ENCYCLOPEDIA OF LIBRARY AND INFORMATION SCIENCE

VOLUME 22

EXECUTIVE EDITORS
Allen Kent
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VOLUME 22

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PENNSYLVANIA. UNIVERSITY OF PENNSYLVANIA LIBRARIES

The University of Pennsylvania Libraries consist of the Charles Patterson Van Pelt Library and 19 departmental libraries reporting total holdings in 1975 of 2,640,013 volumes and 999,633 units of microform material. The libraries serve a diverse university community of 20,000 students and 15,000 faculty and staff, as well as providing access to the collections to the larger community of students and scholars.

The University of Pennsylvania Libraries are administered by the director of libraries, who is responsible to the provost of the university. The Office of the Director of Libraries includes: the director; two associates directors, one with responsibility for collections and technical processes and the other responsible for personnel and public services; a business administrator; and a building administrator. The departments of the main library, such as Circulation and Processing, and various departmental libraries report directly to the Director's Office. The departmental libraries receive varying degrees of administrative and financial support from the main library; and, with the exception of Biddle Law Library, Dental School Library, Medical School Library, and Lippincott Library, the processing of materials is centralized. An assistant director for special collections has responsibility for the several major special collections of the main library. An assistant director for collection development coordinates acquisition policies and book selection with faculty and departmental libraries.

The Van Pelt Library is the functional center of the university library system and houses the main collections, concentrated in the humanities and social sciences, and the major special collections. Participation in and commitment to the PALINET–OCLC (Pennsylvania Area Library Network–Ohio College Library Center) computerized, shared cataloging network has grown since 1971. The University of Pennsylvania, in cooperation with the Union Library Catalog of Pennsylvania and the libraries of Temple and Drexel Universities, at first operated a pilot project with OCLC. Now, the university participates fully in using and adding to the shared cataloging data base. In 1973 a Data Services Office was established to provide library users with access to the contents of machine-readable data bases, such as the Lockheed and System Development Corporation networks. In addition, Van Pelt Library and two departmental libraries employ an automated circulation control system that utilizes an IBM System 7 minicomputer to provide on-line access to some circulation data, such as restricted borrowers and books called in from circulation. The principal finding device is provided by regular updates of a printed circulation listing produced by a commercial computer center.

The University of Pennsylvania Libraries possess holdings in all subject fields covered by university programs of instruction and research. Some schools and academic

departments of the university are serviced directly by departmental libraries. The departmental libraries include: Allied Medical Professions Library, Annenberg School of Communications Library, Biddle Law Library, Biology Library, Chemistry Library, Dental Library, Fine Arts Library, Hospital Library, Lippincott Library of the Wharton School, Mathematics–Physics Library, Medical School Library, Moore School of Electrical Engineering Library, Museum Library (anthropology, archaeology), Music Library, New Bolton Center (veterinary medicine), Penniman Library (education), School of Social Work Library, Towne Scientific Library (engineering, materials science), and Veterinary School Library.

Particular strengths of the main collections may be highlighted here: Middle English, Old French, and Germanic language and literature; Italian Renaissance literature; Spanish literature of the Golden Age; Baltic studies; Semitic languages; South Asia studies. The Rare Book Collection's areas of strength include: Aristotle texts and commentaries; the Bible in English; biblical and Eastern texts; Spanish and Italian literature of the 16th and 17th centuries; 18th-century English fiction; the Maclure collection of French Revolutionary pamphlets; cryptography; and collections of Jonathan Swift, Walt Whitman, and Theodore Dreiser. The Rare Book Collection is also the main repository of manuscripts. Definitive collections of manuscripts include, among others: Van Wyck Brooks, Theodore Dreiser, and James T. Farrell.

Other special collections are: the Horace Howard Furness Memorial Library, containing material written by or about Shakespeare and other Elizabethan dramatists, as well as material on the history of the English and American stage; the Henry Charles Lea Library, an outstanding library in the field of the Inquisition, church history, canon law, witchcraft, 16th- to 18th-century Italian archival manuscripts, and Byzantine history; and the Edgar Fahs Smith Collection in the history of chemistry and alchemy, which comprises rare books, manuscripts, and prints relating to chemists and their work. Several departmental libraries possess notable special collections in their subject field. The Biddle Law Library is strong in early American and English law, legislative histories, and air and space law. The Veterinary Library holds the Fairman Rogers Library on Horsemanship, which contains material on all aspects of horses and horsemanship beginning in the 17th century. The Lippincott Library of the Wharton School houses the Peck Corporate Finance Collection, which includes annual reports, histories, and stock prospectuses published by 2,300 business firms. The Woody History of Education Collection, located in the Penniman Library, has its principal strengths in comparative education, Russian education, and women's education. The Medical School Library has a large collection of audiovisual material, which supports the instructional needs in the Schools of Medicine and Nursing.

Data on the holdings and expenditures of the University of Pennsylvania Libraries are shown in Table 1.

The beginnings of the University of Pennsylvania Libraries date from 1749 when Richard Jackson, a London lawyer and politician, donated several books to the newly formed Philadelphia Academy. Gifts from the trustees of the academy, particularly

TABLE 1

University of Pennsylvania Libraries,
Basic Statistics, 1970/71–1974/75

	1970/71	1971/72	1972/73	1973/74	1974/75
Volumes added (gross)	92,140	102,979	98,353	97,014	96,047
Total volumes	2,310,901	2,399,633	2,472,735	2,557,046	2,640,013
Salaries	$2,293,247	$2,614,750	$2,769,616	$2,951,400	$3,147,964
Personnel benefits				$297,783	$435,538
Books	$899,221	$1,039,352	$1,065,570	$1,165,822	$1,153,193
Binding	$146,743	$158,000	$162,456	$162,406	$182,262
Total expenditure	$3,561,066	$4,094,814	$4,323,122	$5,006,838	$5,293,838

Benjamin Franklin and Lewis Evans, followed. The trustees soon appointed a committee, led by Franklin, to select books for the students of the academy. The money to purchase these books was to have been acquired through a system of fines upon trustees absent from meetings and fees collected from students upon issuance of degrees. Income from these measures was small, and since no regular source of income was provided for, the growth of the library depended on gifts from benefactors and on fund-raising drives and lotteries. For example, Dr. William Smith, the provost of the college, conducted a fund-raising campaign in England during 1762–1764; and Dr. John Morgan, the founder of the Medical School, raised funds in the West Indies in 1772. A substantial gift of 100 volumes of scientific and literary works was received in 1784 from Louis XVI of France in appreciation for the honorary degree conferred upon the Marquis de Chastelux.

