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ABSTRACT

Two questions arise in regard to the computer-based humanities reference services: (1) What knowledge, abilities, and attitudes should the information specialist or librarian in the university library have in order to aid users in fully exploiting the innovative humanities information handling processes? (2) To what extent do users in the university library require direct assistance in using the services? This study aimed to determine answers to these questions in regard to seven of these services. The following subsystems were analyzed in an attempt to ascertain the knowledge, abilities, and attitudes that are or will be required for most effective use of the data bases: (1) index language, (2) indexing policy and practice in updating and maintaining the file, (3) interaction between the system and the users, (4) conceptualization of searching strategies, (5) manipulation of the search, and (6) evaluation of the service cost-performance-benefits. Implications for further study in four areas were derived from, or born out, by this study: (1) in-service and continuing education programs for librarians, (2) library education, (3) needed research on humanities services, and (4) the role of the university library and librarians in regard to the services. (Author/NH)

COMPUTER-BASED HUMANITIES REFERENCE SERVICES AND THE UNIVERSITY LIBRARY

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Abstract

Scholars in the humanities could profitably utilize to a greater extent as aids in their research computer-based humanities reference services. Several now exist, and more, including several major services, are in the development stage. Two questions arise in regard to the computer-based humanities reference services: (1) What knowledge, abilities, and attitudes should the information specialist or librarian in the university library have in order to aid users in fully exploiting the innovative humanities information handling processes? (2) To what extent do users in the university library require direct assistance in using the services?

This study aimed to determine answers to these questions in regard to seven of these services. Three were studied on-site and four through questionnaire and telephone conference.

The following subsystems were analyzed in an attempt to ascertain the knowledge, abilities, and attitudes that are or will be required for most effective use of the data bases: (1) index language, (2) indexing policy and practice in updating and maintaining the file, (3) interaction between the system and the users, (4) conceptualization of searching strategies, (5) manipulation of the search, and (6) evaluation of the service cost-performance-benefits.

Implications for further study in four areas were derived from, or borne out, by this study: (1) in-service and continuing education programs for librarians, (2) library education, (3) needed research on humanities services, and (4) the role of the university library and librarians in regard to the services.

Acknowledgments

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John MacPherson, Deputy Chief Librarian; Robert E. Morton, Systems Analyst; and Clarke E. Leverette, Collections Appraiser; all of the University of Western Ontario Library System; and John Glinka, Associate Director; Anna R. Condit, Library Systems Specialist; Kent Miller, Serials Librarian; and Stanley Lin, Circulation Librarian; all of the Kansas University Library, were also helpful.

The ideas expressed in the conclusions and implications are those of the authors and are not necessarily held by those who assisted us.

Computer-Based Humanities Reference Services and the University Library

Scholars in the humanities could profitably utilize to a greater extent as aids in their research computer-based humanities reference services. In recognition of the value of such services, humanities scholars have created several which are now in operation. More services, including several major projects, are in the development stage, such as the Philosopher's Information Retrieval System (PIRS), the London Stage Project, and the Répertoire International de la Littérature Musicale (RILM).

For the purpose of this study, "humanities" is defined as including language and literature, music, philosophy, religion, fine arts, and those phases of the social sciences that stress the humanistic. The term, "computer-based reference services" is defined as those services available through machine-readable data bases which have the capability of being manipulated in response to on-demand requests.

Two questions arise in regard to the computer-based humanities reference services: (1) What knowledge, abilities, and attitudes should the information specialist or librarian in the university library have in order to aid users in fully exploiting the innovative humanities information handling processes? (2) To what extent do users in the university library require direct assistance in using the services?

This study aims to determine answers to these questions in regard to seven computer-based humanities reference services, devoted exclusively or partially to the humanities, in the operational or near-operational stage, and chosen because they were the first seven we verified: (1) Playbill Information Retrieval System (PIRS), University of Kansas; (2) Incuna-

bula Project (Incunabula), Columbia University; (3) Hand-Printed Books Project (HPB), University of Western Ontario; (4) Art category of the Computerized Slide Classification System (SC), Slide Library, University of California, Santa Cruz; (5) Computerized modified Fogg Slide Classification System (Buffalo), Art History Department, State University of New York at Buffalo; (6) National Information Center for Educational Media (NICEM), University of Southern California; and (7) America: History and Life (America), American Bibliographical Center, Santa Barbara, California. These services are described later in this paper.

Basic assumptions of the study are as follows: (1) Employers of university librarians desire top level performance from librarians with a minimum intern training period; (2) University librarians recognize the need to determine the educational qualifications for their work; and (3) The relationship between the information specialist or librarian and the user is that of a teaching-learning situation or research team in which there remains a distinction in role between the two.

Limitations of the study are as follows:

(1) The judgment ratings of required knowledge, abilities, and attitudes on which the conclusions are based were formulated from the specific supporting examples and tables given later in this paper. Judgments remain subjective and are not the result of a study of performance records and educational backgrounds of intermediaries and users. Not all of the projects, especially those not yet in operation or not in operation at the time of the interview, would have lent themselves to such an objective study at this time. Yet those responsible for continuing education programs and library education must try to anticipate performance requirements and prepare graduates to develop services still on the horizon.

(2) The findings do not necessarily apply to other computer-based humanities services but would apply to any university using or contributing to the seven services studied.

(3) "Users" are defined as faculty members and students and referred to as user groups. The individuality of users and their needs would more accurately require that each of the thousands of users in these categories be the subject of a separate study.

(4) Attitudes are spoken of as though they exist of themselves as independent units. Sociologists have determined that attitudes consist of components: cognitive, affective, and behavioral. Thus, the knowledge and attitudes catagories of requirements are not discrete entities. All three components must be considered in effecting attitudinal change.

Three of the seven services (PIRS, Incunabula, HPB) were studied on-site and four (SC, Buffalo, NICEM, America) through questionnaire and telephone conferences to supplement information taken from the printed sources cited below under each service. We were unable to find a synthesis in the literature of the field focused on the intermediary's required background preparation for use of computer-based humanities reference services.

Six common elements or subsystems in each of the computer-based reference services were analyzed in an attempt to ascertain the knowledge, abilities, and attitudes that are or will be required for most effective use of the data bases: (1) index language (the set of terms comprising a thesaurus, or the points of access by which information can be retrieved from the service); (2) indexing policy and practice in updating and maintaining the file; (3) interaction between the system and the users (products of the service, motivating and instructing in use, identification

and planning of improvements and needed future projects); (4) conceptualization of searching strategies (translation of the inquirer's terminology into the indexing language); (5) manipulation of the search (technical aspects); and (6) evaluation of the service cost-performance-benefits.

The subsystems should be viewed as one whole process but are separated for the purpose of analysis. The examples which illustrate the need for various kinds of knowledge, abilities, and attitudes for use of the services, and on which determination of the requirements are based, are given later in this paper under each subsystem.

Following is a brief description of each service treated, including (1) name of the service followed by the abbreviated name in parentheses used in this paper in referring to the service, and the location; (2) name and title of the person who provided interpretation of the service and who updated printed material where necessary; (3) relevant published items, where these exist, in which further details such as computer configurations and cost analysis might be sought; and (4) the purpose and products, actual and potential, of the service.

(1) Playbill Information Retrieval System (PIRS), International Theatre Studies Center, University of Kansas.
Mr. Linn S. Kovar, Investigator in Project.
Kovar, Linn. A Pilot Project for Computerized Storage, Manipulation, and Retrieval of Theatrical Playbill Information. Submitted to the Faculty of the Graduate School in partial fulfillment of the requirements for the degree of Master of Arts in Speech and Drama, Kansas University, May, 1970. 235 p.

A pilot project for the creation of a system of FORTRAN programs and subprograms which will store, manipulate, and retrieve information from theatrical playbills, such as references to a single name, play, or other information fragment; furnish playbill location references; compile lists and indexes, which cross reference all the playbills as

types or kinds of information; and print out playbill document briefs, which are full listings of the data contained in computer storage for each individual playbill. The system will be designed to handle many thousands of playbills. The experiment was begun with a trial series of about thirty playbills, dated 1855-1865, from Spencer Research Library.

(2) Incunabula Project (Incunabula), School of Library Service, Columbia University.
Dr. Theodore Hines, Professor.

A general purpose bibliographical program capable of being adapted to producing a combination of a dictionary catalogue and multiple access to incunabula. Aims to produce a book catalogue and has capacity for on-demand searches. Special subject class headings for incunabula have been developed. Approximately ten percent of the 843 titles in the incunabula collection utilized to form the data base have been keypunched.

(3) Hand-Printed Books Project (HPB), School of Library and Information Science, University of Western Ontario.
William J. Cameron, Dean.
Cameron, William J., Brian J. McMullin, and Joginder K. Sood. The HPB Project: Phase II; describing an experiment in creating a computerized cumulative short-title catalog of Hand-Printed Books leading to a universal bibliography of books printed 1453-1800, with illustrative material from John Milton and Miltoniana. London, Ontario, Canada, School of Library and Information Science, The University of Western Ontario, 1970. 165 p.
The HPB Project: Phase I is out of print and will not be reprinted.
"A Milton Bibliography;" an experiment in collocation of the machine-readable bibliographic records of the HPB Project. In process.
"Application of the Method to Miltoniana." Unpublished. 14 p.

A project to establish data banks from which a universal bibliography may be developed, and from which subject bibliographies, chronological and other listings, and information of various kinds may be retrieved. The method is to establish bibliographical and computer-readable conventions that will enable a union catalogue to be made that can be

developed into the universal bibliography and to design bibliographical records that will be inexpensive to store, manipulate, and gain access to in machine-readable form. The general principle of the HPB Project is that a universal bibliography should be based upon a cumulation of existing records.

The main file consists of approximately 20,000 items. The locations file is divided into two parts. The major part, which is integrated with the main file, consists of the six-character addresses of each entry in the main file to which have been added holdings of those books in forty-seven libraries in Australia, Canada, and New Zealand. The minor part, which will eventually be integrated with an augmented main file, consists of all those STC and Wing references not yet subsumed under HPB numbers, (Pollard and Redgrave's Short-Title Catalogue (English books before 1640) and Donald Wing's 3-volume continuation (1641-1700), together with the holdings of the forty-seven libraries. The total number of STC items is nearly 2,000 and of Wing items over 9,000.

The main objective of Phase II is minimal physical identification of a bibliographically distinct volume, with less importance attached at this stage to collocating devices. The printout does not constitute either a catalogue or a bibliography but a list of bibliographically distinct volumes roughly grouped by authors minimally identified. It may serve as a tentative union catalogue, a data bank for experimentation, or an exercise in pragmatically approaching the problems of computerized bibliography. Listings from Milton and Miltoniana have been compiled and serve as an example of an author collocation. The Project is currently on-line with the main file stored on disc to allow for random accessibility and is in experimental use.

(4) Art Category of Computerized Slide Classification System (SC), Slide Library, University of California, Santa Cruz.
Luraine C. Tansey, Slide Librarian
Simons, Wendell W., and Luraine C. Tansey. A Slide Classification System for the Organization and Automatic Indexing of Interdisciplinary Collections of Slides and Pictures. Santa Cruz, University of California, 1970. 263 p.
A preliminary edition of this work was distributed in 1969 to a limited audience under the title, A Universal Slide Classification System.

An automated indexing method developed concurrently with a slide classification system for the organization of general collections of slides and pictures, including art. The project was supported by grants from the Council on Library Resources. Following are the basic requirements which had been set down for the system prior to its development: (1) The collection, and hence the classification, should be general, encompassing the subject matter of all academic disciplines; (2) The arrangement of the collection should reflect a broad historical, cultural approach to teaching; (3) The filing arrangement of the collection should encourage and facilitate browsing, that is, visual inspection and comparison in the files; and (4) In addition to being filed for easy browsing, the collection should be fully catalogued or indexed, preferably by automated means.

The automated indexing method of printing indexes or finding lists to the collection yields the catalogue-type data as a by-product of classification; for example, the existing computer-printed index in call number order and the author list are two of many possible orders and types of searches of which the system is capable. The data base currently represents the labels on 37,000 slides, classified according to chronology, country, and media or art form. This number could eventually reach as high as 300,000 according to possible plans for expansion.

Each bit of information recorded on the slide labels is also assigned to a corresponding field on a keypunch card, but the format of the card has been designed to provide for sorting potential beyond that inherent in the call number.

(5) Computerized modified Fogg Slide Classification System (Buffalo), Art History Department, State University of New York at Buffalo.
Mr. Herbert B. Sanford III, Slide Librarian.
"Fogg Art System Classification for Photographs and Slides." 1968 version as modified by Luraine Tansey and Herbert Sanford III. Art History Department, State University of New York at Buffalo, n.d. 26 p.

An application of the Fogg Art System Classification for Photographs and Slides to over 26,000 slides listed on tape, with capability for printout of hardcopy indexes and for on-demand searches. The subjects represented are art-oriented and include, among others, architecture, sculpture, painting, and the minor arts, such as pottery, woodwork, and cloth and costumes.

(6) National Information Center for Educational Media (NICEM), University of Southern California.
Dr. M. Thomas Risner, Director.
NICEM Category and Subject Matter Headings, 1969. 21 p. Pamphlet available from NICEM.
Index to 16mm Educational Film; Index to 35mm Filmstrips; Index to Educational Audio Tapes; Index to Educational Video Tapes; Index to Educational Records; Index to 8mm Cartridges; Index to Producers and Distributors; Index to Ecology; Index to Educational Overhead Transparencies; Index to Black History & Studies. Extensive bibliographies updated periodically.*

An operational computer-based index system for audiovisual materials cataloguing. The Center publishes and updates ten* indexes and performs on-demand computerized searches for special bibliographical lists on any headings in the NICEM subject heading list, which includes, among others, the categories of English Language, Foreign Language, Literature, Fine Arts, and Religion and Philosophy. Its memory tapes contain over 160,000* main title entries to which data are being continually added on new

films, filmstrips, audiotapes, videotapes, transparencies, disc recordings, slide sets and other essentially nonbook instructional materials.

(7) America: History and Life (America), American Bibliographical Center, CLIO Press (ABC-CLIO), Santa Barbara, California.
Mr. Lloyd W. Garrison, Managing Editor and Vice-President, ABC-CLIO.
Boehm, Eric H. The Cue System for Bibliography and Indexing. Santa Barbara, Cal., ABC-CLIO, 1967. (Bibliography and Reference Series, No. 7). 45 p.
"ABC-CLIO, Inc. -- System ABC." Four pages of descriptive material.
Garrison, Lloyd. "Automation and Published Materials for Research; Published Sources, Articles and Monographs." Libri, vol. 19, no. 2, 1969: 92-101.

Abstracts of serial literature concerned with U.S. and Canadian history, including serials in the humanities. Three abstract numbers appear annually, with two separate indexes (Nos. 1 and 2), an annual cumulated index, and a cumulated index every five years. The abstracts are produced by "System ABC: (Automation of Bibliography through Computerization), a method of library control, processing, printing, and indexing which facilitates the preparation of special indexes, demand bibliographies on the basis of interrogation in terms of specified coordinate cues, interrogation of the data file, and, ultimately, the selective dissemination of information. An eventual goal is to expand into providing service aimed directly toward the humanities and arts.

* * * * *

Below are the subsystems under which the knowledge, abilities, and attitudes requirements are given, subdivided by service under each requirement.

