There is no qualitative difference between private home viewing and private library carrel-viewing which could in any way injure your clients' interests.

*Issue 3—Libraries which knowingly rent equipment or videocassettes to patrons for unauthorized copying or public performance are infringers; they cannot insulate themselves from liability by posting warning notices.*

We agree that knowingly lending videoequipment or videocassettes to patron for the purposes of infringement could give rise to liability for copyright infringement. Obviously, in the usual case, librarians don't know the purposes for which their patrons borrow library materials or equipment. We understand that patrons' rights to use videocassettes are limited to private performances, regardless of their "For Home Use Labelling." (We will revise Guideline I(c) to avoid any contrary implication.) Therefore, merely loaning a videotape to a patron should not give rise to liability on the librarian's part since he or she has no reason to believe the patron will in fact infringe the copyright in a work.

The posting of notices is suggested by ALA in order to be helpful to videoproducers such as your clients. As you know, the Copyright Act exempts librarians from liability for infringements by patrons which may take place on unsupervised photocopying equipment, provided a warning notice appears on the machine. 17 U.S.C. Section 108(f) (1). Unsupervised use of videoequipment should be treated similarly.

*Issue 4—Although the Guidelines and the Article correctly state that classroom performances must meet the requirements of Section 110(1) in order for the performances to be exempt, certain of the examples in Section III of the Guidelines vary from these requirements.*

We believe that Examples 3 and 5 are reasonable interpretations of the law. If a student misses an instructional lesson in the classroom which incorporates a privileged public performance of a videotape, it seems to us unfair to penalize the student by invoking the copyright law to prohibit the student from viewing it in the school library. The school library is often a place used for systematic instructional activities. Allowing the student or students to make

up the class by using the library seems to us to be a performance by an audience entirely of students involved in a teaching activity conducted by a non-profit education institution where the students are all in the same area and thus legal under the Copyright Act. Again, since the students could have viewed the tape in class, we perceive no economic harm to your clients in allowing them to make up the class using the school library's facilities.

Example 5 also seems to us to be within the spirit of the law. One student could view the tape alone for the reasons stated with respect to Issue 1. Several students together poses a more difficult problem, and technically would be a public performance not allowed in the library. We can conceive of unique situations, however, where the public library in a community may be a place devoted to systematic instructional activity so that the performance could come within the statutory guidelines. Moreover, in special circumstances, a librarian could have reason to believe such a use is fair. In subsequent publications of the Guidelines, we will revise the answer to Example 5 to urge caution when a group of students desire to view a videotape together in a public library because they missed a class.

We at ALA share the concerns of copyright owners and are constantly involved in educating our members, who are anxious to comply with the law. We appreciate the opportunity to discuss these matters with you, and are enclosing the chapter on video from our forthcoming publication on copyright for librarians. While it is not substantially different from the guidelines you saw, we would appreciate your comments. I am confident we can work together to resolve any remaining difficulties we may have.—*Thomas Galvin, Executive Director, American Library Association.*

Dear Mr. Galvin:

This letter expresses our continued disagreement with certain positions taken in your letter dated November 5, 1986.

In the Article and Guidelines the American Library Association had taken the position that performances in library carrels are open to the public. In your November 5, 1986 letter you assert for the first time that performances in carrels are private. You rely on *Professional Real Estate Investors*, which held that videodisc performances in hotel rooms are private, stating they are no different from viewing movies in a private home; that case is now in appeal. However, library carrels are remarkably similar to rooms described in *Redd Horne* and *Aveco*; rooms held to be part of a place open to the public despite the fact that only friends or family members could occupy those rooms. Thus we think it is clear that your reliance on *Professional Real Estate Investors* is misplaced because there is no question carrels are open to the public.

With respect to the issue of fair use, you continue to ignore the fact that the relevant market is the library public performance market. Libraries, including carrels, are open to the public; performances in any part of a library, including carrels, are public. If libraries are not required to obtain a license for the public performances of our clients' copyrighted motion pictures, an important, expanding market will disappear. The resulting substantial harm to our clients by itself precludes availability of the fair use doctrine. Although unnecessary, analysis of the other fair use factors buttresses that conclusion. Your statement that libraries are a "huge and steady market" for the purchase of our clients' products is irrelevant. The purchases of videocassettes do not grant any right to publicly perform the products purchased.

Finally, we also continue our disagreement with respect to your "classroom performance" exemption analysis. 17 U.S.C. §110(1) circumscribes a very limited and strictly defined exemption. Each condition must be satisfied before the exemption is applicable. It is not subject to interpretation which delete conditions. This is clearly reflected in the House Report pages 81–82 which explicitly restricts the exemption.

We are still concerned that the views expressed by the A.L.A. will cause its members to engage in infringing acts. We hope this letter and a continued dialogue, possibly at a meeting, will result in an agreement on policies for the performance of motion pictures consistent with the rights of copyright owners.—*Burton H. Hanft and Harvey Shapiro, Sargoy, Stein & Hanft, 105 Madison Ave., New York, New York.* ■■

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