In 1791 the college was taken over by the University of the State of Pennsylvania and for the next 20 years was embroiled in political maneuvering that advanced neither institution. Finally, in 1811, the college was reorganized as a private institution, the University of Pennsylvania. Under the new regulations, a library committee was provided for and instructed to encourage donations of books. At this time, preparations for the publication of a catalog were begun; however, it was not until 1829 that the catalog appeared. In 1832 the library reported holdings of 1,670 volumes. Donations of books continued to be the principal source of new materials for the library. Throughout this period the library was under the care of the provost of the university. In 1855 the provost relinquished the duties of librarian to the professor of belles-lettres and the English language and literature. This arrangement continued until 1884 when the first trained librarian was appointed.

With the move of the university to West Philadelphia in 1872, the library shared in the expansion of support for a vital and growing institution. A series of important subject collections were donated or purchased by subscription during the later part of the 19th century that greatly increased the library's holdings. It was during this period, too, that several important endowed funds were established for the library. By 1887 the cramped quarters of the library had made use of the collection virtually impossible, and efforts were initiated to build a special building for the li-

brary. The building was designed in consultation with two prominent librarians, Justin Winsor of Harvard and Melvil Dewey of Columbia, and represented the best thinking of the day on library architecture. In 1890 the Furness Memorial Library was opened and after a year was declared the perfect library. The library's collections grew from approximately 28,000 volumes in 1886 to 272,248 in 1907. With the appointment of the first professional librarian, a dictionary card catalog of the library was begun. James G. Barnwell took charge of the library in 1884 and remained until 1887. Barnwell had been director of the Philadelphia Mercantile Library and went on to become librarian of the Philadelphia Library Company. His successor, Gregory B. Keen, served as librarian until 1897. Keen was a graduate of the university and a clergyman. An assistant librarian, Morris Jastrow, had been appointed in 1889 and he succeeded to the post of librarian when Keen became librarian of the Historical Society of Pennsylvania. Jastrow was a professor of Semitic languages and librarian until 1919. The librarian from 1919 to 1931 was Asa Don Dickinson, who resigned to become librarian of Brooklyn College. Charles S. Thompson, who was assistant librarian from 1927 to 1930, became librarian and remained until his retirement in 1945. With Thompson's retirement, the duties of librarian were merged with those of director of libraries, a position created in 1940. Charles W. David, who had come to the university as director of libraries in 1940, took charge of the Main Library on the resignation of C. S. Thompson. David undertook the revitalization of a library that had suffered for several decades from lack of funds, personnel, and space. He took immediate steps to increase funding for the library and to improve staff morale by raising abysmally low salaries and improving working conditions. He had been, in addition, the prime mover behind the organization of the Union Library Catalog of Pennsylvania and he promoted library cooperation at all levels. The University of Pennsylvania and the Union Library Catalog undertook an in-depth survey of the libary's collections. In 1940 *A Faculty Survey of the University of Pennsylvania Libraries* was published. Also, David recognized the hopeless inadequacy of the library building to support the changes in library needs and began a campaign for a new library. By 1951 plans were completed for a new structure; however, funding was not available at that time. Upon David's resignation in 1955, Kenneth M. Setton became director of libraries and remained until 1965. During Setton's term, a new building was planned and completed with the opening of the Van Pelt Library in 1962. Setton was also responsible for important book and manuscript purchases. Warren J. Haas came to the University of Pennsylvania in 1966 and remained until 1969. He instituted a major reorganization of technical processing and public service functions and did much to achieve centralized budgeting through the Office of the Director. During his administration, the library adopted the Library of Congress classification system to expedite processing of materials and to reduce costs. Since 1970 the director of libraries has been Richard De Gennaro.

TOBY HEIDTMANN

THE PEOPLE'S REPUBLIC OF CHINA, LIBRARIES IN

Introduction

A study of current librarianship in China has to be based on individual reports by visitors, since statistics and official accounts are rarely released and reference sources are incomplete. Yet it is important that information is available on the most populated country in the world --latest estimated figures are 920 million (see *Background Notes: China, People's Republic of*, Department of State Publication 7751, rev. November 1975, Government Printing Office, Washington, D.C.).

The historical development of libraries in China and the first decades of the People's Republic have been extensively described by Dr. K. T. Wu in Volume 4 of this encyclopedia (pages 627–646). This article attempts to highlight some of the current trends and describe some prominent libraries.

Chinese libraries play a leading role in the socialist construction of the country, not only through the dissemination of the socialist writings of Marx, Engels, Lenin, Stalin, and Mao Tse-tung, but also by giving guidance and encouragement in raising the political consciousness of the people. Most libraries have a political reading room, in which material is grouped to serve the current ideological discussions—for example, since 1974 there were: the movement to criticize Lin Piao and Confucius, the study of the dictatorship of the proletariat, and the campaign to criticize the ancient novel *Water Margin* [Shui hu].

Second, libraries strive to provide scientific and technical information needed for production and research. They actively go out to determine the needs of factories and rural areas and supply them with necessary material, both within the library and at their places of work. In the natural sciences and technology, both Chinese and foreign reference and serials material are kept up to date. Thus, library services extend to such a degree outside the established libraries that one may use the analogy of "libraries without walls."

To understand library development in China, one has to bear in mind that the primary aim of Chinese libraries is an ideological one, to serve the socialist society. Without the proper political attitude, education and training are considered to be of little value.

Chinese librarians seem to approach the challenges of society with great energy and resourcefulness in finding innovative solutions for specific problems. China, as a developing country, is still struggling to achieve prior goals of meeting the needs of its population, and some libraries have still to operate under less favorable physical conditions. But new library buildings are being constructed in incredibly short times (such as in Peking and Kunming); and from design, to construction, to final moving, the whole library staff has been involved. Use of advanced technology and automation may be expected in the near future (see under Peking University). As is characteristic for a socialist society, librarians are actively participating in all levels of services and decision-making processes in a spirit of hard work and self-

reliance. New classification schemes have been introduced which are more suitable to socialist thought, and the role of women and national minorities has been emphasized.

Since Liberation (1949), a number of directives (see the section "Library Legislation") have attempted to define the role of libraries and give directions to library developments. An interesting result has been the centralization in large libraries on the one hand, and the extensive establishment of basic libraries throughout the country in small rural and urban places on the other hand, whereby the large libraries serve as the centers for these well-organized networks. It appears that all segments of society have access to such library services.

Book losses present no problem for libraries in this highly moral society. In the section on "Library Education" the new approaches to training are discussed and the main emphasis on practical knowledge.