Subsystem 1: Index language

The first of the six interrelated subsystems analyzed in each service to ascertain the knowledge, abilities, and attitudes required for use of the service, is "index language," the set of terms comprising a thesaurus, or the points of access by which information can be retrieved from the service.

Knowledge

Subject matter

SC: The sort fields in the Art Division of the Slide Classification System accommodate sufficient detail to suggest that a thorough knowledge of art would aid in obtaining working familiarity with the index terms.

Each slide has two labels, the top containing the call number and descriptive information about the content of the slide, and the bottom containing additional information about the location of the object pictured and the source of the slide.

The eighteen digits of the call number comprise ten sort fields, and the classification schedules are organized in the order of their corresponding sort fields. The ten sort fields, plus the additional information, given below as 11-15, are as follows: (1) period; (2) country; (3) medium; (4) style; (5) origin (artist); (6) subject; (7) subdivision of subject; (8) title; (9) detail (may indicate that the picture is a view of the entire work); (10) additional detail (may indicate that this is the third slide in the file of this view);

(11) the artist's name spelled out in full for visual scanning of the index; (12) the title in full for visual scanning of the index; (13) date of the work; (14) the location of the work; (15) the source of the slide, with codes to indicate whether commercial, the work of a local cameraman, or another slide from which a duplicate was made.

Buffalo: The less extensive classification scheme used in the Buffalo system ("Fogg Art System Classification for Photographs and Slides," 1968 version as modified by Luraine Tansey and Herbert Sanford III, currently under revision) suggests that a less advanced knowledge of art might suffice for mastery of the access fields. The classification number shows a primacy of media or art form followed by country, chronology, and subject.

Eight tables cover (1) Media or art form; (2) Country; (3) Architecture subject numbers; (4) Common subjects in painting and sculpture, third line subject numbers; (5) General sculpture subject numbers; (6) Non-Christian religious painting and sculpture; (7) General painting subject numbers; (8) Minor arts material number.

Table 1 for media or art form includes the following designations: (0) Maps; (1) Architecture; (2) Sculpture and (3) Painting, both to be used for representative art, not for useful objects; (4) Mineral works; (5) Metal works; (6) Wood works; (7) Miscellaneous; (8) Textiles, clothing, dolls; (9) Prints, manuscripts.

Countries are provided with an ancient or modern period code according to a designated break point. Special notes are provided in indexes in the appendix for some countries marked "(note)," usually giving information about dynasties which are indicated in one of the columns on the punched card.

America: The scholarly nature of the journals abstracted suggest that the cues, or subject headings, used internally in this system for subject control reflect the detail and specificity required adequately to represent the scholarly material in the journals abstracted.

Media characteristics

Related to subject matter, this category is separated for emphasis and reflects the physical characteristics of the type of media under consideration as well as the nature of the contents.

PIRS: Familiarity with the type of information included on theatrical playbills and the consistency of its meaning and structure would lay a foundation for readiness in working with and utilizing the points of access.

Incunabula: Works of incunabula and hand-printed books of later periods are treated in this paper as types of media because of the emphasis on physical aspects in their analysis. Indeed, the nature of much of the literary and other scholarly subject knowledge required for the most effective establishment of indexing terms for these works is derived largely from the fact that textual analysis is necessary because the books were printed in a letterpress process. Scholarly knowledge relevant to the subject matter of the books is basic to the provision of clues toward the identification of editions, issues, and states. Thus, knowledge of subject matter is considered for Incunabula (as well as for HPB) as part of "media characteristics."

The Columbia University Incunabula Project stores bibliographic data by title, author, format, references to standard bibliographical tools, place of printing, printer, date, Library of Congress location code,

the Columbia call number, and the subject classes and/or added entries. The system makes use where possible of data provided by Goff (Incunabula in American Libraries; A Third Census of Fifteenth-Century Books Recorded in North American Collections. Compiled and edited by Frederick R. Goff. Published by The Bibliographical Society of America, New York, 1964). The use of such aids in establishing points of access would be greatly facilitated through a firm grasp of knowledge concerning the production of incunabula.

HPB: Knowledge of analytical bibliography, the description of incunabula and other hand-printed books, is necessary for the formulation of HPB entries and their use. Users of the system contribute toward preparation of the entries for input into the files, including determination of what access points are useful to the system. Two valuable results of the project were considered to be the recognition of the need to explain certain concepts about author and date and to define "bibliographically distinct volume" for someone who has had no contact with the HPB Project. Differences exist between regular library cataloguing and the HPB conventions, primarily because of the emphasis on the physical aspects of the early printed books.

The most important principle is that each entry in the main file is an attempt at minimal physical identification of a bibliographically distinct volume, defined as a book, pamphlet, or other printed item conceived of and printed as a single physical entity, or a volume consisting of a title page followed by a complete series of signatures and pagination. This objective is reached by (1) recording format; (2) transcribing from the title page (or its equivalent) (a) The first few words

(and, if these are not distinctive enough, after ..., a few words further on that are highly distinctive) (b) The minimum number of words for identifying the 'intellectual authors' (with some modifications for an inflected language) (c) The minimum number of words for identifying the 'physical authors' (printer, publisher etc.); (3) conventionalizing other information, viz. (a) Date of publication (b) Edition information (c) Volume information (d) Extra information to correct ambiguities of misleading information in the main body of the entry. HPB contains no analytical entries at this stage.

SC: The points of access for slide retrieval were designed according to the following rationale based on the nature of pictorial material. The rationale is an aid in understanding the objectives which the access points were designed to serve.

A picture is more analogous to a sentence or a single word than to a book and makes a single statement on a single theme. A single picture or slide cannot in itself develop a train of thought or a continuity of ideas. A picture's message is subject to many varying and even contradictory interpretations, particularly as it is placed in varying sequences with other pictures.

Meaningful classification of slides and pictures relies not on the intellectual content of the picture but upon the visual content which can more nearly be described with objectivity. The visual content of a still life may be a bowl of fruit, but the primary concern is not the printed subject content but rather with the fact of the painting. The work of art itself is considered the visual content, and classification centers on when, where, in what medium, and by whom it was created.

The classification must be cased in very concrete, specific terms. It has three basic divisions: history, art, and science, and we are, of course, only concerned with the art division in this paper. Separate subject schedules for each of the various art media exist. Those that are truly pictorial in nature are divided by the subject content of the picture; those not pictorial, such as architecture, book arts, fabrics, etc., are divided by another function, such as technique. Only non-arguable statements are represented in the category, and therefore any verbal rather than visual aspects, such as the influence of one artist on another, must be excluded from representation in the index terms.

Time and place are given precedence over subject matter in the classification scheme, for a picture cannot depict the essence of theoretical subjects but only isolated visual phenomena that exist in an historical context, the prime delimiters of which are time and place. The subject content of art is a statement of the time and culture that inspired it, whether the content is a utilitarian artifact or a completely imaginative abstraction.

The call number consists of eighteen digits, arranged in three horizontal rows of six each, the top row roughly corresponding to the classification number in book classification, the second row to author mark, and the third row to title mark. An index leads into the classification schedules.

Buffalo: Similar considerations as those expressed above for SC would apply to this system.

America: In this service, articles which are parts of a medium, the journal, are indexed rather than items of media indexed as a whole. Thus, greater degrees of detail and specificity are required.

Information science

Information science is defined in this paper as including the theoretical and practical aspects of information retrieval and library science.

PIRS: Knowledge of the highly structured, single-argument characteristics of the information from the playbills to be processed was a great aid in selecting the type of programming and data indexing to serve as an operating system that would obtain optimum internal storage and accurate, quick information retrieval at the lowest possible cost. Such analysis enables an information specialist or librarian in the process of developing a project better to communicate system requirements with the computer specialist who handles the technical aspects. In the case of PIRS, however, the developer of the project is himself a computer specialist.

Because playbills lack subject content, there is no need for a thesaurus of subject terms. The data from the playbills, made up of many individual equal parts (actors, characters, etc.), constant enough in their size and form to be considered machine identical, remain unchanged from playbill to playbill. The internal structure remains constant even if playbills from a variety of historical periods are included.

Each piece of information from the playbills can be placed in one of several information classes, such as name of playwright. Each of the individual pieces of information represents only one idea or possible category of ideas. Thus, the information is composed of "single-argument entries," as differentiated from multi-argument entries, such as the single entry word, "set," from an article in Theatre Crafts, which might mean "storage arrangement," "to place," and "a degree of readiness," among other possible meanings.

Points of access include storage locations, date, actor, playwright, play title, theatre, and dramatic characters.

Incunabula: Strong cataloguing knowledge is essential to an understanding of the points of access and to the use of class rather than specific headings or of any other subject approach such as coordinate indexing.

HPB: The points of access in HPB are based on the principle of information retrieval that where there is a large file and not excessive use, simplicity of input with greater burden on evaluation of output is preferable to input which involves complicated coding and editing.

A gross retrieval number (GRN), automatically generated for the entries, has been devised for use in querying the data base and consists of the first three letters of the author's family name, the first three letters of the title (other than an article), and the last three numbers of the date of publication. These represent fields 1, 3, and 7 of the following total range of fields eventually to be coded and queried: 01 Primary author; 02 Secondary and tertiary authors; 03 Title; 04 Imprint; 05 Volumes; 06 Edition; 07 Date; 08 Format; 09 References to bibliographies; 10 Other comments.

The automatically-generated GRN file for the approximately 20,000 entries in the main file is used for experimental manipulation. It will develop statistical data for determining what might best serve as a refined retrieval number. This may also be used as a locational device in the form of a permanent address for each entry in a cumulated main file. The present main file will be supplemented by nine more such files of about 20,000 entries. Then, when 200,000 entries are in the file, a cumulated file with this permanent address system is planned. The possibility that this cumulated file should be split into several files according to language or place of publication (or any other useful

criterion) will be influenced by detailed analyses of the frequency and usefulness of the GRNs.

SC: A basic knowledge of how classification schemes and numbers are formulated is needed for the most meaningful understanding of this Slide Classification System.

Buffalo: A basic knowledge of how classification schemes and numbers are formulated is also needed for the most meaningful understanding of this Slide Classification System. The composition of the call number varies for different kinds of media. Its primacy sequence generally is media or art form, country and subject. Where applicable, the author is included after country and before subject. For example, for paintings, the first line of the call number consists of "3" plus the general country number; the second line, of the artist if known (instructions are provided for cases in which artist is unknown); and the third line, of a subject number from an appropriate table plus an alphabetic identifier. A Table of Contents leads into the tables and instructions for formulating call numbers.

NICEM: Familiarity with the alphabetico-classed type of subject heading structure used in the NICEM scheme of organization of nonbook materials might possibly effect more efficient use and constitutes a basis for evaluation of this heading structure as compared with other types of subject analysis. An example from NICEM Category and Subject Matter Headings of the type of heading used follows: In the "Index to Subject Headings" section appears "FINE ARTS" and beneath that "Dance." In the "Topical Index" section the entry word "Dance" leads to the proper place in the subject heading list: "Dance" and beneath that "FINE ARTS" and beneath that "Dance."

America: Knowledge of information retrieval is particularly desirable in regard to the cue system of alphabetical codes, formerly used

in America: History and Life, at the head of each abstract and in the subject index as a means of subject retrieval. The use of cues was dropped as of July, 1969, on the basis of feedback received from librarians using the publication. The cue lines, or group of cues used, described the chronological, topical, and geographical aspects of the article with emphasis on the geographic. For example, an article dealing with social history; economic history and life; cultural life, specifically philosophy; until 1965, with no starting year evident from the abstract, received the following subject cues: -1965 SOC ECO CUL. PHIL. The cue lines also contained the bibliographical citation of the entry which now appears without the subject cues.

The cue system of America: History and Life emphasizes the geographic element, as this approach complements the mixed chronological, topical, and geographic systems of classification of the abstracts and appears to satisfy the predominant number of users.

The cues continue to be used internally for subject control by the American Bibliographical Center. The system was originated because it was felt that scholars in the humanities might have a resistance to codes such as the Dewey, Universal Decimal, or Library of Congress systems. It was created to serve three objectives: (1) Reduction of bibliographic search time with the aid of an abbreviated description for each article, the cue line; (2) Development of a general knowledge classification system, primarily for the humanities and social sciences, with alphabetic codes endowed with substantial mnemonic potentials; (3) Use of the computer to create the subject index from cue lines, make index searches, and prepare special bibliographies.

Most of the cues used for major subjects are easily recognized three-letter abbreviations, such as LIT for literature. There are four levels of cues: main, secondary, tertiary, and fourth level.

The dictionary of the subject index serves as the thesaurus and includes: (1) Subject headings, listed after their corresponding cues, and cross-references thereto; (2) Geographic headings, listed after their corresponding cues, and cross-references thereto, and (3) Additional index entries not assigned a cue, usually because they appear less frequently. Examples from the subject index dictionary follow:

REL. CHR. (CHRISTIANITY) SEE ALSO DENOMINATIONS

MUSIC SEE CUL. MUS. (CULTURAL LIFE---MUSIC)

Under "CUL":

CUL. MUS. (MUSIC) SEE ALSO FOL (FOLKLORE...)

A "Combined Index of Author, Biographical, Geographical, and Subject Entries" now appears each July without the cue lines. An example of an entry in the index follows: Under "Music" appears, among other subheadings, "Arkansas," and the number 1397. Under "Arkansas," the same number appears under the subheading "Music."

Educational objectives, curriculum, and teaching-learning methods

SC: Although knowledge of educational objectives, the curriculum and its development, and teaching methods is undoubtedly helpful in the handling of all aspects of a computer-based humanities reference service, the SC Slide Classification System is specifically designed to reflect the interdisciplinary approach to the study of man and the humanities which is one of the characteristics of the Santa Cruz curriculum. The scheme is designed to relate every aspect of life in any particular era or culture for purposes of comparison and to facilitate

the viewing, chronologically, of the whole movement of human history.

NICEM: University libraries are among the types of libraries making use of the NICEM services. The headings reflect topics represented in school curricula and educational media centers. They were derived with the aid of a check of the audiovisual catalogues in existence in 1963 all over the United States. The list was developed further through suggestions from the Sears and LC subject heading lists and from current literature on topics of major interest. There are also codes for titles and for producers and distributors.

Computer technology: (including input devices and processes)

It might be well to recall that we are attempting to determine what the information specialist or librarian who administers and works with the services needs to know, not the computer specialist who writes the necessary programs.

A basic knowledge of the computer, what it can do, and how it operates is necessary to understand such terms as "sort field," "fixed field," and "length of field," used with reference to any of the systems and to structure the points of access. This knowledge is an aid to understanding such concepts as the following concerning HPB: It is highly likely that the whole file will eventually have to be completely reformatted as the use of fixed fields takes up too much storage space. Until further experimentation with manipulating bibliographic data is gained, the use of fixed fields was thought to be advisable.

Administration

The requirement of knowledge of administration applies in this paper to information specialists or librarians whether or not they hold an administrative position.

America: Although it is felt that the predominantly geographic structure of the subject index probably well serves the majority of users, the decision to place this limitation on the structure was also prompted by the need for economy. This points up that even the choice and extent of index headings depends on established overall administrative policies and their application.

* * * * *

Subsystem 2: Indexing policy and practice in updating and maintaining the file

The second subsystem analyzed in each service is "indexing policy and practice in updating and maintaining the file."

Knowledge

Subject matter

SC: Published works must be referred to and reference work performed to prepare entries for the SC file. Extensive knowledge in the filed might be considered a requirement for entering data into the file because of the plans for continued growth of the collection into research proportions. A technical knowledge of print making, evaluation of prints, lithography, and photography are also important background areas and too often ignored in the preparation of art librarians.