The National Library

The National Library of Peking (director: Liu Chi-ping; deputy director: Pao Cheng-hu) is the most prominent and largest library in China, and its development of a new Chinese Classification Scheme is of major impact upon Chinese libraries. Its impressive collection includes 8,000,000 books in the Chinese language and 4,000,000 in foreign languages. It subscribes to 8,000 current foreign journals. Founded in 1910 (see K. T. Wu, this encyclopedia, Vol. 4, p. 634ff for early history), the library has developed rapidly since 1949. The building, designed by a Danish architect, no longer fulfills the growing needs for space for bookstacks and more reading rooms and modern equipment, and plans are underway for an annex and a new building for serial publications.

As a depository library, it receives one copy of all new publications (official publications now must use the new, reformed characters of the Chinese language). International exchange programs have been in effect since 1950 with more than 3,400 institutions and libraries in over 100 countries, including the United States.

The library has a staff of some 500, one-fourth of which holds a library science degree, and over half of the staff are women, some of them department heads. Library hours are from 8 A.M. to 5:30 P.M., 6 days a week. Users are the general public, government organizations, and research organizations; and all books circulate and may be borrowed through national and international interlibrary loan, except for rare books. A photoduplication division provides services of copying and microfilming of material. Preservation and restoration of library material has been an ancient art in China and methods have been further refined and developed at the National Library of Peking to preserve not only Chinese classical works, but also first editions and manuscripts of socialist writings. Access to the collection is provided by a card catalog and a book catalog for the rare books.

The library defines its objectives as "to disseminate a knowledge of Marxist-Leninist-Mao Tse-tung thought, to serve the three great revolutionary movements,

the class struggle, the struggle for production, and the struggle for scientific experiment." Thus, the collection policy is based on obtaining the socialist writings and publications in the basic sciences and technology. The library takes the initiative in providing seminars on current ideological discussion topics, in arranging exhibits such as an exhibit on the contributions of China to science and technology since earliest times in 1975, and in generally assisting libraries throughout the country by supplying them with library cards and training of personnel. Thus the National Library of Peking can be regarded as a center of library activities in China.

College and University Libraries

Academic libraries are under the supervision of the Ministry of Higher Education. Since the Cultural Revolution (1966–1968), education has been undergoing radical transformations, in fact, one speaks of an "Educational Revolution," which has affected colleges and universities, including libraries, and is considered as still being in an "experimental stage" undergoing continuous study and evaluation. At present there is a high student–teacher ratio, but enrollment figures are expected to increase.

Two directives of Mao Tse-tung had profound impact upon educational policies. One, issued on May 7, 1966, called for peasants to increase their political, cultural, and military knowledge and resulted in the so-called "May 7 Peasant (or Agricultural) Colleges." The other, from July 21, 1968, called for college students to be selected from workers and peasants with practical experience, and resulted in the so-called "July 21 Worker Colleges." The number of worker colleges, set up in factories and other places of work, and peasant colleges, set up in the rural areas, increased dramatically after the Fourth National People's Congress in January 1975, which set high economic targets for the nation. Such types of colleges provide the means for the speedy acquisition of technical knowledge through short-term training classes lasting from several months to 1–2 years. A report by the *China News Service* of January 2, 1976, mentions over 6,000 such colleges in factories and communes with an enrollment of over 460,000 students, as compared to the more than 300 regular colleges and universities with their 500,000 students. In Shanghai alone the number of workers' colleges increased in 1975 from 360 to 1,200. The emphasis is on training in practical skills and also in some languages so as to be able to read technical information. The teachers are workers, technicians, professionals, or college teachers.

This increase in learning activities *outside* established institutions must have an impact on the library services provided by these institutions and requires innovative solutions for new needs. This also agrees with the concept that the whole society is a classroom and that the learning process is no longer confined to institutions but is a life-long experience.

Under the new enrollment policies for academic institutions, students are taken from the countryside, factories, or army, where they have worked at least a couple

of years after graduating from high school. Through de-emphasizing formal education and shortening the length of study from an average of 5 to 3 years, the gap between physical labor and intellectual work is further narrowed. As a stated goal—"the laboring people will be culturalized and the intellectual people will be laborized"—it is another step in advancing the concept of the socialist society. "Education must serve proletarian politics and be combined with productive labor" is one of the sayings most frequently cited. Also, "from the commune to the commune," which means that the graduates should return to the rural areas from which they came.

This attitude toward education and spirit of service has to be kept in mind when considering the functions of libraries in higher institutions of learning in China.

PEKING UNIVERSITY LIBRARY

The University

For its history see K. T. Wu, this encyclopedia, Vol. 4, p. 639.

The educational reform has been successfully carried out in the past 3 years: first, to enroll students with experience in practical work, the so-called workers, peasants, or soldiers; second, to integrate theory with production and class struggle; and third, to involve all teachers in these processes. Teachers and students study socialist thought and the current ideological movements of criticism, and together produce publications in the political and scientific areas. Short-term training classes for workers and peasants are given outside the university with the assistance of teachers and students who go out to these places. In 1974 attendance of such short-term classes, which last from 1 to 6 months, was about 50,000.

In 1975 the university enrolled 5,300 students (40% women) and had 2,700 students (one-third women). The Revolutionary Committee, which is the administrative body, consisted of 29 members (six women).

The Library

The administrators are: director, Kuo Sung-nien; deputy director, Lian Su-chuang.

In May 1975 an imposing new library was opened, whose rapid construction had started in March 1974 (see Figure 1). The new library has an area of 24,500 square meters and contains 31 reading rooms, with 2,400 seats and some research halls for students and teachers doing research work together. All members of the university had been involved in its design and construction and in the final moving of books. The library has a collection of nearly 3,000,000 books, about one-fourth in foreign languages; 2,000,000 books are in the new building, the rest are housed in four older buildings and 20 departmental libraries. The new building serves as an example of modern library construction in China. There are four sides with a yard in the center, thus providing excellent natural light for the reading rooms having large windows on opposite sides. The front of the building is four stories high.

FIGURE 1. *The new Peking University Library. (All of the illustrations in this article are reproduced from photographs taken by the author.)*

In the back there are 10 levels of bookstacks. The reading rooms contain two levels of bookshelves and the furnishing is functional and simple (see Figure 2). Provisions for automated installations have been made.

Since the opening of the new library, daily use has been on the increase, to about 1,000 users. To correspond to the concept of the "open-door university," the library organizes special groups for serving the students and teachers who are out working in factories and communes. In 1975 the library sent 8,000 books and journals to 190 such places and material may be borrowed for 6 months or longer, if needed. As in most Chinese libraries, the stacks are closed and books are procured for the users by the library staff.

Peking University Library introduced innovations in library education to meet the requirements of a rapidly developing economy and respond to current educational reform. It integrated its Library Science Department with the new library. Thus, both students and teachers are involved in practical work in addition to training classes held by teachers and other experienced librarians. The training period lasts 2 years in the library. Besides that, the library conducts short-term training classes outside the library. Some of the students, who finish their training in the library, may continue to work there, but most of them go out to serve in the province, county, or commune libraries. Half of the students are women.

The library has a staff of 120 (60% women). All members participate in the activities of the open-door policy of going out to places outside the university. This is considered as helping their political outlook and encouraging their spirit of service. Furthermore, all this strengthens the cooperation among students, teachers,

librarians, and other staff workers. Foreign students receive their initial training in Chinese language and current history at this university and are visible in reading rooms. Through its organization of the collection and prospective automation, the Peking University Library can be expected to have future impact on the development of library services in China.

TSING-HUA UNIVERSITY LIBRARY

The University

Located in Peking, this is one of the leading universities in the applied sciences, with 11 departments and 54 subject specializations. Originally founded in 1919, it has undergone fundamental changes in policy since 1949. Of the 3,000 teachers, one-fourth are women, and of a total of 11,000 students, one-third are women. In addition, the university provides evening courses for factories and other places outside to 1,700 people; and with the open-door university policy, this number is expected to increase. The length of study ranges from 1 to 3 years. The university has relations with 100 factories outside the campus and also involves students and teachers in workshops located on the campus. The new educational system emphasizes class struggle and the combination of theory and practice, the integration of knowledge with production. The university maintains close cooperation with Peking University and publishes some joint journals and articles.

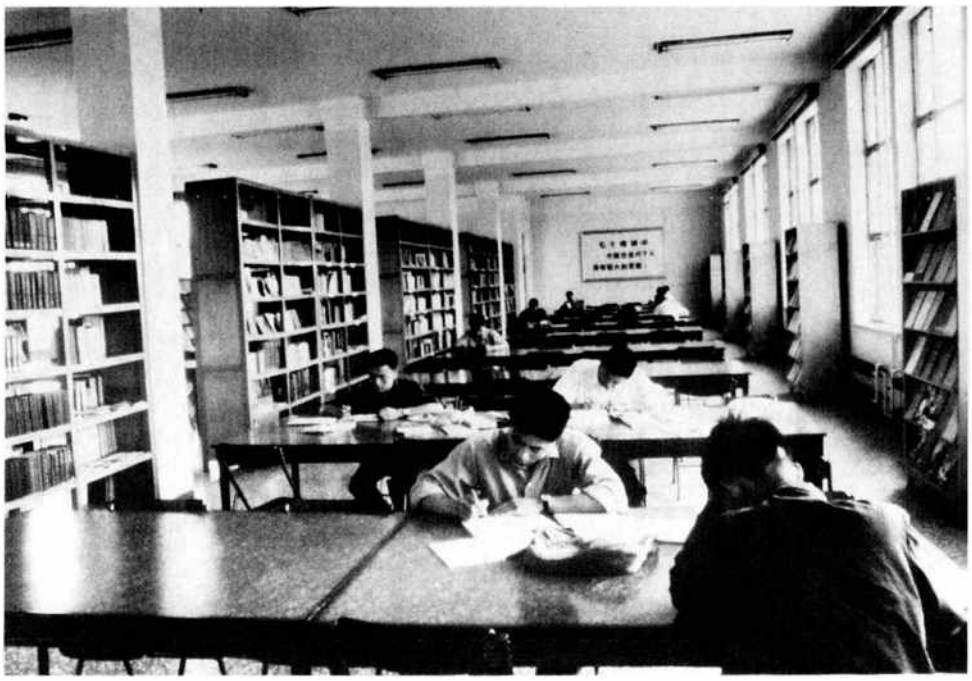

FIGURE 2. *Reading room in the new Peking University Library.*

The Library

The library is housed in a building constructed in 1919 and has a collection of 1,500,000 books, one-eighth of which are foreign publications. It subscribes to 2,000 foreign journals. The four reading rooms—political, science and technology, journals, and newspapers—provide some 400 seats. Photographic duplication is available and library catalog cards are provided by Peking University. The library has a staff of 80. Its collection contains some early bone inscriptions.

KIRIN UNIVERSITY LIBRARY

The University

Kirin University is located in Changchun in Kirin Province in the northern part of China (see Figure 3). Founded in 1946 for training cadres for the Liberation War in China, and transformed into a comprehensive university in 1952, it is under the direct administration of the Ministry of Higher Education. Since the Cultural Revolution it takes students from all parts of the country, and after finishing their education, students are assigned to all parts of China. The program trains scientific and research workers, teachers in higher education, and cadres.

The university has two departments: (*a*) Natural Sciences (mathematics, physics, chemistry, semiconductors), and (*b*) Liberal Arts (Chinese literature, economics, philosophy, law, foreign languages, history). There are 32 subject specializations taught. The university has 2,300 teachers and staff members (30% women), of whom 1,100 are teaching personnel. Before the Cultural Revolution, the university had 4,500 students. In the present experimental stage of education, 480 students have graduated since 1970. The university runs six factories and has its own printing press to print textbooks and other teaching materials, mostly compiled by members of the university. Over 200 items were printed during the past years. The university also runs a clinic, a nursery, and a primary school. The length of studies varies from 2 to 4 years, depending on the subject field.

Reforms are under way in teaching policies, methods, and materials. Since education must serve proletarian politics, students go to factories, People's Liberation Army (PLA) units, and communes, and members of these institutions are in turn invited to the university to give lectures. Teachers also participate in productive labor and stay on as long as they are needed and able. Workers may retire at age 60. In the university factories, students and teachers combine scientific research work with education and production.

The Library

The collection consists of 1,500,000 books, of which 540,000 are in the liberal arts (predominantly social sciences) and 470,000 in the natural sciences; 320,000 Chinese hand-sewn books (1,700 county records, over 2,500 varieties, history, geog-