Following is a selection of file policy statements which reflect the need for bringing art subject matter to bear in reaching the necessary decisions:

(1) Classify a slide in the art division of the classification scheme if the representation is a work of art. A work not produced by a camera but judged to have no artistic merit is placed in history or science. A photograph may be classed as art if its subject content is indefinable or is clearly subordinate to its artistic qualities.

(2) Obtain the subject from the title rather than by what is seen in the picture. Thus, a portrait is classed as a portrait even if done in cubist fashion. Abstract art is the category for what is not readily recognized.

(3) Prefer history for ethnic, aboriginal groups, primitive cultures

for primitive arts, expecially in the later chronological periods where, for example, American Indian artifacts would become mixed with industrial design if included in art of the United States.

(4) In field 14 (the location of the work), the present location of a movable work of art is used. City name is preferred, if known; otherwise the next larger political or geographical subdivision is used. The abbreviated name of a collection may follow if appropriate. Location names are spelled out in full.

(5) Priorities have been determined for the origins of works of art: personal or corporate name of artist; city or other political subdivision; subdivision of style to be entered by a contrived Cutter number taken from special schedules; or A000 signifying "insufficient information."

The determination of the origin of a prize-winning painting by a baboon in a zoo who has made headlines for this accomplishment was not specifically included among the policies but intrigues our imagination.

An authority list containing over 4,000 of the most commonly used artists' names has been prepared as a primary classification tool. The list gives four different facets of information necessary to the construction of a complete call number: (1) chronological period to which the artist is assigned; (2) the country of his birth; (3) the Cutter number for his name; and (4) standardized spelling for his name. The dates of each artist and the media in which he worked are also given for aid in correct identification of artists.

In this authority list, artists are normally classed in the country of their birth and the century of their death. It was felt that this practice outweighs, in most cases, the desirability of placing a man

elsewhere on the basis of subjective judgment about where or when he did his most important work.

Buffalo: Following are several examples of classification instructions which probably could be carried out more readily by a classifier with a basic art background, particularly the first two, at least until the collection grows to research proportions necessitating expansion of the classification scheme.

(1) Under architecture, in the third line, use the subject number and alphabetical identifier. Use one or two letter code for each building, with second or third column identifying the view. Put plans first. If there are more than twenty-six views of a particular building, change the second or first letter to the following letter and start over, e.g., St. Peter's, Rome: 172/R664/20PEA through 172/R664/20PEZ, then 172/R664/20PFA, etc.

(2) Under minor arts: useful objects, third line, if there are a great number of similar items of the same material, e.g., Chinese bronze vases and cooking pots, it may be necessary to devise a chart that will assign one letter or two letters to designate a particular type, and then assign the letters of the alphabet in order following.

(3) Under painting and sculpture, second line, include date and dynasty for anonymous works. (A helpful appendix provides this information.)

(4) Under minor arts: textiles, etc., if the material of the article of clothing or the costume is known, classify it under the textile rather than under clothing and costume.

(5) Under Table II, Country, whenever possible, use the large, non-decimal numbers for an area or country. Use the decimals only

if the collection has sufficient entries in one area to warrant further subdivision.

(6) For maps, the second line of the classification number consists of the Cutter number for political subdivision of line one, or time period if specific.

America: The subject knowledge required for updating the subject index is a general humanities and social sciences background sufficient to prepare an index from the abstracts themselves rather than from the articles. Although recommendations for specific index entries by the abstracters are considered, the indexers avoid making entries on information not evident from the abstract. Detailed instructions are provided for the formulation of geographic headings such as when sovereignty changes. The abstracts, as part of the information retrieval system, are written by scholars and require subject knowledge in keeping with the range and scholarly nature of the journals abstracted.

Media characteristics

Incunabula: Need for scholarly knowledge of the characteristics of incunabula is essential in resolving the time-consuming problems encountered in verifying the input information, both descriptive and in regard to subject analysis, because of the complexities in the field of analytical bibliography and the necessity for accurate information.

HPB: The Chief Investigator appeals to librarians to help both to increase the size of the files and to elaborate the record that already exists. The following account, paraphrased from The HPB Project: Phase II, indicates that a background preparation involving hand-printed books to a significant degree would be a necessity for maximal

performance at the input stage where cataloguing procedures are integrally related with knowledge of this particular medium. However, all contributions from librarians are useful and welcome whether or not further editing is required.

Updating of the main file and the locations file is done by contributions from librarians of their holdings of hand-printed books. Contributing libraries are supplied with a free printout of the locations file. The conversion file enables any new information supplied according to STC, and other bibliographies, along with date, as a crosscheck against error, to be automatically transferred to either the locations or the main file. When standard bibliographies are cited in the elaborations of the main file the conversion file will be used to transfer automatically to the appropriate file any information supplied by reference to such bibliographies. This development will be tested initially by experimenting with incorporating information from Macdonald's bibliography of Dryden into the HPB record. When main file entries have been compiled for every book entered in the locations file, the locations file will disappear.

Each library may request a printout of the information about its holdings already in the main file and the locations file, and may then correct the record by deletion or addition. Such correction enables HPB to report on the holdings of that library in a variety of forms.

Certain of the instructions for transcription of information are routine in nature, such as to transcribe letter-by-letter following punctuation and spelling literally and to record the date of delivery of a sermon and omit place. Other instructions, such as those concerned

with volume identification, are more complex.

The need to grasp the concept of the "bibliographically distinct volume," as well as definitions of text, work, and formally distinct volume, might challenge a librarian not accustomed to working in this area, as the following passage, although taken out of context, demonstrates:

> This means that a bibliographically distinct volume (and even a formally distinct volume) containing Paradise Regained (with or without the Minor Poems) may not appear as a separate entry in the British Museum catalogue. We must assume, then, that HPB entries such as M10259, 263, 264, 265, 266, 273, 276, 277, 278 are all subsumed in the appropriate entry whenever "Paradise Lost" appears as the title under the heading "POETICAL WORKS". Bibliographically, the two volumes are separate works; if a general title page reading "The poetical works ...in two volumes" had been inserted before either or both separate title pages, the two volumes would be best described as an "aggregate issue" of either or both bibliographically distinct volumes, but would not make two formally distinct volumes into one formally distinct volume.

Another principle in the collection of data to be added to the HPB file is that they should be transcribed from the actual book itself and not from what might be imperfect bibliographical or cataloguing records now in existence. In attempting to select the data from the title page or other parts of the book, the cataloguer must follow rules that will produce results with an absolute minimum of difference between one cataloguer and another to insure accurate retrieval at a later phase of the project.

To achieve the most unambiguous identification of an author with the minimum of information, the author is recorded in the form of his family name, followed by one or two given names, with no attempt made to distinguish two authors who happen to have the same family and given names, as other elements in the entry will serve to avoid confusion between books. The problem of transcribing a name from a title page is

that more than one form of the name may occur on a title page, e.g. John Sheffield, Earl of Mulgrave, Marquis of Normanby, and Duke of Buckingham. If different cataloguers are forced to choose between such variants, they must have an unambiguous rule to go by.

If the name on the title page is not certainly the family name, an alternative retrieval number (ARN) should be supplied as well as the apparently obvious GRN, the most important use of which is for adding entries to the main file. The ARN number is assigned in place of a GRN when indefinite information is involved and consists of a square bracket and two blanks in place of the conjectured characters. The greater the number of ARNs supplied, the greater the certainty true matches will be found but also the greater amount of false drops. The librarian has to decide how much specificity he wants and how much comprehensiveness is worthwhile in view of the objectives to be served.

Where errors in the date occur, the error is literally reproduced as part of the imprint, and the true date supplied within square brackets.

The most significant part of title page information from the bibliographical point of view is the imprint, and this should be transcribed letter-by-letter, except for words not needed to identify and relate the "physical authors" to each other or to the book itself.

Conventional forms for the notes will be finalized later in the project, and problems such as how to guide cataloguers in determining what constitutes a secondary author will be tackled in Phase III.

The printout in The HPB Project: Phase II of the Milton items in the locations file and in the main file shows how such union lists

might best be developed by using the data banks. Librarians are invited to check their holdings of Milton against the printout, and to send in corrections and additions for incorporation into the record. A list of the HPB numbers of those books in the library and a xerox copy of the title page of any relevant item not in the checklist together with a note as to its format, constitutes sufficient information to contribute toward expanding the file.

The printout is possibly the most complete listing of Milton before 1800 (other than in individual library catalogues) that is publicly available, but if it is not, it can very quickly be made so, provided that librarians use it as a checklist and report on the results of the comparison. Milton holdings of twelve libraries have been edited into the file in whole or in part thus far. Experimentation is now taking place with the use of the GRNs (gross retrieval numbers) as a preliminary method of checking an already catalogued collection against the HPB main file.

In time, the possibility of incorporating in a separate file an abstract of the differentiating "points" found by comparing two seemingly identical books, not only by Milton but in regard to the total file, and of changing the information in this file without changing the main entry may solve the problem of instant outdating associated with conventional publications.

Because the cooperation of a large number of librarians is needed for the success of the HPB Project, an attempt was made to make the computer-produced printout resemble the written entries supplied by the librarians as closely as possible. A goal was to design the conventions for compiling the entries to be simple enough to be taught in a day or

less to a bibliographically-oriented librarian and in an easy to use checklist form.

Lack of knowledge of incunabula was reflected, however, in some of the replies from librarians and in some of the contributions made to the file, as exemplified by the following examples: (1) One librarian raised a question concerning format, indicating one format through the description but reporting another format; (2) Another librarian stated that when in doubt, the librarian put the format information in brackets, and that no one at the university knows very much about bibliography (the librarian unquestionably is referring to "analytical bibliography"); (3) Another expressed lack of knowledge of bibliography; and (4) One librarian conventionalized the entries reported instead of following the HPB format as requested.

Information science

All the services require a knowledge of information science (recalling that in this paper "library science" is included in the definition of "information science") in the sense that a strong knowledge of indexing (cataloguing) is needed to undertake the incorporation of entries into a file in the most consistent manner; for PIRS, however, a basic knowledge would suffice.

NICEM customers add to the data base through contributing information on their holdings at the time of placing an order for a custom book catalogue. Knowledge of cataloguing is a predominant need in fulfilling this function. NICEM sends the user an alphabetical title list on the data base for the requested sections, and the user checks his holdings and adds any desired information unique to his situation such as call number. For holdings not included on the list, the user fills out an

input card and marks the list returning both to NICEM. The NICEM data base is then updated to include the additional holdings after consultation with the producer or major distributor if necessary to obtain any information otherwise unavailable.

The subject index dictionary of America permits unlimited growth and expansion of the cue lists and of the cross-referencing apparatus. A knowledge of information retrieval is relevant to determining the optimum degree of specificity to be assigned under any level of cue. Specificity can be increased as required by the growing number of entries. A thorough grounding in precision-recall ratios and in the findings of relevant research studies would enhance ability in effective file maintenance. A set of abstracting instructions for the guidance of the scholar abstracters is in preparation. Instructions are also being compiled for indexing and preparing input data.

Needs of researchers and other users

Knowledge of the needs of researchers and other users is included when this requirement was specifically mentioned by those we interviewed or in the literature related to the services. This knowledge is defined in this paper as constituting needs of researchers and other users on an individual or "profile" basis or otherwise beyond a general underlying awareness of user needs.

PIRS: The addition of playbills to the data base involves the exercise of judgment in making decisions about the research usefulness of certain information. Information of no research usefulness is omitted from the playbills. Exclusions include publicity-inspired adjectives, typographical embellishments, and other material deemed useless to the

researcher.

Explanatory words following the name of a character are reduced when the length of the explanation exceeds format storage capacity. The reductions are made in keeping with the philosophy of providing a suggestion of the information contained in the playbills. For example, the character "Cecelia Moonshine" from the play Boots at the Swan, 1862, was followed by "A Romantic Young Lady, a victim to sentiment and light reading, with a fond attachment to extraordinary novelties." The playbill computer storage merely states "CECELIA MOONSHINE (A ROMANTIC YOUNG LADY)."

SC: This Slide Classification System permits addition of data in accordance with the needs of researchers. For example, ordinarily only two people in a group portrait are encoded, but the identification of every person in the group can be included if desired. A painting of a historical event is dated according to the date of the work of art but the historian may also be interested in the date of the event pictured, and this date as well can be encoded. Such entries might encourage interdisciplinary use of the collection.

Another possibility for encouraging interdisciplinary use is that history and art can be more closely integrated by rearranging the prime chronological schedules to place history and art under each chronological subdividion rather than separating the subjects and then subdividing chronologically. The primary sequence of time, place, and media or art form can be rearranged to bring any of the facets to a more dominant position.

NICEM: Researchers and others have recently demanded greater access to black history and studies and to ecology. The NICEM subject heading list accordingly expanded in these areas. The list grows in

this manner as additional headings are needed for particular topics, and the next edition will reflect this growth.

Computer technology

PIRS: Those desiring to contribute additions to the store of playbills in computer readable form may do so. Clear, brief instructions are provided which include some reference to the terminology of computer science. At least an introductory knowledge of the field might aid in carrying out the following instruction, for example: The sequential arrangement of the complete data deck of two hundred punched cards should exactly correspond to the sequence shown in the array storage format, etc.

Incunabula: Knowledge of computer capabilities for collocating entries is essential for designing input coding to bring together varying entries under a single conventional entry.

HPB: As with Incunabula, knowledge of what it is possible for the computer to do is useful in planning for improved means of maintaining the file. For example, eventually a computer program can be devised to bring together such various entries as the following in the HPB file to "Tully's Offices" under a single conventional entry, avoiding difficulty with collocation for an author bibliography: (1) Tull(ius Cicero, Marcus), (2) (Cicero, Marcus) Tull(ius), (3) Tully, or (4) (Cicero, Marchus Tullius) Tully.

An automatic transliteration program will be built into the keypunching operation by placing caps with the Greek letters over the keys. More complex relationships identified through research can be incorporated into the record, such as the fact that one work prompted another, or the

linking of items that belong to a pamphlet controversy as responses to a common stimulus. The computer has a built-in flexibility for incorporating such additions and elaborations into the file.

SC: Updating the computer file in this system is considered to be relatively quick and simple, but deletion is a slow, complicated process. For this reason, some errors are not eliminated. Although the computer specialist handles details of these operations, an understanding of the processes and reasons behind quick or slow functioning in regard to error correction would appear essential to one responsible for the development and operation of the service.

Buffalo: In this system, minor changes can be made simply but of course require time and the use of additional punched cards.

NICEM: This service reports that errors are easy to correct by computer once the error is known.

Administration

Incunabula: A difficulty in completing the keypunching is that one person cannot work long enough to begin and complete the gathering of the material and the keypunching for the entire collection. Therefore, a number of people must be trained for performing the necessary operations. Budget is also a factor militating against rapid completion of the developmental phase.

HPB: Librarians who made contributions to the HPB file encountered certain problems of an administrative nature. Although identification of administrative problems does not guarantee their solution, at least it is a step in the right direction if coupled with the knowledge of university-wide administrative structure and problems.