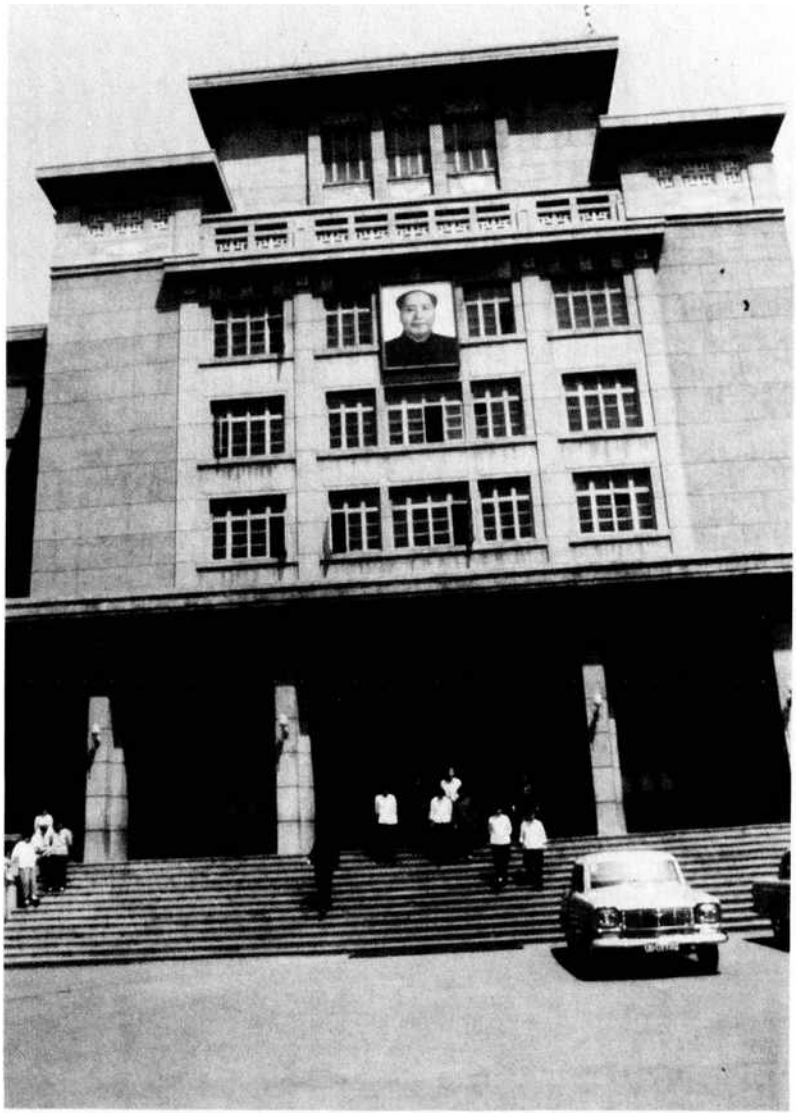

FIGURE 3. *Kirin University and Library in Changchun.*

raphy, classical Chinese); 2,600 titles of Chinese rare books (e.g., earliest edition of hand-sewn books of the Sung Dynasty); and 170,000 bound periodicals.

There are five departments: Acquisitions and Cataloging of Books, Liberal Arts, Natural Sciences, Periodicals, and the Library Office (administration). The library considers its objectives as "to consolidate proletarian dictatorship and popularize Marxist-Leninist-Mao Tse-tung thought." It arranges exhibits and posts photos and clippings.

According to the "open-door way" to facilitate revolution in education, mobile libraries were organized in recent years, which go to factories and communes where students and teachers of the university are working, and also deliver material at their homes. The mobile libraries have three purposes: first, to take part in political study by teachers and students; second, to bring books to places of teachers and students; and third, to solicit opinions of teachers and students. Recently several

mobile libraries were established at different places, such as production teams and factories. They are circulating libraries and may be run by students or librarians.

Selection of books is done by library personnel with the help of students and teachers and various departments. Students and teachers may also request books. Volunteer librarians from students and faculty take care of the books in their departments. All departmental holdings are recorded in one central card catalog. Another task of the library is to render active service for production and scientific research work under the motto "make the past serve the present and make foreign things serve China." A spacious, light room serves as a political reading room. The library is open from 8 to 11:30 A.M. and from 2 to 5 P.M. for borrowing. The reading rooms and reference room for librarians and teachers are open from 6 to 9 P.M. On Wednesday afternoon and Saturday afternoon the library is closed for political study, and on Friday afternoon is closed for professional study as a group. Librarians carry out professional study of books, bibliography, and foreign languages. The library has 2,500 users, with a daily average of 280. The same classification system as at the National Library of Peking is in use. Borrowing privileges are 20 copies for teachers for 2 months and 5 copies for students for 1 month, more for advanced students. Literature can be taken out for only half a month. Further services provided are through three photoduplicating machines and interlibrary loan within China.

For special training, eight librarians were sent to Peking University, but the rest study in their spare time at the university and gain practical experience.

FUTAN UNIVERSITY LIBRARY

The University

Located in Shanghai, this is a general university of the liberal arts and sciences, which incorporated the former Aurora College (founded 1905). It has several factories run by students, for example, an optical factory. In 1974 the university had a staff of 3,500 (including 1,800 teachers) and 3,000 students. Like other universities, it conducts short-term training and correspondence courses. The revised curriculum, shortening the period of studies from 5 to 3 years, gives students and teachers the opportunity to gain practical experience in one of the over 100 factories outside the university, with which it has established links, and this has improved the relationship between teachers and students to one of equal cooperation. There are also a number of foreign students enrolled at Futan University.

The Library

Futan University Library is housed in a spacious building with excellent natural light, has a collection of 1,600,000 books (with some 300,000 in Western languages), and subscribes to 2,000 periodicals (109 from the United States). The

library is administered through five departments: Technical Processes (acquisition and cataloging), Reference and Circulation, Serials, Editorial and Translations, and Binding and Restoration. Each academic department of the university has its own reading room and reference collection.

There are 80 staff members (one-third women). The same classification system as at the University of Peking is in use. Students and teachers have the same rank as to borrowing privileges, five books at a time. The political reading room is well equipped and offers excellent natural light. Microfilm services are provided as well as interlibrary loan. Since all students live on the campus, the library is closed during mealtimes and is open from 8 to 11 A.M., and 2 to 5 and 6 to 9 P.M.

HEILUNGKIANG UNIVERSITY

Figure 4 shows Heilungkiang University in Harbin, which is not discussed in this article. It is the northernmost university in China.

CHIAO TUNG UNIVERSITY LIBRARY

The University

Chiao Tung University is located in the ancient capital Sian in Shensi Province. As the largest university in the province, this scientific and technical university was originally founded in Shanghai in 1896 and moved to this part of the country in 1956 "to meet the needs of socialist construction." The whole campus covers an