Following are statements which describe situations reflecting problems relative to library administration from correspondence received from contributing librarians, but it should also be noted that the librarians expressed interest in the HPB Project and regret for the obstacles against their participation: (1) In regard to checking library holdings, one library reported that a clerical worker is leaving and another staff member is going on vacation, creating a shortage of personnel; (2) Another library reported an extreme staff shortage and therefore could not state how far the library could involve itself in the project; (3) Another library reported that the staff was reduced to the point that there was hardly any possibility of participating in the project in the near future as the library could not keep up with the regular work; and (4) Another library reported that shortage of staff and complications associated with a move into a new building made it hard to forecast when a contribution could be made.

The HP8 Project center itself suffered the following delays and difficulties reflecting overall university administrative problems concerning priority determination for campus projects; (1) At one point there was a six month delay in obtaining a needed tape drive installation; (2) Available computer facilities for originating the main and locations files were very limited in stoarage capacity and in print-train capability; (3) 8ecause of the non-availability of computer processing time as well as restricted facilities, catalogue cards contributed by librarians were compared manually with the printout of the main file additions made to the locations file by the slow method of keypunching the lIP8 number and the library symbol rather than by machine matching and automatic updating of the locations file; (4) Through lack of funds, at one time entries for

the locations file accumulated for seven months and held up the correction of the files; (5) Additional funds are required in order to proceed with the next printout as scheduled in the overall design; (6) Two additional full-time people would desirably be funded for work on both cataloguing and input plus secretarial help; (7) At one point in which entries were available for addition to the file, the computer was not to be available for a month; (8) Reports had to be made in three cases to librarians who had requested printouts or short-title cataloguing from title pages sent that lack of staff and the need to batch the cards to keep down costs contributed toward delaying fulfillment of the request.

Buffalo: The work of encoding and keypunching input will stop temporarily when the student help leaves at the end of the term. The slide librarian works on a part-time basis. Recent budget cutbacks in the state could possibly create future staff problems.

Abilities

To apply policies and instructions in assignment of index entries

For all services, subject knowledge and a grasp of theoretical concepts of information retrieval are obviously of no avail if the cataloguer lacks the ability to apply the knowledge and theory in the assignment of index entries to the materials and to develop the syndetic apparatus of the file as needed.

Attitudes

Respect for scholarship

Maintaining a file consistently requires a respect for accuracy. The following examples illustrate this requirement very well.

The Chief Investigator of PIRS stated that it would be very easy for a researcher to project parts of his own personality into selecting pieces of information or mentally to correct "errors" in the original playbills. Only data clearly presented on the playbills or made clear from information contained in other playbills is to be included in the selected information which becomes part of the data bank.

In regard to Incunabula and HPB, if relevance of the information included in the data bank to the scholarly activity which will be facilitated by the service is not seen by librarians contributing to the information store, they may feel that attention to the fine points of format, and later, when the HPB "points file" is developed, to the differences between editions, issues, and states are irrelevant and not worthy of the time required to determine the exact information. What would be the point of seeing that information entered into the file is taken directly from the works themselves rather than from possibly inaccurate cataloguing which is already available if the information taken from the works themselves is going to be entered incorrectly by someone not motivated to assume responsibility for the attention to detail required by scholarship?

Motivation for conducting research

America: The continuation of internal use of the cue system suggests the desirability of study and evaluation in regard to updating and maintaining the file. Additional study and analysis of the cue system would contribute further insights into this type of retrieval system.

* * * * *

Subsystem 3: Interaction between the system and the users

The third sybsystem analyzed in each service is "interaction between the system and the users." This section concentrates on the overall relation of the service with the user: the products of the service and their usefulness to him; means of motivating and instructing in use; and identification and planning of needed future projects. Specific search strategy procedure is treated under Subsystem 4.

Knowledge

Subject matter

America: The broad historical, sociological, and humanistic range of subject matter covered by the periodicals abstracted requires extensive subject knowledge for the overall planning of the scope of the service.

Media characteristics

PIRS: Playbills may be in bad condition from crumbling, making them difficult or impossible to reproduce and requiring valuable time of the scholar to decipher. This factor underlines the value of this computer-based service for the many scholars who do not need to see the original playbill in order to carry out their research. Fifty percent of the playbills used in the PIRS pilot project were not in a suitable condition to be reproduced and none circulated.

Incunabula and HPB: The very basis of both of these endeavors derives from needs of scholars in the field of analytical bibliography which field reflects the manner in which the books involved were printed.

SC and Buffalo: Certain characteristics of slides cause problems in providing services to users, especially with respect to determining the possible value of reproducing the slides on aperture cards to be made part of the computerized service. SC felt that this arrangement would prove too bulky, the color would not be good enough, and the burden of filing the slides if sold to the user for a small charge would then be placed on the user who may want a certain slide five times a semester and discard it each time to return to the library to obtain it again. Buffalo also mentioned color as a problem with slides, and that reproduction affects the color. True color is important in scholarly work in art, and it is costly to keep replacing slides whose color has faded. For identification of the artist for obscure but known paintings, or similar questions, it would not be necessary to view the slide.

Both systems base their organization on the assumption that users do find it very useful to browse among the slides.

NICEM: This service covers an array of nonbook materials, the characteristics of which are amply discussed in the literature of audio-visual media. These characteristics must be taken into consideration when applying the principles of book cataloguing to the various points of access for retrieving nonbook items. Research results in the field of perception might also be applied profitably to the organization of nonbook media where appropriate, an application apparently not yet in practice.

The subject, title, producer-distributor approach rests on a numerical classification scheme with a subject heading list that contains elements of classification in its alphabetico-classed arrangement.

Users may purchase the additional service of having call numbers added to the entires if desired.

America: The nature of periodicals, the characteristics of which are also amply discussed in the literature, underlies the design of this service. In particular, the service aims at currency, for the time lag between the acceptance of an article for publication and the actual publication may already account for months or even years of delay.

Information science

HPB: The HPB Project engages librarians and researchers as users in a variety of ways with various kinds of interaction between users and the system taking place. One of the ways in which librarians use the system is in cataloguing collections of hand-printed books. One librarian is using the short title cataloguing that HPB uses. Another plans to conduct a time study of gaining temporary control over a backlog of 1,500 volumes in the library's special collections division through use of the conventions of short-title cataloguing. The collection is receiving additions faster than they can be catalogued by conventional means. Another is annotating an HPB printout as an adjunct to the card catalog which does not always account for all the bibliographically distinct volumes.

As an indication of how useful HPB can be for any librarian wanting to overcome a cataloguing backlog, use of the main file in making entries for holdings in the Stuart Collection of over 500 items at the University of Western Ontario was timed and results were obtained which were judged as indicating that the process is a speedy one. Librarians desiring to get a collection of uncatalogued pre-1801 books under some kind of bibliographical control through use of HPB can follow this procedure established

by the system:

If the books are covered by STC or Wing he may identify the uncatalogued books by consulting those reference tools and putting a slip in each book with the STC or Wing number on it, and marking up the library's copy of STC or Wing for use by scholars wanting access to such books. If he supplies a list of STC and Wing numbers to the HPB Project, the information can be added to the locations file so that an up-to-date list in any required order may be supplied. If a main entry has already been made by another contributor for any of these books, this too can be sent to the cooperating librarian. The librarian could then, if he wished, make short-title catalogue entries for those not in the main file so that such entries would be available to himself and others in the future.

If the books are not covered by STC and Wing, the librarian may now, if he wishes, identify the books by putting a temporary slip in the book with the GRN on it, and then supply a list of these GRNs (with any call number necessary to locate the book) to the HPB Project. In return, a printout of matches can be supplied, and the librarian can substitute the HPB number for the GRN in some of his uncatalogued books. For the others, he may make short-title catalogue entries for adding to the main file. The true matches can be reported for adding to the locations file, and an up-to-date printout of his holdings may be supplied.

Acquisitions is another area in which librarians make use of HPB. For example, a search determined the location and extent of early Milton itmes in Ontario. As a result of the information provided, the Stuart Collection of Milton and Miltoniana was acquired with confidence in the

knowledge of what it would add to the resources of the province as well as of the University of Western Ontario. A rationalization of the acquisitions programs in rarer material in libraries will possibly be a product of the union catalogue.

Through use of the file, resources may be built up in various areas, as in a project in one location involving studies in eighteenth century library history.

Perhaps the most challenging use that librarians can make of the data base is response to the invitation extended to librarians in Australia, Canada, and New Zealand, the countries whose holdings are currently represented in the file, to engage in research and development in the field of bibliographical control of early books in special collections. For this purpose, all or part of the data in a variety of forms can be obtained, including the whole data bank, if desired, copied on tape or cards or supplied in printout form at cost price. Parts of it will be available after workable programs are devised to produce selective printouts, cards, or tape.

One example of the kind of research needed is response to the challenge of certain critics that until some kind of subject classification and coordinate indexing are provided, the information given in the HPB printouts is practically useless to scholars other than librarians or bibliographers, a statement calling into question that the function of hand-printed books as objets d'art is the most important aspect for analysis. Experimentation in providing access to dictionaries by form rather than by subject was undertaken but was not considered to be successful.

Further experimentation in access to hand-printed books by form and subject needs to be undertaken, for example, in such aspects as how much subjectivity the indexer would need to exercise in coding information

and the justification of subject access, not traditionally provided among the multiple access points already available through conventional bibliographies. An assumption set forth in the project is that special collections demand a specialized approach, and that most attempts in the past to organize a special collection by standard tools such as the Library of Congress Subject Headings have been valuable only because the reader is familiar with the use of subject headings in general collections, not because they provide the best access to a closed collection, and that elaboration of the title for purposes of subject analysis does not provide the answer to the need for subject analysis. Cross-referencing in the main file is another area requiring further study.

In addition to aiding in contributing toward a bibliography of hand-printed books which could eventually supersede any other bibliography published through constant addition and correction, librarians can bring to bear their knowledge in bibliography to the production of machine-readable author bibliographies in the form of comprehensive union catalogues through use of the HPB file in response to needs of scholars. A cumulative list of such union catalogues could be published as part of the report on Phase III of the project if a sufficient number of bibliographies are compiled.

Librarians now can receive a printout of a union list of the writings of a particular author currently in the file which can be circulated among other librarians for checking and comment. However, with respect to the bibliography in progress of Milton and Miltoniana, experiments with manipulation of the information in Field 2 (secondary and tertiary authors, along with attention to the problems of cross-referencing) will augment the Milton checklist, and the GRN experiment will be used to

produce a "Miltoniana" bibliography, both particularly useful at the University of Western Ontario because of the strength in Milton holdings represented in the special collections. Because the GRNs are compiled from bibliographies, booksellers' catalogues, and library catalogues, references to these sources can be stored with the GRN. When the GRN produces a true match, the NPD number is "tagged" with a dictionary number indicating that the item can be considered to be Miltoniana, providing a type of subject indexing.

An attempt projected for Phase III of the project to generate a machine-readable dictionary of anonymous and pseudonymous literature and a dictionary of family names for people whose names changed in the course of their lives (titled people, married women, etc.) will provide a tool for the cataloguer, relieving him of the necessity of consulting a secondary source for this information. The tool would also constitute a list of books for which information is still being sought in the case of anonymous and pseudonymous authors. Separate sequences for these and other kinds of authorship, such as corporate, permit the use of an uninterrupted mnemonic device in the identification of personal authors.

NICEM: The computer products of this service are filed in a different manner from conventional library catalogues. Very briefly, the general sequence followed is: nothing, symbols, letter, numbers. Knowledge of information retrieval through use of the special filing system is therefore essential.

America: Because the cue file is searched internally, users are members of the staff of the American Bibliographical Center. Although the cues were removed from the America bibliographical service in response to the reaction of librarians, the cue system based on the cue thesaurus

remains the internal basis for subject queries of the system and for structuring the index. The four levels of specificity of the cues and the possibility of coordinating them require application of the principles of information retrieval to the determination of the most useful printout products and methods for obtaining them.

Research methods

The research methods of the users are treated with respect to how the methods affect the planning and use of the services. "Research methods" are defined as a higher level, scholarly approach to investigation of a problem, according to a design which meets established criteria for rigor, validity, and reliability.

Incunabula: This service facilitates textual analysis, a major research method of literary history scholars through recording works according to the principles of analytical bibliography. Knowledge of the research method of textual criticism is essential to understanding the very purpose of the service.

HPB: As with Incunabula, researchers in literary history use textual analysis as a research method to identify documents and literary works accurately. To provide the researcher with this type of information through the HPB data base, the development of a machine-readable "points" file is planned. The bibliographer could then examine main entries in the HPB file to distinguish the items which seem from the main entry to to be identical but which are not. Where no standard descriptive bibliography exists, the determination of points can be undertaken as preparation for such a bibliography.

American: This service is geared to satisfying the needs of the researcher who approaches humanistic and sociological study historically.

Needs of researchers and other users:

PIRS: This information retrieval system performs three distinctly different tasks directed toward fulfilling needs of the researcher:

(1) Prints out the full document briefs of each playbill in storage.

(2) As a look-up procedure, indexes all playbills in storage and forms lists of desired access points, including the following possible program runs: Index to collections (storage locations), Chronological index, Actor index, Play title index, Playwright index, List of theatres, Dramatic characters list, Playbill document briefs, Date search routine, Playwright search routine.

To exemplify the "list of theatres" printout, line one of the list contains the theatre name, and, opposite, the city of its location. Line two contains the name of the public library which holds the original playbill, and, opposite, the number of playbills in the collection from the theatre in question if more than one playbill is held. By contrast, the "dramatic characters list" is simpler with this format:

CAPTAIN CROSSTREE — BLACK-EYED SUSAN OR, ALL IN THE DOWNS

The PIRS Project potentially could in time become a periodical publication with updating in the form of document briefs, lists, and indexes, depending on what direction feedback from users might indicate.

(3) Performs individual searches and retrievals through all the playbills in storage to find references to a single name, play, or other information fragment.

To exemplify the "playwright search routine," the playwright search was assigned the name "Shakespeare," and the machine was asked to

review all listings of playwrights and make a report through a computer printout of any locations in which the name "Shakespeare" was found.

Although the search procedure could serve as a functional and valuable process in some cases, it is felt that for most users the document briefs, indexes, and lists are of greater value. The system has a large growth potential and through the storage location code can serve as a union list.

Incunabula: Plans for further development are based on determining more precisely the actual needs of users in regard to a multiple access approach to incunabula. The need for an on-line search service is not foreseen as sufficient to justify the expense.

HPB: One of the principles of the grand algorithm of the project is that contributions to the design may be made by anyone who uses the data bank. What might be called marketing research takes place to communicate with users and potential users in determining scholars' needs. Through the publications cited earlier, explanations of the complete design including aims, methods, and costs; requests for expression of needs; and invitations to librarians to cooperate in the project and to demonstrate the use to which the embryonic data banks could be put have been set forth. Twenty pages of explanatory text preceded the printouts sent to librarians in Phase I of the project.

The system currently can search only the author, title, and date fields. The latter is a major retrieval device for scholars in the humanities because conjecturally dated items can be retrieved for review; ordering of selected entries in a chronological sequence can be done; selection within chronological limits can be made; publishing history, printing history, contextual dating, and many other activities of

humanist scholars can be facilitated. In addition, use of the date helps to counteract the effect of the missing edition information. The system will accommodate at a later stage other multiple access devices, such as chronological files, provenance files, indexes to printers, places of publication, etc., for the reason given that the scholar in the humanities requires more access routes to the file than those provided by conventional author and title approach.