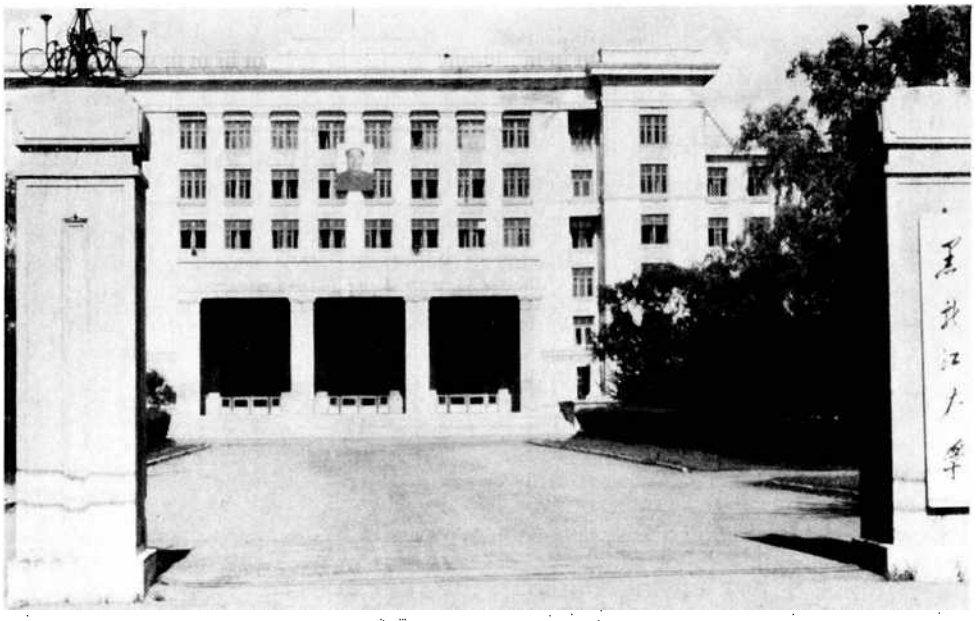

FIGURE 4. *Heilungkiang University in Harbin.*

area of 90 hectares and the buildings an area of 290,000 square meters. There are 4 departments with 28 subject specializations and 33 laboratories. Each department has its own workshop and there is a factory located on the campus for practical training.

The university has 3,000 teachers, staff members, and workers (1,300 of whom are teachers). Student enrollment, which was interrupted during and after the Cultural Revolution, from 1966 to 1972, is gradually increasing. Before 1968 the university had 8,000 students and there are 5,000 students now (one-third women). New students spend 4 months out of the year in a factory and their education has been shortened from 5 to 3 years. Many teachers are graduates of the university.

The Library

A new library building was constructed in 1956. It is a modern, spacious building with large glass windows allowing for ample natural light and overlooking a large rectangular pool of lotus flowers (see Figure 5). The huge glass doors at the entrance are flanked by heroic statues of a woman and man. A huge portrait of Chairman Mao hangs in the entrance hall between two open staircases (see Figure 6).

The library has 800,000 books and 3,200 periodicals from 23 countries and regions. Its collection covers five major languages: English, German, Japanese, French, and Russian. The building covers an area of 11,200 square meters. The furnishings are simple and functional. The library has six reading rooms with a total of 1,500 seats. The large political reading room has 230 seats (see Figure 7).

FIGURE 5. *Chiao Tung University Library in Sian, Shensi Province.*

FIGURE 6. *Entrance hall of Chiao Tung University Library.*

Access to the collection is through card catalogs, one in Chinese (arranged by the number of strokes); one in Russian; and one in the Roman alphabet for Western languages, arranged by author–title–subject. As in most Chinese libraries, the classification outline is visibly posted and explained near the card catalog. Librarians attend evening courses to learn foreign languages and receive practical training in the library. The library is open in three shifts, morning, afternoon, and evening, until 10 o'clock at night.

YUNNAN UNIVERSITY LIBRARY

The University

Yunnan University is located in Kunming, the capital of Yunnan Province in the southwest part of China. Founded in 1923, the university included an Agriculture College, Medical College, and Engineering College, all of which became independent institutions after 1949. Yunnan Province, with 22 nationalities, is the center for the study of national minorities and their history. Of the university's 3,000 students, one-third are members of national minorities.

The Library

The main library moved in 1960 into the present massive building. It has 8 departments and a staff of 30 librarians (including 17 women). The library has a col-

FIGURE 7. *Students in the political reading room at Chiao Tung University Library, with a painting of Mao Tse-tung in Yenan.*

lection of 600,000 books and receives all current newspapers published in China as well as a number of foreign scientific journals. The library covers an area of 6,500 square meters. There are four reading rooms with reference material for literature and the humanities (history, politics, foreign languages, literature), and four for science and technology (mathematics, physics, chemistry, biology). In addition there is a political reading room with the socialist writings. A characteristic of the library is the special study of minorities. There is a total of eight levels of stacks, two of which are for classical Chinese material, dating back some 700 years. One room is for microforms. Selection is done by teachers and librarians, and, as throughout China, foreign imports are carried out through the Hsin-hua Bookstore. There are exchange programs with other college and university libraries and interlibrary loan within China only. The salary of librarians is slightly lower than that of teachers due to different scales. Some 500 students use the library daily. They are issued 10 cards each and can borrow one book for 1 month with each card. Teachers receive 20 cards and may extend borrowing to the whole semester. Students also buy textbooks sold in a special room of the library.

The main responsibility of the library is toward the students, but outside workers can borrow with a special letter of recommendation from their units. Otherwise they are expected to obtain books from their own provincial library. Accession lists of newly acquired books are distributed to teachers with comments by librarians. Both recommendations and negative criticism are given and may be either printed and distributed or written on posters and displayed on the ground floor of the library.

KUNMING ENGINEERING COLLEGE LIBRARY

The College

Located in Kunming, Yunnan Province, the college was previously attached to Yunnan University (founded 1923). A separate college since 1954, it enrolls 1,609 students, with yearly increases of 300 expected. One-third of the teachers and staff of 1,300 are women. Ground has been broken for a new building. Twenty to twenty-four percent of the students are women, more in the field of chemical engineering. The large number of students from the national minorities spend 1 year first to study the Chinese language before their regular 3-year studies. There are 6 departments and 17 subject specializations in geology, mining, metallurgy, steel production, machinery, chemical engineering, and others.

The Library

The library has a collection of 370,000 books and provides supportive material for the open-door school management and its worker-peasant-soldier students. It is felt that by going to factories, teachers and students help workers to solve technical problems and popularize technical knowledge. According to a directive of July 21, 1968, by Chairman Mao, teachers go to factories to conduct night schools, so-called worker colleges. They also give short-term courses and thus establish close ties between the college and workers.

CHUNG-SHAN UNIVERSITY LIBRARY

The University

The university is located in Kwangchow in Southern Kwangtung Province, the first major city near the Hong Kong border and seat of the semiannual trade fairs. Founded in 1924 by Sun Yat-sen, the university changed its name in 1926 from Kwangtung University to the present name (which is another form of Sun Yat-sen's name). It is a general university in the liberal arts (Chinese literature, foreign languages, history, philosophy, economics) and sciences (mathematics, mechanics, physics, chemistry, metallurgy, geography, geology), with 11 departments and 31 subject specializations. Enrollment was interrupted during the Cultural Revolution and resumed in 1970. There are now 2,500 students with over 1,100 teachers.