The value of each field for collocation, indexing, retrieval, and cross-referencing was analyzed in detail to arrive at a compromise between the amount of data included in the entries and the higher cost and greater chance of inaccuracy in collection, recording, and proofing, and the lower the speed of compilation when more data are included. Fields 11 and 12 give the index user an author-title display in natural language and are not intended for mechanical sorting.

In regard to the Miltoniana collocation in progress, the following questions are put forth to prospective users: Is it desirable that all Miltoniana be lumped together in one alphabetical sequence? Would a chronological listing of a conflated list be of more use than an alphabetical one? What headings provide the most useful subdivision of the subject? What constitutes the precise limits of Miltoniana? What are the parameters of the category of imitations of Milton? How efficient is the British Museum catalogue's segmentation of the works (collective, selective, and individual) of Milton in satisfying the demands of scholars for certain kinds of bibliographical access? How can the HPB main file collocate entries into groups that represent an approach to the traditional concepts of the "individual work" or "groups of works?"

An example of user interest in the bibliographical listing produced by HPB is the expression of interest in receiving a computer listing by

an Association for Eighteenth Century Studies at a university.

SC: Professors in this situation usually know the artist they are looking for and more profitably find subjects they are interested in by browsing in the slide drawers than they could by computer search. The professors and students know certain principles of the subject, and their questions can be anticipated.

Most answers can be obtained from the straight shelf list order printout with the alphabetical list of artists in the back of the book used as the artist authority file, and the observation was made that professors do better to find subjects by browsing in the slide drawers. Questions are worked through the lists and answers found, as in the case of searches through the printouts made in order to obtain appropriate slides for the multi-media shows which take place frequently on the campus. An advantage of the system is seen to be that the stabilized lists are constants and soon become familiar to the patrons.

The next printout planned, incorporating the 8,000 slides catalogued this year, are subject and title listings. A slide book catalogue with the following sections is also planned: shelf list, artist authority file, place authority file, accession record, and source, whether commercial or from a book, and, if so, author and title. Source information is now placed on the slide itself with only a code on the tape, but means have been found by which this information can be printed out from the tape in natural language.

The codes have been manipulated to obtain listings of a specialized nature, such as media, place, art form, etc., but only in an experimental way. There are no immediate plans for incorporating on-demand searches into the system or for the use of terminals for this purpose, but the

need for this service is not sufficiently apparent to justify the cost. Computer applications in the system could potentially be carried much further, however, to include on-line search, visual display, permuted indexes of multiple-word titles, and additional kinds of printed indexes.

What might be called a theoretical basis for determining additional information and services for users is aptly phrased: some work must still be done by the mind of the person using the system. The availability of libraries containing books with additional information, and particularly discussions of questions in the field yet unproven, supports the decision to code only factual information into the system and to refrain at this time from establishing subsidiary index systems to expand, for example, on assigning style to works other than those in periods known to have a large number of anonymous artists. To pursue this point, Field 4 now provides a means for relating all Byzantine works, for example, regardless of period or geographical origin. For countries in the western tradition, users now find more significant the grouping of all works done by an artist under his name. In addition, such information would add to the expense and volume of the system.

Buffalo: One punched card is presently being prepared for each slide preparatory to completely computerizing the system. A printed catalogue by artist will be distributed with copies also in the main library system.

The system would lend itself well to correlated searches for on-demand requests, and programs could be written in approximately twenty minutes and keypunched and debugged in approximately an hour, but lack of expected need and high computer costs, particularly storage for on-line service, make it unlikely that on-demand service will materialize. From

the printout, the user will be able to examine entries for specific topics, such as all Byzantine manuscripts in the file.

Professors using the Slide Library find it extremely helpful not to have to charge out the slides in the usual manner of library charging. Each professor has his own color assigned to him and receives a batch of colored cards, called back-up cards, kept in drawers by color, and when he takes out a slide, he simply drops a back-up card into the place from which the slide was taken.

NICEM: This service seeks feedback from users and sends representatives to conferences to this end as well as making presentations at library schools. The standard NICEM format contains subject heading outline; index to subject headings; subject guide (audience and/or grade levels, title, and producer and distributor code); alphabetical guide by title with annotation and a full citation; and directory of producers and distributors (alphabetical by code and by name). Requests received by NICEM from university library clientele may stem from the educational media center or anywhere in the university library system which has an integrated media collection.

America: Users of this service are primarily historians, but users also include humanist scholars, especially those interested in an interdisciplinary approach in their research. All previous abstracts are now in machine-readable form. This machine-readable data base has the capability of automatically producing bibliographical materials from the file on demand. The files could be rapidly searched for materials on special topics and the date reformatted to what ABC refers to as a "spin-off" publication (bibliography on a special topic) at a reasonable cost.

Although it is felt that important topics of interest to the typical user are represented in the index and in the classification system supplemented by generous cross-referencing, on-demand bibliographies, information retrieval, and selective dissemination of information are potential services for those users requiring them.

User needs have been difficult to determine, however. Extensive inquiry was made through appropriate published sources and professional organizations to this end by staff of the American Bibliographical Center, but it was found that the researchers themselves had difficulty in coming to grips with and formulating their research needs.

The following steps are being taken to determine scholars' bibliographical requirements more precisely and thus what the market will sustain: (1) Preparation of a general guide to the organization and use of the ABC reference publications, including America: History and Life; (2) Organization of a conference held June 25-28, 1971, in Santa Barbara, with participants representing, among other groups, the American Political Science Association, the American Historical Association, the International Studies Association, and the American Council of Learned Societies.

ABC-CLIO has begun to publish on-initiative "spin-off" publications on topics discerned by the systems operator as being of importance. The first, American Politics and Elections, reproduced 407 abstracts from volumes one through four of America: History and Life. Later in 1971, another will be published on Negro history and life in the United States. The first was compiled and sorted by hand except for the indexes which were machine processed and produced, but in the future these publications will be taken from the magnetic tape files, sorted, merged,

and printed by means of computer technology. It is recognized that although these publications may satisfy the researcher's need for specialized topical information, they do not satisfy a current awareness need, for there is a considerable lag between the original publication of the material and its appearance in the retrieval bibliography.

Educational objectives, curriculum, and teaching-learning methods

Planning, development, and use of all the services require a high degree of knowledge of university goals, campus-wide curricular offerings, and teaching-learning methods. It may appear to be relatively simple to ascertain whether there are sufficient relevant course offerings, planned or on-going, to justify the establishment or use of a service, but the ordering of priorities on the basis of university goals in relation to the specializations of other universities may be complex.

SC reported that professors tend to differ in how they would like to have the slides arranged depending on the nature and sequence of their curricular units. Different professors teach the same and other courses in various ways. In addition, there is turnover in faculty. An overall service requiring a minimum of changes and rearrangement of slides, with a maximum of consistency, and with a minimum of time needed to locate the slides is the objective that the system attempts to fulfill. Educational objectives, curriculum, and teaching-learning methods are taken into consideration so that wherever possible, varying requests for such designated aspects as ceramics by shape, china by dynasty, and architecture by city can be answered. Consistency opens the way toward any desired nationwide standardization in slide classification with particular educational needs fulfilled through the retrieval aspect of the service.

At Buffalo, professors tend to use the slides to illustrate their lectures, and there are not enough slides in the collection to accommodate work at a true research level. If the Slide Library were part of the university library, perhaps more researchers would want to utilize the collection for this purpose provided that holdings could be expanded.

Computer technology

PIRS: With respect to the use of the tapes by other institutions, a characteristic of the system is "machine independence," or the ability of this group of programs and routines to travel from one computer to another without having to be rewritten for each machine. This adaptability, sought from the outset, was achieved in the programs through several decisions: (1) To use Fortran IV as the programming language; (2) To use few single-machine software operations; (3) To use small storage requirements for memory core; (4) To specify common input devices, and to use more than one possible form of library storage.

This system, a pilot model for a much larger retrieval system, is open-ended to allow for the addition and subtraction of playbills at any time without requiring program changes. Any machine would have core storage large enough to handle the activities called for. The largest amount of core storage called for by any of the PIRS programs is 27K.

Two methods of input are possible: magnetic tapes and punched data cards.

Each computer tape is capable of holding information from approximately one thousand playbills. Two thousand reels can easily be stored in a room the size of an average classroom. Simple modifications of the

programs would allow for program continuation from tape to tape so that PIRS could index a library's total holdings. A large quantity of playbill data can be manipulated easily and effectively.

Hardcopy printouts of the PIRS programs range in cost from approximately $4.00 to $10.00. The complete file of PIRS tapes costs $50.00 per copy.

A background in computer technology is needed for communicating effectively with a computer specialist about user needs at one's own institution and computer potentials for fulfilling them.

Incunabula: The potential of this general purpose bibliographical system for producing both dictionary catalogues and retrieval stems from the capabilities offered by the computer for effecting this combination of products.

HPB: The data bank can be copied on tape or cards, and programs are available. Almost any kind of access can be devised for manipulating the file. Copies of the HPB main file printout can be obtained at cost price.

The following aspects of the service require a basic knowledge of computer technology on the part of the intermediary who plans the service with the computer specialist: (1) Because the information in some fields is of variable length, it is not always simple to devise a program that will collocate information without considerably increasing processing time. Therefore, modifications in the physical appearance of the entries have been introduced, but with the principle of legibility in mind; and (2) Peculiarities of filing were introduced by the minimal collocation program. For example, as the title sequence is determined only by the first twenty-five characters, "maiesty" in GA 0071

follows "majestie" in GA 0070. Sorting refinement that will solve this problem produced by the gross sorting program remains to be designed. The present method is very economical of machine time, and it is felt that humans can learn the peculiarities of letter-by-letter filing. However, two librarians, in correspondence, expressed confusion concerning particular examples in the filing.

SC: Users can obtain a copy of the tape for $10.00. Tape must be supplied by the requester. Librarians can delete items not held and make additions. Five libraries have bought the tapes, and some have already produced printouts of their holdings.

Reproducing for use with one's own computer is not difficult. A sheet is available giving the parameters for use of the system as well as a chart for the eighty digit format. If a change in the primacy of the sequence of the classification numbers is desired, additional cost is involved in programming the change.

One punched card is used per slide. Any method of cataloguing, indexing, or retrieval can be used in conjunction with the Santa Cruz Classification without altering its primary usefulness as a tool for file organization. The single card format was purposely developed to keep input effort to a minimum. Through use of follower cards or other input techniques, much fuller output information could be achieved.

In printing, the eighty columns of punched data are expanded to 120 columns in the printed format. This allows adequate spacing to make the printed lists more readable.

Santa Cruz uses the same machine which they rented for use with their book catalogue. The printout is therefore reduced to book size with smaller type and bound as a book. It will be updated every six months.

Locations names are spelled out in full on both the slide label and the keypunch card, not Cuttered or otherwise coded. Although it is possible to sort these names mechanically, the process would be slower than that of sorting coded data.

Buffalo: A tape with a complete listing of the slides, plus a program for printing out, will be available. Approximately 47,000 slides will eventually be represented. The fee will consist of the cost of the tape plus a dollar for the copying. It would not be possible to produce a manual catalogue that could compete in product and cost with the computerized catalogue.

NICEM: Libraries cannot buy the data base and software. These are owned by the University of Southern California. NICEM is a non-profit service business on the campus of this private university.

America: An institution wishing to interrogate the abstract file could do so by purchasing a copy of the magnetic tape file. ABC could also contrive software to do whatever the institution wanted to get from the tape if technically possible. No libraries are now on-line with the service, but large institutions might find it useful to have this retrieval service, on-demand, on a subscription basis.

Administration

PIRS: Prerequisite to operation of the service is the availability of the data on tape to be transferred to the computer memory. An administrative consideration is illustrated by the following: The tape to hold the playbill information was assigned from what is called the open file. The allotted time ran out for use of the tape for this purpose, and the playbill information was erased. The tape can be run again from the

punched cards and the programs put on another tape. Another project number and financing are needed to return the project to running status.

Incunabula: The administration of the service beyond the development stage by a library school, if the operational service will be administered by the library school, will contribute toward development of rationale for the most effective administrative placement of services.

HPB: A librarian reported the following familiar circumstances surrounding the process of reporting holdings which serve to remind the overall planner of services that seemingly quick procedures are slowed down by accompanying minor requirements which add up to more time than would perhaps be foreseen:

The search of the catalogue took only thirty-five minutes, but due to the spread of physical locations of special collections material and the request for the format of the book which is not mentioned in the catalogue cards, the rest of the checking and copying took three hours. Xerox copies were not sent because several volumes were very tightly bound and could have been damaged. An offer was made to send the item through interlibrary loan. Interpretation of the truncated LC numbers on the standard coding sheets sent to libraries to be checked also caused some difficulty.

As with Incunabula, rationale will need to be developed for operating the service from a library school if the service will remain with the school rather than be transferred to the university library or elsewhere.

SC: After the list of approximately 37,000 slides was printed out, the project was relegated to the hold position because of library budget shortages while other automation projects were brought up level or ahead to maintain a balance in the library processes. It has been a year since

there have been printouts in the artist authority file or in slide lists. Since that time some 8,000 new slide keypunch cards ready for printout and some four hundred new artists to add to the authority file have accumulated.

Another administrative consideration felt worthy of mention is the advantage of housing the slides separately so that professors from various fields can utilize a logically arranged collection, not geared organizationally to any one discipline, yet specialized to the extent of having the collection grouped into the three major divisions of history, art, and science.

Buffalo: The conjecture was expressed that administratively the Slide Library would probably be in a better position to obtain funds, staff, and space as a part of a larger library rather than as an independent departmental library.

With respect to administration of all the services, the information specialist or librarian and professors must have a schedule conducive to communication of needs and the means of fulfilling them, with representatives of both groups on appropriate university committees. Proper administrative measures could help alleviate the very understandable communications problem typical in universities among departments and agencies on campus.

In two cases in the process of first verifying the existence of the services which we had read or heard existed, the phone call had to be transferred to another location on the campus or within the library over five times before reaching the service. In one of these cases, where the possibility of reaching someone with whom we could speak about the collection being keypunched appeared to be exhausted at the institution at which the collection was actually held, the number of the proper person was

obtained from someone outside the institution who we thought might plausibly be aware of the collection. We ourselves originally aggravated the communications problem by calling an incorrect neighboring institution.

We met the same difficulty in verifying two of the major services in process of development. In every one of these instances, the librarians or other personnel who answered the telephone were very much interested in our query and coridal in their responses. The above comments are included, however, to illustrate the typical and perhaps inevitable communications problems which militate against the maximum use of a service on a university campus.

NICEM: Administration of this service involves communication with a number of institutions, including university librarians, as well as administrative responsibilities attendant upon maintenance of a large data base.

America: Administration of this service includes financing with an effort to increase subscriptions without raising the price beyond what university libraries might be able to afford with current, fairly universal budgetary restrictions in universities.

Abilities

To effect change

In order to bring the computer-based humanities services into existence and create motivation for maximum use, the information specialist or librarian must be able to act as a change agent in various ways in relation to different units within the university structure. The sociologist's knowledge in this area must consciously be drawn on and applied

to the situations encountered by the librarians, information specialists, and systems analysts involved. Perhaps in some cases where the librarian is long established in a mode of service emphasizing collection building and is entrenched in routine work which he has rationalized as professional and which he feels the need to defend, the biggest change will have to take place within himself.

To communicate well with people

Every aspect of interaction between the system and the user depends on the ability to relate effectively to other people, particularly when pleading the case for the service in regard to funds and priority in computer time.