The Library

Chung-shan University Library is housed in two red-brick buildings, one for reading and reference, the other for bookstacks. A new library building is planned in the future. Its collection of over 2,000,000 books makes it one of the major academic libraries. There are 450,000 foreign-language publications, and 2,400

periodicals are currently received, both in Chinese and foreign languages. The library has 4 departments and a staff of 58 (28 women). The library is under the direct leadership of the Revolutionary Committee of the university. It uses the classification scheme of the National Library of Peking. Books are selected by teachers, students, departments, and library staff. Notices of new books are issued and visibly posted. The library is open from 7:30 to 11:30 A.M., and 3 to 5:30 and 7:30 to 9:30 P.M. It is closed Saturday evenings and Sunday mornings.

The users are students, teachers, staff, and some people from the outside, especially for political publications. Borrowing privileges are 5 books per student for 1 month, and 20 books per teacher, also for 1 month, or longer if needed. It provides microform and duplication services and interlibrary loan.

THE KWANGTUNG POLYTECHNIC INSTITUTE LIBRARY

The Institute

The Polytechnic Institute is located in Kwangchow in Kwangtung Province in the south of China. It has a staff of 2,600 (including 1,100 teachers), and with its 2,000 students is still in the experimental period of education and has not yet reached its maximum enrollment since the Cultural Revolution. One-fourth of the students are women, with a large proportion in the semiconductor field. Annual enrollment is expected to be 1,600 students. Two-thirds of the students are from the Kwangtung Province and a number are from different national minorities. English is taught to students to enable them to translate technical material. The average length of study since the Cultural Revolution is 3 years, or 3½ years for those who have to make up courses, for instance, minority students for Chinese.

To meet the needs of production and industry, teachers go to factories to train in short courses from 1 month to 1 year. A workshop run by the institute serves to combine teaching, scientific research, and production. Before the Cultural Revolution it was purely a research laboratory. Again, the emphasis is on training students' ability to analyze and seek innovative solutions in solving problems. Besides teachers, experienced factory workers give lectures to students. Some of the textbooks have been compiled by members of the university in an effort to guide the students in self-study and to revolutionize teaching materials.

The Library

The Institute Library is located in a spacious, modern building with much natural light. Built in 1952 by the university's Engineering Department, it stands among the luxuriant vegetation of the campus and covers an area of 8,000 square meters. It contains some 620,000 books and 1,000 titles of foreign periodicals. Half of the staff of 47 are women. There are four departments (Periodicals, Cataloging, Acquisitions, Reference). Book selection is done with the help of teachers and a Teaching Research Group. As in other libraries, all foreign publications are

imported through Peking. The library has exchange programs with 400 libraries in China. The stacks are closed except for the use of teachers. Borrowing privileges for students and staff, and some workers from factories, are seven books for 1 month. Money fines for overdue books were abolished since the Cultural Revolution, but borrowing privileges may be reduced.

The hours of service to the 1,000 to 1,800 daily users are from 7:30 to 11:30 A.M., and 2:30 to 5:30 and 7 to 9:30 P.M. During vacation the library is open half-days only. The staff meets regularly for group studies. Each month the library publishes a classified accession list. It collects material in five languages, with English being the most important foreign one. A new classification system using both letters and numbers was expected to be introduced in late 1974, with cards supplied by the National Library of Peking. Retirement age for the staff, that is, for cadres (professional staff), is 60 for men, 55 for women; and for workers, 55 for men and 50 for women. As in most Chinese academic institutions, kindergarten, nurseries, and canteens (eating places) for the staff are provided on the campus.

Besides the above described libraries, some other significant academic libraries are located in Wuhan, Nanking, and other major cities of China.

Special Libraries at Government Agencies and Scientific Institutions

Libraries serving government agencies and institutions are under the jurisdiction of their appropriate government agencies.

THE LIBRARY OF THE ACADEMY OF SCIENCE OF CHINA

The director is Tung Tseng-kung.

In its short history since its founding in 1951 (see K. T. Wu, this encyclopedia, Vol. 4, p. 637), the library developed rapidly into a leading research library with over 4,000,000 books. It serves the many institutes of the Academy of Science, each with their own library, all research units in Peking and other cities, and industrial establishments as well as other colleges and universities. The library consists of two divisions (*a*) Social Sciences, housed in a separate building, and (*b*) Science and Technology. Both divisions are under one administration. The Science and Technology Division has a collection of 2,600,000 items, with 1,500,000 journals and magazines, 500,000 monographs, and the rest technical reports, transactions, and proceedings of conferences. The emphasis is on the collection of current information worldwide. Five thousand titles of scientific and technical journals are currently received.

More than 10,000 research workers have been issued individual cards with borrowing privileges, and 600 cards were issued to research units. A great amount of the work of the library is conducted outside the library, for example, providing scientific material for conferences organized by the Academy of Science and for important national conferences. Research units located at far distances are sent needed

material for their work and technical material is prepared for current programs conducted by the Academy of Science.

The library organizes its collection under its own classification system. Technical reports are arranged by their numbers. Four catalogs provide access: (*a*) Chinese, (*b*) Western languages (Roman alphabet, in author–title–subject arrangement), (*c*) Russian, and (*d*) Japanese. The library pursues a comprehensive collection policy of all technical reports in foreign languages. Foreign publications are acquired either through extensive exchange arrangements with other institutions throughout the world, or through the centralized book import agency in Peking, which also handles subscriptions of foreign journals. Interlibrary loan with other libraries is extensive. Two current problems are lack of space, so that books have to be housed at other buildings, and sometimes lack of multiple copies, in which cases photoduplication and microfilming may be used.

The library has a staff of over 200 (including over 100 women), 30 to 40 of whom are graduates of the Foreign Language Institute and others having their own subject specialty. Most of the training of the staff takes place in the library. Short-term classes are conducted on the premises and some of the staff members are sent to Peking University for library science classes. The staff is encouraged to specialize in a subject field. Moreover, specialists of research units give lectures at the library on certain subjects. There exists extensive cooperation among all librarians and specialists in the exchange of experience and work in order to promote research for successful results. A chalkboard, for instance, near the entrance on the ground floor of the library is covered with detailed instructions to library users concerning the use of specific research material. The library appears to have an outstanding comprehensive collection in the current scientific and technical literature and receives all major abstracts and indexes in these fields. Hours of service are 8 hours each day, Monday through Friday, from 8 to 12 A.M. and 2 to 6 P.M. The library is closed in the evening. On Saturday, political study by the staff takes place.

THE CENTRAL INSTITUTE OF NATIONALITIES LIBRARY

The Institute

Located in Peking, the institute was founded after Liberation to train cadres (leaders) of the 50 minority nationalities, which make up some 4% of the total population. At the same time, nine similar institutes were established in different provinces. Enrollment for this institute is drawn from all national minorities, who are widespread over 50–60% of China's territory. The largest groups among them are the Mongolian, Hui, Tibetan, Uighur, Miao, Yi, Chuang, Puyi, Korean, and Manchu. There are 1,400 students, one-third of them women. There are also a few students of the Han nationality to which most Chinese belong.