To teach

The role of teacher of every level of clientele is also central to all aspects of the user-system interface.

Attitudes

Respect for people

An accepting attitude toward users is necessary for understanding a possible reticence on the part of users to learn to use a computer service. Professors may feel actually guilty about receiving services providing them with information which formerly took them hours to gather manually. As was brought out in the PIRS interview, they also may not realize how much information in available to them through the service. The need for perseverance in attempting to determine user needs and the interim need to interpret on-initiative practices to users was brought out particularly by the experience of America in this regard.

Respect for scholarship

Playbills are often found in widely scattered collections in poor condition and seldom indexed. Only a respect for the playbills as a research tool would likely motivate effort to organize them for retrieval. The main form of communication between the theatres and the public during the nineteenth century was the playbill.

A respect for the value of the whole area of analytical bibliography of incunabula and the hand-printed books is necessary to motivate conscientious performance in distinguishing among editions, issues, and states and in identifying the locations of variants.

The precision demanded by the computer to achieve accuracy is likely to create in a humanistically oriented information specialist or librarian a feeling of dismay. As mentioned during the Incunabula interview, it is sometimes difficult for humanists to be consistent and give the attention to detail required by the computer, as they tend to think in more general terms. The following excerpt from an HPB printout illustrates the point: The printing of each line of each record begins L positions to the right of the right base margin, where L is the number in the margin field. The humanist scholar might instead specify a printout requiring in places more room than is provided by the computer format.

Acceptance of computer services

Both the intermediary and the user must regard the services as nonthreatening in any way in order to plan and develop them effectively. A relevant thought expressed during the NICEM discussion is that it is not possible to know how many potential users are frightened about using a computer-based service. Lack of response may, of course, come from other reasons, but certain of the negative reaction expressed in con-

nection with the HPB Project sometimes appeared to reflect a less than complete understanding about the nature of what a computer-based humanities service is designed to accomplish.

Although a number of future humanist scholars are now receiving instruction in computer assisted research as part of their degree program, information specialists may be able in collaboration with a computer expert to design machine systems and printouts which are understandable and predictable or to provide effective instructions concerning them. The PIRS system specifically incorporated this consideration into the machine design.

Respect for the contribution of the information specialist or librarian (on the part of the intermediary himself)

The information specialist or librarian must regard himself as an expert in his own right and as making a major contribution to the teaching and research program of the university, an idea derived from the NICEM interview. The information specialist must feel no hesitation in informing the university community about the service through demonstration projects and other appropriate means. The intermediary must view his services as an information specialist in a positive way, taking pride in the service rendered and recognizing its provision as constituting his unique professional contribution, rather than resenting his making work easier for users, with the attitude that users should play not only their own roles but also in part or in full that of the information specialist.

A logical outgrowth of the idea that the role of the information specialist deserves respect in the scholarly community is exemplified by

the statement made in the SC interview that the operations of SC should be performed on a professional library basis by someone with a knowledge of the material, the subject matter, and library science. The concept of developing specialized information services for the humanities scholar must be explored as an appropriate function of the university library and role of the appropriate university librarians.

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Subsystem 4: Conceptualization of searching strategies

The fourth subsystem analyzed in each service is "conceptualization of searching strategies," or translation of the inquirer's terminology into the indexing language.

Knowledge

Subject matter

America: The cues in the system of subject analysis in internal use for searching the data base includes geographical terms, names, subjects, and dates. A familiarity with the topic being searched, and in many cases, a detailed knowledge, would facilitate obtaining the highest precision-recall ratio at an earlier stage in the search.

Information science

PIRS: Search strategies may require the calling into play of more than one program, depending on the specific information sought and its location in the data bank. An actor's name may be listed in more than one way or be spelled in various ways through the actor's choice or typographical error in the playbill. Therefore, imagination must play an important role in the search.

Incunabula: The provision for multiple access and the use of the special subject class headings for analysis of the incunabula suggest that the most profitable searches and lists will be consistently formulated from a thorough knowledge of information science.

HPB: In the present stage of the project's development which has not yet concentrated on cross-referencing, along with the possibility that those contributing data to the store may not be entering authors under uniform headings, search strategy may have to include a resourceful

approach to searching for authors under various possible headings.

SC: Desired information on availability and file location is extracted from the coded material on the shelf list printout. Knowledge of the pattern according to which the classification scheme is constructed and facility in use of the scheme would enable the user to conduct his search more effectively, particularly if detailed subject information was being sought. Reference to the printed scheme as an aid in formulating the search strategy may prove helpful in certain cases. A computer-printed index in call number order is one of many possible orders.

Controls must be exercised in manipulating the printouts and sorts so that subjects such as buildings and paintings, which have different codes for subject matter, will not be confused.

Buffalo: Similarly, searches through a computer printout in call number order will require knowledge of the pattern according to which the classification scheme is constructed and facility in use of the scheme, to enable the user to conduct his search effectively, particularly in cases where a chart has been devised to enumerate types of Chinese bronze vases, as in the example cited earlier, or when more than twenty-six views of a particular building necessitates the changing of the appropriate letter in the third line to the next letter to start the alphabet over, also as in the example cited earlier.

NICEM: NICEM performs on-demand searches for special bibliographies on any particular heading in the subject heading list. Requests are sent in by users who then receive printouts from the file. A request for up to nine headings at a time can be made. The user would benefit by understanding the relation of the broader subject categories to the special topics.

America: The cues used internally in the cue system of subject analysis are put into the core storage. Machine input is matched against the core to obtain the desired output. A background of information retrieval theory would aid in formulating the most judicious combination of cues from the four levels of cue specificity.

When the cues were given in a cue line with the abstracts in the subject index, it was necessary to know what the cues stood for, either from memory or use of the thesaurus, or subject index dictionary. On the other hand, without the cue lines, the abstract had to be read in order to determine the subject matter of the article.

Needs of researchers and other users

This aspect of the search formulation subsystem is itself an interplay with the user's need and thus applies to all the services.

Abilities

To apply theoretical knowledge of search formulation

One who is well acquainted theoretically with how to formulate search strategy and, in the case of the intermediary, how to conduct an interview with the user for this purpose, may nonetheless fail to plan search strategy effectively without the ability to apply the theoretical knowledge imaginatively in practice. In all cases, judgment is required; for example, the procedure cannot be compared with applying instructions for operating a microfilm reader.

To communicate well with people

The user-intermediary interface or relationship will be helped or hindered through abilities or their lack in human relations. Positive

rapport with users and an accepting attitude toward them would likely result in creating an atmosphere in which users feel free to discuss the search strategy or to ask for help with a self-formulated search.

To teach

Teaching ability is essential, particularly when the service lends itself to user performance of the search. Instruction takes place, however, in the course of an interview as to what information and in what style the user might best convey his request so that the term he uses can be translated into the index language. The teaching must be effectively done with everyone from the freshman to the nationally know scholar.

Attitudes

Respect for people

Underlying the abilities related to human relations and teaching expertise is the necessary respect for people to motivate development of these abilities.

* * * * *

Subsystem 5: Manipulation of the search

The fifth subsystem analyzed in each service is "manipulation of the search." The technical aspects of querying the computer are treated. However, searches may possibly result providing on-initiative or full lists, indexes, and document briefs as printouts as well as in filling on-demand requests. The printouts are themselves search tools manipulated from a technical, physical point of view conventionally by opening the book or other item produced. This seemingly minor point may make a difference in the evaluation subsystem when timing access to the conventional and machine system. Users do at times have difficulty in handling even a conventional printed tool through oversights regarding location of material as physically arranged in the tool.

Knowledge

Computer technology

PIRS: This system requires that the person manipulating the search knows how to call into play the necessary programs in the proper sequence. A basic introduction to computer technology would provide a frame of reference to facilitate grasp of the instructions for manipulating the search.

Abilities

To query the computer

The ability to query the computer is of course required in order to use all the services, but particularly in the case of PIRS, for the user must not only be able to gain entry into the computer by identifying himself through use of the proper code but also to activate the programs

necessary for running his search. The ability to apply basic knowledge of computer technology to manipulating the search must be well developed.

Contemplated future plans for the PIRS system include the possibility of creating a drive program in a system level language, making natural English language entry possible. With the use of such a program, the drive assembles the necessary combinations of programs until all available information is exhausted, or until there has been a command from the user to stop. This method would make on-line searching with CRT display more practical than at present. On-line search is possible with the present system but is not practical because it saves only minutes over a search of the printouts and costs more.

To communicate well with people

Positive rapport with users would enable users at all levels to feel free to ask for instruction and help when difficulty is experienced in operating the machine.

To teach

Teaching ability, both orally and in written instruction, is essential for enabling the user to query the computer with accuracy and speed.

Attitudes

Respect for people

Underlying the required abilities in human relations and teaching expertise is the attitude of respect for people which motivates development of these abilities.

Respect for scholarship

Patience is necessary to query the computer with accuracy, for if

a request for an item is misspelled, for example, the item is lost to the search.

Acceptance of computer services

Both the user and the intermediary need to begin with a basic acceptance of the computer in order to function most effectively in manipulating searches. If the computer is seen as a threat either to the user's ego or to the intermediary's self respect or even his job, the search procedure will likely appear to be more difficult than it actually is, especially in the case of users who are no longer young. As was brought out in discussion relative to Incunabula, humanists may find it very difficult to be sufficiently specific when attempting to formulate search strategy to gain maximum benefit from the several kinds of combinations possible.

* * * * *

Subsystem 6: Evaluation of the service cost-performance-benefits

The sixth subsystem analyzed in each service is "evaluation of service cost-performance-benefits." This section treats evaluation of the service through sustained, systematic determination of cost-performance-benefits.

Knowledge

Subject matter

For PIRS, SC, Buffalo, NICEM, and America, the evaluator would need only an elementary or moderate amount of subject background to know whether his question has been answered, depending, of course, on the difficulty and depth of the question. But when an evaluation of the response is undertaken from the point of view of determining the accuracy or the quantity and quality of the material made available by the system as measured against all known available material on the matter in question, an advanced level of subject matter is then required for effective evaluation of these services.

Media characteristics

Incunabula: A thorough knowledge of incunabula and their characteristics is fundamental in evaluating a service purporting to allocate and retrieve these items.

HPB: The HPB Project demonstrates the need for knowledge of hand-printed books in order to determine whether the file produces complete, accurate information related precisely to user needs. The following examples are cited:

With respect to the practice of minimal identification, printed

entries are being compared with the machine-readable entries in the main file to determine which HPB entries require elaboration to avoid the dangers of disguising by minimal physical identification those books which in fact exist in bibliographically different editions, issues, or series.

In regard to the proposed Miltoniana bibliography, one of the most complex bibliographical problems of the 17th century, the Eikon Basilike, which has been the subject of two descriptive bibliographies, Almack and Madan, is being used to illustrate the way in which research and development into bibliographical elaboration of the main file is being undertaken. "Points" tables were developed experimentally with a hierarchy of collation, pagination, title page information, and text "fingerprints."

On the basis of this experiment, considered sufficiently successful to warrant a tentative attempt at developing principles for a "points" file, evaluation will be made as to how efficient an HPB entry is for distinguishing variant editions, issues, or states in comparison with a full descriptive bibliography. Fifty-six variants differentiated by Almack are listed. It was found that twenty-two of the fifty-six items can be isolated by HPB entries.

Through use of the tables, there was no difficulty in quickly establishing an Almack number for each copy except in two cases in which initial (in one) and final (in the other) pages were missing. This suggests that the "points" file should avoid using initial and final pages as the basis for the "points." The conclusion was drawn that the HPB entry apparently has a high degree of efficiency for making

bibliographical distinctions. Evaluation will continue, using Macdonald's Milton bibliography, even though considered unsatisfactory as a descriptive bibliography, as the basis for the experimental "points" file.

Errors will undoubtedly be picked up by those using the printout as a checklist.

NICEM: The evaluator must determine whether the types of media obtained through the printout fulfill the particular objectives for use. The whole area of media and their effects as treated in perception research must be brought to bear in formulating judgment concerning acceptability of the media provided by the system.

Information science

PIRS: Although the points of access in this system are single argument and thus not subject to the same need for evaluating control of meanings, nonetheless the following aspects of evaluation are relevant to the service: (1) With regard to the search routines, can the information be found almost as easily by the lists and indexes? As the collection grows, will the situation change? An example would be the use of the playwright search routine to review all listings for Shakespeare as compared with use of the playwright index. However, if the source location is desired, this will not appear on the printout of the playwright index. The chronological file would have to be checked in addition.

Incunabula: Evaluation of output must go back to evaluation of the accuracy of any records from which input is made, of procedures used to record information accurately from the works themselves, and of input policies and practices.

HPB: The comparison made of the HPB list of over 250 entries for the works of Milton with the British Museum catalogue provided insights into the strengths and weaknesses of both lists. This is a reminder that evaluation of the service depends on the quality and effectiveness of the acquisitions policy for the collection being entered into the file.

An evaluation was also made of a sample of the cross-referencing of Miltoniana items in the British Museum catalogue to determine how best to incorporate cross-referencing into the machine-readable file so that machine records will not repeat the errors of manual methods.

With regard to the experiments taking place in subject analysis of the works, a broader data base and more carefully chosen and elaborated descriptors will be used to test the validity of the idea of form and subject analysis for users of the hand-printed books.

NICEM: Evaluation has taken place comparing the use of keywords and the subject headings from the list used. To obtain the keywords, conjunctions and articles were stripped from the titles and remaining words were rated in a hierarchy based on frequency of appearance. So far, in spite of unavoidable occasional subjectivity in assignment of subject headings, these have been found more effective than the key words in recalling the desirable subjects.

The most effective searching on headings has come from the librarians' reading a description of the material, the content of the media, looking at the media, and then making a choice of headings. In utilizing the massive data base of 160,000* entries, covering seven* types of nonbook media, users are depended upon to catch errors in the process. NICEM also tries to do this in running the searches.

America: The following evaluative information in regard to the

cues has been determined: The index created by the cue system is two to three times as long as a conventional subject index. For most users, search time is reduced to about ten percent of the time required for conventional indexes, and false leads are practically eliminated.

The person who searches the index by topic only, instead of its basic geographic pattern, may hardly be in a better position, it is recognized, than the user scanning the cue lines above the abstracts, when the cue line formerly appeared with the abstracts. Time tests indicate, however, that he has gained in comparison with any of the conventional bibliographies, because the cue line provides him with all of the facets of the article.

For about ninety percent of the users, the information in the enhanced cue line is specific enough that they can quickly eliminate the irrelevant and easily find the desired entries. The yield of information from the index is high, and its cost is not excessive, after the development stage. The developers of the system express the hope, therefore, that the cue index will become the scholar's desk tool, to be used with the corresponding set of abstracts at a nearby library.

In evaluative comparison of the cue headings to a KWIC index, the cue system has these characteristics as contrasted to KWIC: (1) The cues are selected by indexers on the basis of a cue and authority list; (2) The printed text is considerably less than KWIC, hence (3) The cue index is not as bulky as the KWIC index. KWIC makes publication of multi-volume computer-generated cumulations prohibitively expensive; and (5) Information retrieval from several volumes of cue lines is relatively economical via a computer. In the balance, the KWIC index has applicability primarily for current awareness needs. It is not, and was not designed to be, a solution for sophisticated long-range

bibliographic needs in the social sciences and humanities, where retrospective or cumulative search is more important than the speed of a current awareness service. The cue system can serve both immediate and long-range needs.

The system could be adapted by relatively simple means to an SDI service in which users of the bibliographic service would regularly get a computer-produced list of the bibliographic entries which match the subjects they specify in their research or interest profiles. By contrast, an SDI service based on title search by the computer would yield many false leads and ignore many relevant items -- at least during the initial period when costly auditing and feedback into the computer are necessary.

Research methods

NICEM: The discussion of NICEM revealed that users are unaccustomed not only to computer use but also to the computer products offered by the service. Some users are not yet accustomed to requesting on-demand bibliographies compiled by traditional methods or to receiving bibliographical services by mail. Adequate lead time for users to become accustomed to the product is needed before evaluation of the service can take place, and research methodology must incorporate this consideration.

America: The efforts made by this service to determine user needs point out the difficulty in devising evaluation procedures when the users of the products themselves are not sure of what they actually want. Means of using the evaluation as a means of helping users formulate their needs should be explored.

Needs of researchers and other users

The "benefits" aspect of evaluation of cost-performance-benefits centers on whether the services fulfill user needs, particularly those of seemingly inestimable value to the user yet which perhaps cost more than what might appear justifiable at first glance.

Educational objectives, curriculum, teaching-learning methods

SC: The location of the services on a university campus prompts the need for knowledge of university educational objectives, curriculum, and teaching-learning methods. Research is undertaken not only by the faculty but also by graduate students. In the SC system, professors at times express the preference of having the collection arranged according to the organization of their course structure. Therefore, the products of the services in the university library must be evaluated for their effectiveness in meeting specific educational needs as well as for providing access to a well-organized research collection serving interdisciplinary needs.

Computer technology

PIRS: Evaluation concerning errors in hand copying was made and amounted to one or two errors per playbill. Once the computer programs are tested for being error free, however, the scholar is insured of receiving accurate information.

Administration

PIRS: Knowledge of how to conduct time and cost studies is essential toward determining a service's cost-performance-benefits, time being the more important factor because costs change. Evaluation

is very important as a basis for seeking priority in funds and computer time for a service. Administrative reports must be prepared expertly. The cost of obtaining a copy of the tape containing the data base where this is possible has been given above.

PIRS has determined that obtaining hard copy listouts of any of the programs requires approximately an hour. It costs twenty cents to look at a playbill by computer through the document brief by on-demand search with a cost of $3.00 for the computer center to perform the search, plus cost for the telephone line and on-line rental of memory time. On this basis it was concluded that the researcher could be best served through the hard copy printouts. Even a batch process would be costly and save only minutes of time, probably ten at the very most.

Incunabula: The administrative consideration of cost of on-line search is regarded as prohibitive to this type of project.

HPB: The HPB Project: Phase II should be referred to for several references to costing processes and results. The following are two samples of the kind of information provided: (1) The main file catalogue of over 500 items before 1801 in the collection was compiled in twenty hours, checked in ten hours, and incorporated into the data bank with only a few more hours of keypunching, computer processing, checking output, and incorporation of corrections; and (2) Rough calculations in terms of man-hours and machine processing time revealed that approximately seven entries per man-hour can be printed in final form, i.e., proofed and corrected against input, at a cost of approximately twenty seconds of machine time. Processing 1,000 entries required man-hours as follows: cataloguing from the books themselves, not including gathering the books, 80; input editing, 4; keypunching, 25; proofreading

(against input, not the books themselves), 8; final proofing and correction, 33; total man-hours for 1,000 entries, 150.

SC: The printouts for 37,000 slides cost the system $125 to produce.

Buffalo: The printout of the book catalogue will cost an estimated one cent per page. Thus, it was figured that a printout of 50,000 slides requiring 160 pages would cost $1.60.

NICEM: Estimates for supplying catalogues or filling on-demand requests can be obtained by writing to NICEM.

America: Interrogations of the abstract file would cost approximately $16.00 per search, not including computer time.

Abilities

To make cost-performance-benefits studies

This ability is basic to evaluation of individual searches and of the total value, justification, and establishment of priority for the whole service.

To communicate well with people

This ability is needed because the essence of evaluation is the seeking and obtaining of user reaction in regard to the value of individual searches and the service as a whole.

Attitudes

Respect for people

This attitude is essential to communicating with users as they provide feedback concerning the service.

Respect for scholarship

If accuracy is not seen as an essential element of evaluating a

service, it is unlikely that effective evaluation will take place. If information on tapes is not properly recorded, its use by other institutions may be seriously impaired. The fields and scholarly materials represented in the services must be seen as valid demands upon the library's time.

Motivation for conducting research

The evaluation process is essentially a research process, and thus the recognition of the need to apply research methods to the evaluation of the services and the desire to do so are essential.

Respect for the contribution of the information specialist or librarian

Initiating a humanities computer-based service may have an end result of partial or total failure. An account of such failures with an analysis of the factors involved must be considered as a positive contribution to the information retrieval field just as are accounts of the successes.

* * * * *

Conclusions

In response to the first question - What knowledge, abilities, and attitudes should the information specialist or librarian in the university library have in order to aid users in fully exploiting the innovative humanities information handling processes? - judgments were determined. A 1 rating was assigned to an aspect considered basic, and a 2 rating assigned those aspects of a more advances, concentrated level.

Each requirement could receive a total of 42 ratings, but judgments regarding requirements were made only when a distinctive, significant emphasis appeared to characterize the point as one especially required. The judgments were grouped by subsystem and by service. The question was answered from the point of view of the intermediary. No attempt was made to identify with precision exactly what the user might be able to do for himself. This would have been to answer the second question prematurely.

Following is the "Code Key to Tables" of knowledge, ability, and attitude requirements determined by the study as necessary for aiding users to exploit the services fully:

Code Key to Tables

Knowledge

a Subject matter

b Media characteristics

c Information science (theoretical and practical aspects of information retrieval and library science)

d Research methods (of users)

e Needs of researchers and other users (where specifically mentioned, or on an individual or "profile" basis, or otherwise beyond a general underlying awareness of user needs)

f Educational objectives, curriculum, and teaching-learning methods

g Computer technology (including input devices and processes)

h Administration (knowledge of administration, whether or not an information specialist or librarian holds an administrative position)

Abilities

a To apply policies and instructions in assigning index entries

b To effect change

c To communicate well with people

d To teach

e To apply theoretical knowledge of search formulation

f To query the computer

g To make cost-performance-benefits studies

Attitudes

a Respect for scholarship

b Motivation for conducting research

c Respect for people

d Acceptance of computer services

e Respect for the contribution of the information specialist or librarian (on the part of the intermediary himself)

Following are Tables 1 A-F giving requirements for each service by subsystem:

a: etc. see Code Key
1: basic level required
2: advanced or concentrated level required

1 A. Subsystem 1: Index language

Service	Knowledge								Abilities							Attitudes					
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e	
PIRS		1	1				1														
Incunabula		2	1				1														
HPB		2	2				1														
SC	2	1	1			1	1														
Buffalo	1	1	1				1														
NICEM			1			1	1														
America	2	1	2				1	1													

a: etc.: see Code Key
1: basic level required
2: advanced or concentrated level required

18. Subsystem 2: Indexing policy and practice in updating and maintaining the file

Service	Knowledge								Abilities							Attitudes					
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e	
PIRS			1		1		1		2							2					
Incunabula		2	2				1	2	2							2					
HPB		2	2				1	2	2							2					
SC	2		2		1		1		2							2					
Buffalo	1		2				1	2	2							2					
NICEM			2		1		1		2							2					
America	2		2						2							2	1				

a: etc.: see Code Key
1: basic level required
2: advanced or concentrated level required

1C. Subsystem 3: Interaction between the system and the users

Service	Knowledge								Abilities							Attitudes					
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e	
PIRS		1			2	2	1	2		2	2	2				2		2	2	2	
Incunabula		2		2	2	2	1	2		2	2	2				2		2	2	2	
HPB		2	2	2	2	2	1	2		2	2	2				2		2	2	2	
SC		1			1	2	1	2		2	2	2				2		2	2	2	
Buffalo		1			1	2	1	2		2	2	2				2		2	2	2	
NICEM		1	1		2	2	1	2		2	2	2				2		2	2	2	
America	2	1	2	1	2	2	1	2		2	2	2				2		2	2	2	

a: etc.: see Code Key
1: basic level required
2: advanced or concentrated level required

1D. Subsystem 4: Conceptualization of searching strategies

Service	Knowledge								Abilities							Attitudes					
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e	
PIRS			2		2						2	2	2					2			
Incunabula			2		2						2	2	2					2			
HPB			2		2						2	2	2					2			
SC			2		2						2	2	2					2			
Buffalo			2		2.						2	2	2					2			
NICEM			2		2						2	2	2					2			
America	2		2		2						2	2	2					2			

a: etc.: see Code Key
1: basic level required
2: advanced or concentrated level required

1E. Subsystem 5: Manipulation of the search

Service	Knowledge								Abilities							Attitudes					
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e	
PIRS							1				2	2		2		1		2	2		
Incunabula											2	2		1		1		2	2		
HPB											2	2		1		1		2	2		
SC											2	2		1		1		2	2		
Buffalo											2	2		1		1		2	2		
NICEM											2	2		1		1		2	2		
America											2	2		1		1		2	2		

a: etc.: see Code Key
1: basic level required
2: advanced or concentrated level required

1F. Subsystem 6: Evaluation of service cost-performance-benefits

Service	Knowledge								Abilities							Attitudes				
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e
PIRS	2		1		2		1	2			2				2	2	2	2		2
Incunabula		2	2		2			2			2				2	2	2	2		2
HPB		2	2		2			2			2				2	2	2	2		2
SC	2				2	1		2			2				2	2	2	2		2
Buffalo	2				2			2			2				2	2	2	2		2
NICEM	2	2	2	1	2			2			2				2	2	2	2		2
America	2		2	1	2			2			2				2	2	2	2		2

In the knowledge category of requirements, out of a possible total of forty-two 1 and 2 ratings, the times mentioned were as follows: information science (theoretical and practical aspects of information retrieval and library science) -29, needs of researchers and other users (beyond a general underlying awareness of user needs) -24, and computer technology -22, media characteristics -18, administration (knowledge of administration, whether or not an information specialist or librarian holds an administrative position) -18, subject matter -13, educational objectives, curriculum, and teaching-learning methods -10, and research methods (of users) -5.

Abilities rated most often were to communicate well with people, mentioned 28 times, and to teach, 21 times. Other abilities, each mentioned 7 times, were to apply policies and instructions in assignment of index entries, to effect change, to apply theoretical knowledge of search formulation, to query the computer, and to make cost-performance-benefits studies.

Attitudes rated most often were respect for people and respect for scholarship, each mentioned 28 times. Other attitudes required were acceptance of computer services and respect for the contribution of the information specialist or librarian (on the part of the intermediary himself), mentioned 14 times each, and motivation for conducting research, 8 times.

Table 2, "Comparison of 1 and 2 Requirement Ratings for the Six Subsystems of the Seven Services," gives the number of times each requirement received a 1 rating, a 2 rating, and totals of 1 and 2:

Table 2: Comparison of 1 and 2 Requirement Ratings for the Six Subsystems of the Seven Services

Requirement	Knowledge			Abilities			Attitudes			
	Requirement Rating			Requirement Rating			Requirement Rating			
	1	2	Total of 1 and 2	1	2	Total of 1 and 2	1	2	Total of 1 and 2	
a	2	11	13	0	7	7	7	21	28	
b	9	9	18	0	7	7	1	7	8	
c	8	21	29	0	28	28	0	28	28	
d	3	2	5	0	21	21	0	14	14	
e	5	19	24	0	7	7	0	14	14	
f	3	7	10	6	1	7	-	-	-	
g	22	0	22	0	7	7	-	-	-	
h	1	17	18	-	-	-	-	-	-	
Total:	53	86	139	6	78	84	8	84	92	

Up to this point we have considered only the total occurrences of ratings in the requirements aspects of the six subsystems. As we examine substantial differences between the number of times a knowledge requirement was assigned a 1 (basic) or 2 (advanced, concentrated level) rating, computer technology received twenty-two 1 ratings and no 2 ratings. Conversely, four requirements received a substantially larger number of 2 than 1 ratings: administration (17 and 1 respectively), needs of researchers and other users (19 and 5), information science (21 and 8), and subject matter (11 and 2).

In the abilities requirements, querying the computer was the only ability receiving more 1 than 2 ratings (6 and 1). The other abilities all received only 2 ratings.

In the attitudes requirements, all the attitudes received a greater number of 2 ratings, or in a number of cases exclusively 2 ratings.

Table 3, "Comparison of Total Requirement Ratings by Subsystem," shows the total number of times the three categories, knowledge, abilities, and attitudes, were represented in each subsystem, with a 1 or 2 rating, and with totals of 1 and 2.

Table 3: Comparison of Total Requirement Ratings by Subsystem

Subsystems	Knowledge			Abilities			Attitudes		
	Requirement Rating			Requirement Rating			Requirement Rating		
	1	2	Total of 1 and 2	1	2	Total of 1 and 2	1	2	Total of 1 and 2
1 Index language	20	6	26	0	0	0	0	0	0
2 Indexing policy and practice in updating and maintaining the file	11	13	24	0	7	7	1	7	8
3 Interaction between the system and the users	16	26	42	0	21	21	0	28	28
4 Conceptualization of searching strategies	0	15	15	0	21	21	0	7	7
5 Manipulation of the search	1	0	1	6	15	21	7	14	21
6 Evaluation of service cost-performance-benefits	5	26	31	0	14	14	0	28	28
Total:	53	86	139	6	78	84	8	84	92

In the knowledge category, subsystems 3 (interaction between the system and the users), 6 (evaluation of service cost-performance-benefits), and 1 (index language) had the highest total of 1 and 2 ratings; in the abilities category, subsystems 3 (interaction between the system and the users), 4 (conceptualization of searching strategies), and 5 (manipulation of the search); and, in the attitudes category, subsystems 3 (interaction between the system and the users), 5 (manipulation of the search), and 6 (evaluation of service cost-performance-benefits).

The same subsystems have the highest total number of 2 ratings, with the exception that subsystem 4, conceptualization of searching strategies, received a higher number of 2 ratings than subsystem 1, index language.

Conversely, subsystem 5, manipulation of the search, received only a single 1 rating in the knowledge category. Subsystem 1, index language (as distinguished from subsystem 2, indexing policy and practice in updating and maintaining the file) received no ratings in either the abilities or attitudes categories.

Table 4, "Comparison of Total Requirement Ratings by Service," gives the number of times each requirement received a 1 or 2 rating in the six subsystems.

a, etc.: see Code Key

Table 4: Comparison of Total Requirement Ratings by Service

Service	Knowledge								Abilities							Attitudes				
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e
PIRS	1	2	4	0	4	1	5	2	1	1	4	3	1	1	1	4	1	4	2	2
Incunabula	0	4	4	1	3	1	3	3	1	1	4	3	1	1	1	4	1	4	2	2
HPB	0	4	5	1	3	1	3	3	1	1	4	3	1	1	1	4	1	4	2	2
SC	3	2	3	0	4	3	3	2	1	1	4	3	1	1	1	4	1	4	2	2
Buffalo	3	2	3	0	3	1	3	3	1	1	4	3	1	1	1	4	1	4	2	2
NICEM	1	2	5	1	4	2	3	2	1	1	4	3	1	1	1	4	1	4	2	2
America	5	2	5	2	3	1	2	3	1	1	4	3	1	1	1	4	2	4	2	2
Totals	13	18	29	5	24	10	22	18	7	7	28	21	7	7	7	28	8	28	14	14

Total: 139 Total: 84 Total: 92

Table 5, "Comparison of Total Requirement Ratings by Service, 2 Ratings Only," gives the number of times each requirement received a 2 rating in the six subsystems:

a, etc.: see Code Key

Table 5: Comparison of Total Requirement Ratings by Service, 2 Ratings Only

Service	Knowledge								Abilities							Attitudes				
	a	b	c	d	e	f	g	h	a	b	c	d	e	f	g	a	b	c	d	e
PIRS	1	0	1	0	3	1	0	2	1	1	4	3	1	1	1	3	1	4	2	2
Incunabula	0	4	3	1	3	1	0	3	1	1	4	3	1	0	1	3	1	4	2	2
HPB	0	4	5	1	3	1	0	3	1	1	4	3	1	0	1	3	1	4	2	2
SC	3	0	2	0	2	1	0	2	1	1	4	3	1	0	1	3	1	4	2	2
Buffalo	1	0	2	0	2	1	0	3	1	1	4	3	1	0	1	3	1	4	2	2
NICEM	1	1	3	0	3	1	0	2	1	1	4	3	1	0	1	3	1	4	2	2
America	5	0	5	0	3	1	0	2	1	1	4	3	1	0	1	3	1	4	2	2
Totals	11	9	21	2	19	7	0	17	7	7	28	21	7	1	7	21	7	28	14	14
			Total: 86								Total: 78							Total: 84		

Differentiation among the services is shown only in the knowledge category, with minor exceptions. This category differentiates most in the total of 1 and 2 ratings between the services in subject matter, with a spread of 0 to 5 ratings. With respect to 2 ratings only, differentiation takes place in subject matter, media characteristics, and information science, with spread of 0-5, 0-4, and 1-5 respectively.

A comparison of the two slide (SC and Buffalo) and hand-printed books (Incunabula and HPB) services reveals a close similarity between the two sets in both tables.

In response to the second question - To what extent do users in the university library require direct assistance in using the services? - faculty and students in the academic library would require direct assistance in using the services to the extent that they likely possess the background for the two subsystems most directly related to the actual performance of a search: subsystem 4, conceptualization of searching strategies; and subsystem 5, manipulation of the search. Only the knowledge category is treated, as this indicates the necessary background to be brought to the search process and on which abilities and attitudes needed on the part of the user can be built.

For subsystem 4, conceptualization of searching strategies, all seven services require knowledge of information science and needs of researchers and other users for the most effective formulation of search strategies. However, information or library science is not likely to be part of the formal educational background of either faculty or students, with the obvious exception of those enrolled in or graduated from programs in information or library science, and with the exception of a short course in use of the library which may have been

offered as part of the user's educational experience.

With respect to informal preparation in information and library science, it seems to be a common observation expressed by information specialists and librarians that even faculty members holding the Ph. D. degree sometimes lack the ability to search the bibliographical tools most effectively, regardless of whether or not a short course in library use on a required or elective basis forms part of the inquirer's background.

Needs of researchers and other users, if not sufficiently known by information specialists and librarians, are not always clearly known by researchers and other users themselves, and, if known, are not always communicated with precision.

All this indicates that conceptualization of searching strategies is perhaps not an area to which the user necessarily brings an appropriate educational preparation. Thus, the user might well require direct assistance from an intermediary.

A guided procedure for formulating search strategies with natural language entry in an iterative procedure might be clearly programmed to enable a dialogue to take place between the user and the computer, short of unearthing an instance in which the user has asked the wrong question. However, when such a user-computer dialogue takes place, can it still be said that the user has formulated his search independently, or has the formulation been built in through the expertise of the information specialist or librarian in drawing up the specifications for computer personnel who write the programs and in writing the instructions for the user? Is the important question, then, whether

direct assistance is required by the user, or is it rather, what kind of assistance is required, whether direct or indirect, and how may it most effectively be provided?

For subsystem 5, manipulation of the search, one would expect that requirements for actually querying the computer in regard to technical aspects would fall in the catagories other than knowledge. Simple, printed step-by-step instructions in view at the computer were not interpreted as requiring background knowledge. Only one service, PIRS, received a 1 rating for computer technology in regard to the more complex of the possible searches.

Implications for further study

Implications for further study in four areas were derived from, or borne out (in the case of items already called for or being accomplished in the profession) by this study. They are listed below as topics under each of the areas. We do not necessarily advocate each of the implications but feel that they might well be further explored to clarify the principles that form the basis for their acceptance or rejection.

Area 1. In-service and continuing education programs for librarians:

Further attention to the humanities computer-based services, both with respect to use and to reporting holdings to those with a union list function, with further exploration of the value of videotape presentations or on-site visits to the services.

An invitation was issued to librarians in the area of the HPB Project to visit the School of Library and Information Science and receive instruction on the bibliographical service. The value of

on-site visits to the services or relevant videotape presentations could be further explored.

Area 2. Library education:

(a) A survey of treatment presently accorded to the computer-based humanities reference services in library school curricula to share ideas concerning the incorporation of this topic into the curriculum.

(b) The restructuring of course sequence to treat the aspect of information science, the organization of special materials, not as an advanced level of cataloguing, in cases where it is thus treated, but instead as particular applications of underlying principles of information retrieval, including basic Boolean search techniques.

(c) Inclusion of all the identified knowledge requirements in curricular areas that every future academic librarian will study so that the librarians will be able to use the services, contribute holdings to appropriate services, and communicate needs to computer specialists more effectively. We do not advocate that each requirement, such as media characteristics with respect to incunabula and hand-printed books, should necessarily constitute a separate course.

(d) More substantive attention to administration in the curriculum, in view of the high frequency of 2 ratings for administration.

(e) A program for subject information specialists involving courses taken with those studying for a master's degree in a subject field, in response to the high number of 2 ratings for knowledge of the needs of researchers and other users and of subject matter. The distinguishing characteristic of this arrangement is that learning activities

would be provided that would permit the future information specialist to play his role in teamwork with the future subject specialists, so that, hopefully, when later functioning in the university environment, information specialists and subject specialists would more likely collaborate in this manner. Students with a computer specialty might also be assigned to act as consultants for the humanities course.

(f) Further development of internship programs, preceded by appropriate laboratory and simulated learning experiences throughout the curriculum in which a service might be planned, or an ongoing service operated and evaluated, to facilitate development of the required abilities. The particular ability, to teach - if it is possible to create conditions that will foster this ability - poses a special challenge to the library schools in that the information specialist must be prepared to teach equally well a range of clientele from the undergraduate to the nationally known humanities expert who could be helped in his research by a service he may not comprehend or of which he may not grasp the potential usefulness.

(g) Increasing efforts to incorporate the affective domain of the taxonomy of educational objectives into the library school curriculum. We do not suggest, however, that courses entitled Respect for People I and Respect for People II be initiated.

The requirement, respect for scholarship, occasionally draws comments in the literature which seem to assume that scholarship must by its nature be irrelevant to anything meaningful. We must view information and library science as relevant to scholarship, conduct careful, honest evaluation of computer-based humanities reference services and define their place in the total university program. Otherwise, we may

fail to accommodate scholars' research methods effectively.

(h) Further development of computer-based humanities reference services by the library schools. Each of two services, Incunabula and HPB, constitutes part of a library school instructional program and is one of the means by which the schools exercise a leadership role in the profession.

Working with the HPB data base, students engage in research to build and improve the system through various studies including the feasibility of subject analysis of the works represented and the application of knowledge of coordinate indexing to the problem of retrieval of dictionaries.

The items printed out in the Stuart collection of Miltoniana are used as the basis of an exercise in forming an acquisitions policy for the collection and in compiling a list of desiderata.

Another assignment which utilizes the file is constructed around John Harris' Lexicon Technicum and Ephraim Chambers' Cyclopedia.

The students will also continue research already begun which involves Macdonald's bibliography of Dryden with the objective of demonstrating how the machine-readable checklist can be developed in the context of an existing bibliography to provide similar kinds of bibliographical control for other authors. They will also work on the development of the "points" file to be applied to copies of Eikon Basilike.

To provide faculty members with necessary information regarding local facilities, a representative from Systems and Data Processing, the Computer Center, and the Instructional Media Center were invited to attend a faculty meeting at which they reported on facilities available to the School of Library and Information Science.

Development of computer-based humanities services from small-scale operations may prove to be a feasible way to develop large-scale files, through avoiding the more serious financial and administrative problems which confront more ambitious projects.

Area 3. Needed research on humanities services:

(a) Design of objective research methods for the analysis of the intermediary-user relationship with respect to the two questions constituting the specific objectives of this study, including a more precise delineation of the equipment with which faculty and students are likely to approach the services.

(b) The extent to which the relationship of areas within the humanities and of the humanities with other fields can be incorporated into services to aid interdisciplinary research, as suggested by the objective of SC to serve interdisciplinary research. For example, will it ever be possible, if desirable, to query the computer for references or abstracts on the concept of counterpoint in regard to architecture, sonnets, Bach's fugues, and mathematical relations? Can and should similar types of services be compatible, through a scheme of subject analysis like the cue system, for example? Can the Incunabula, HPB, and the LOC Project, which is attempting to create a machine-readable union catalogue of books published before 1801 in the British Museum and in the libraries of the universities of Oxford and Cambridge, be made compatible? HPB has sent a printout of the letter O from the HPB file for study by LOC. Can the PIRS and the London Stage Project, which includes playbills among other types of materials, be made compatible? Is the problem of machine compatibility subordinate to the

familiar problem of obtaining agreement in phrasing the index language for compatibility in the entry points of access?

(c) New ways of financing the services both within and among institutions, including the large service provided by a single institution; financing problems of both commercial and noncommercial agencies; and the support of on-line ventures for which a cost-performance-benefits analysis has proved justification.

To exemplify these questions, if PIRS, located in a nationally known International Theater Studies Center, were to expand into a national theatre retrieval center, would it be more desirable to spread out the allocation of funds among institutions who would each specialize in one aspect of the service, or to centralize and finance the project at Kansas University?

Also, NICEM found that it has already done approximately half the cataloguing required by a group of major universities for nonbook materials. Could NICEM serve as a cataloguing center for these universities?

Adequate financing is necessary to insure that success or failure of the services is not allowed to rest on something approaching the regularity with which student assistants report to work when scheduled.

(d) Ways of evaluating the humanities services that provide sufficient lead time to take into account the possible lack of attitudinal readiness for the services and clear conception of needs on the part of users, as well as the evolutionary nature of research methods.

(e) Further study of the role of the scholarly societies in defining and creating specifications for fulfilling the specialized bibliographical and search needs of their constituencies.

(f) Analysis of means used to effect transition of a service from a research demonstration mode to an operational mode with least confusion to the user.

(g) Further experimentation with separating completely the continuing research aspect of the service from the production aspect through use of duplicate data bases.

(h) Decentralization of the process of adding holdings to those files with a union list function through the use of mark sense forms, in the case of services like HPB.

Area 4. The role of the academic library and the function of the academic librarian in developing and administering the services in relation to university subject departments, the computer center, and any information center that may exist on campu.:

(a) Use by librarians of the services, with the great potential of the services for encouraging research, to motivate and help those faculty members who do not perform research to do so.

(b) A major shift in view from the library as a system, to the university as a system of which the library is a part. Kansas University librarians reported that meetings are held by the computer center monthly for all those using the computer services, and that another series of meetings is held for campus-wide financial planning and priority determination for computer services.

One result of the intensified application of this concept would be that the library would keep a record of the holdings of all media and data banks on campus with their location, in operation or in the development stage. Another result would be the referral of someone

inquiring about a service directly to the service without necessitating the transfer of the question to a number of agencies, departments, or libraries on campus, as was the case in telephoning several of the services related to this study.

To take advantage of the computer as an interdisciplinary force or catalyst of communication among university agencies and departments, in view of the long-range planning necessitated by the computer for administrative reasons, a means for effecting greater communication might be the use of shifting task force teams. These are sometimes used in business and industry, with a particular mission in regard to planning, use, or evaluation of a service, and dissolve when the task is accomplished. Members of such teams in universities would comprise, as appropriate, information specialists or librarians, systems analysts, computer specialists, and subject specialists. In relation to the task force teams, line-administrators in a parallel career pattern would serve less in a decision making capacity and more in the capacity of coordinators of the teams, in an expediting and mediating function.

(c) Replacement of the university library policy of expecting the faculty and students to do their own bibliographical searching, where this policy may exist, with a policy of providing special library services and utilizing special library techniques in the university library. Such a policy might help alleviate a possible resistance on the part of scholars to the organizational systems established by librarians for consistency and administrative purposes. Optimum assistance for faculty members in carrying out research would be in keeping with the expressed charge to faculty members to produce research.

Provision of special library services by librarians would be in keeping philosophically with those services which do part of the user's work for him in a way which saves him hours over previous laborious processes.

Particular attention might well be given to the question of whether information specialists who handle retrieval would also more effectively handle input.

(d) In view of the prevailing policy of the university library to expect the users to do their own bibliographical searching, and in view of the emphasis of the university library on collection building often to the neglect of service aspects, establishment of the position in subject departments of a bibliographic expert member of the team of subject experts, held by a professor who has received formal education in information science, to act as an intermediary among the library, the subject department, and the bibliographic specialists in other subjects, and to provide special library services to faculty and students. The bibliographic specialist would have a status sufficiently autonomous to permit him to function creatively in relating the computer-based services to the broader problems of scholarship in the humanities and could exercise a strong professional orientation, without neglect of an institutional orientation.

This arrangement would also insure that professors receive sufficient library services for fulfilling their teaching and research responsibilities in the face of the policy, where it exists, of giving priority to service to students. Where budgets permit, the departmental bibliographic specialist could head a departmental library if necessary

to provide professors with services they could otherwise not obtain at the time needed because of the main library's priority of emphasis on service to students.

(e) Evaluation of the function of the "information officer" position currently being created in certain English university libraries.

(f) A sociologist's survey of the conceptions held by the librarians in a university of the function of the university library and the role of the university librarians in regard to the computer-based humanities services. With the survey as a baseline from which to proceed, the sociologist could advise as to the most effective procedure for engineering change to make use of the institution's existing dynamic for change.

Some librarians may not view the computer-based humanities reference services as appropriate to the university library function, and thus they will not realize that they are amiss in not knowing more about them. Other librarians may hesitate to offer the services because they realize that they do not know enough about them and desire to learn more. Other librarians know more than they think they know about the services because they do not associate information retrieval with the fundamentally similar processes of cataloguing and reference work which they have been performing all along.

But one thing is clear: the university agency that assumes responsibility for assisting users in fully exploiting the computer-based humanities reference services will be the agency staffed with those who possess the highest attitudinal qualifications; those who come on strong as experts in humanities information retrieval; those who

have no hesitancy about clearly informing the entire university community about the services offered and how the services benefit users.

Humanist scholars will see that they get the computer-based reference services they need, if they really want them, regardless of administrative arrangement. Whom shall they seek as their intermediary to provide the services and to assist them in fully exploiting them? An Arabian proverb suggests an answer:

He who knows not and knows not that he knows not,
He is a fool - shun him;
He who knows not and knows he knows not,
He is simple - teach him.
He who knows and knows not he knows,
He is asleep - wake him;
He who knows and knows he knows,
He is wise; follow him.

Appendix: Outline of Subsystems

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