Among the departments of the institute are languages, history, training of cadres, Chinese Han language, politics, and arts (including dancing, music, and fine arts). In the Language Department, Chinese and five other languages are taught, namely,

Tibetan, Mongolian, Uighur, Korean, and Kazakh; and students are trained to become interpreters and translators. The students study the language and history of their own nationality, as well as the Chinese language. There are 900 staff members including teachers and one-third of them are women. Many staff members come from minority nationalities. Students have to be recommended by their communes, and middle-school level is not required for admission. The institute aims to preserve customs of minorities and implement the new policies which give all nationalities equal status in society. Students also give performances in the dances and songs of their nationalities in their colorful costumes.

The Library

The Institute Library has 600,000 items, of which 80,000 are in languages of the nationalities and 50,000 in foreign languages (mostly acquired before the Cultural Revolution). It collects all current newspapers and journals in minority languages published in China (see Figure 8).

THE YUNNAN COLLEGE FOR NATIONALITIES LIBRARY

The College

Yunnan College is located in Kunming in Yunnan Province, as an example of an institution serving the large number of 21 nationalities of the province. The college

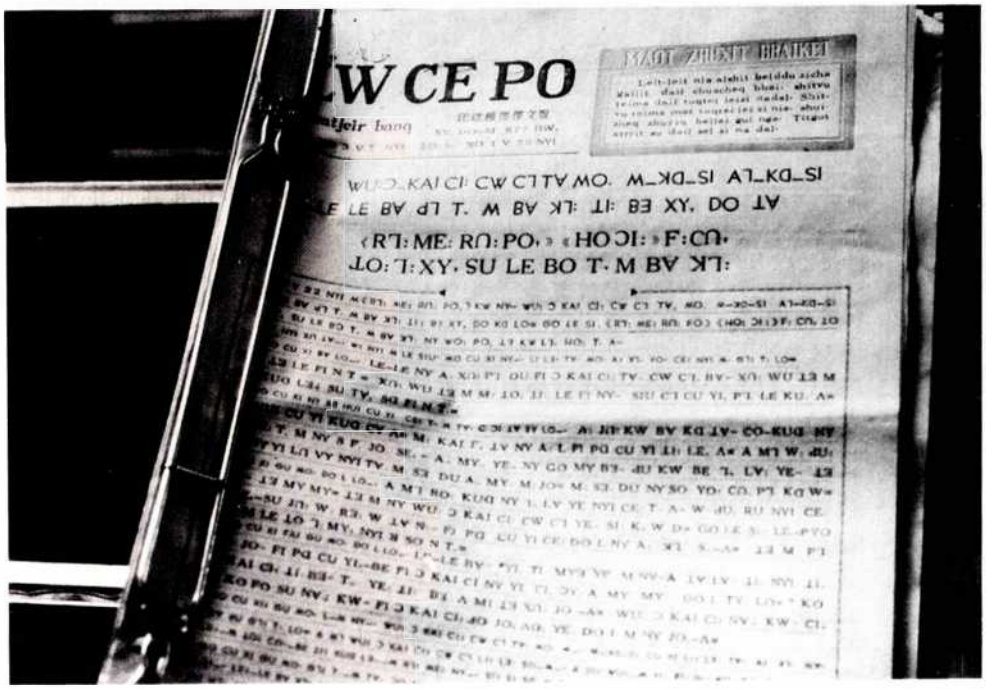

FIGURE 8. *A newspaper in one of the languages of the national minorities.*

was founded in 1951 for the large number of minorities of Yunnan Province, who form one-third of the population and are scattered over 60–70% of the total area. Its aim is to help minorities develop politically, culturally, and economically and to provide education and equality which they had not enjoyed previously. The college trains cadres for the national minorities and only a few Han students are enrolled. Over 10,000 students have graduated from the college so far. Most of the graduates return to their local places of origin and many have become leading members of the communes and local counties.

The college has three departments: (*a*) Politics—for students who already know Chinese and can read by themselves; (*b*) Chinese—the students have to master Chinese first in order to study politics; and (*c*) Minority Languages—the students study their own languages. Some minorities near the border region have their own written language either in their own characters or Romanized, but others have no written language and have to use Chinese as their written language.

There are 443 students enrolled (23% women) and the figure is expected to increase to 800. Before Liberation boys from minorities rarely had a chance to attend school and girls not at all. Women cultivate a great variety of national costumes, whereas men do not wear costumes as much. Enrollment follows a "unified plan" for the whole country and a state plan of the province. The graduates of this college engage mostly in political work after graduation. Since minorities have different customs, it takes some time to raise the status of women and increase the enrollment of women at the college. There are over 300 teachers and staff (including 60–70 women), of whom over 100 are teachers (one-third women).

The Library

The library has a political reading room and a reading room for minority languages with an extensive collection, including texts, newspapers, journals, and pamphlets in minority languages (see Figure 8). The library does its own cataloging and classification based on the classification scheme of the National Library of Peking and adjusts this to its own notations. Periodicals from other provinces and the main newspapers and magazines from the whole country are received.

Public Libraries

Since the Cultural Revolution the role of public libraries has been given new challenges. They are expected not only to organize, preserve, and disseminate information, but to take an active, leading part in political, scientific, and economic progress. So-called Service Groups are being organized on all levels. These groups distribute books for socialist study, production, and scientific research to factories and in rural areas. They arrange for study rooms, run forums, and prepare material to support the current ideological movements.

Some 300,000 basic-level libraries have been established in urban and rural

areas since 1966 throughout China's provinces. At some places a three-level network of commune library stations, production brigade library rooms, and production team library boxes has been established. Over 1 million spare-time rural librarians are now working in the countryside, as reported by Kuo Wei-tu in an article in *Kuangming Daily* of June 5, 1976.

Public libraries are under the jurisdiction of the Ministry of Culture. They function at various levels: national, provincial, municipality, county, places of work (factories), and people's communes in the rural areas. The libraries play an important role in education and mediation of culture.

NATIONAL

The National Library of Peking is discussed in an earlier section.

PROVINCE: THE PROVINCIAL LIBRARY OF YUNNAN PROVINCE

The director is Mo Tien-chuang.

This library is located in Kunming, the capital of the province. When the newly constructed library was opened to the public on March 10, 1975, some of the work was still in the stages of final completion (see Figure 9). Originally set up as the Provincial Library in 1909, with a collection of 100,000 books, the library was enlarged after Liberation by incorporating six different libraries, and in 1950 was named the Provincial People's Library of Yunnan Province. Later the name

FIGURE 9. *The new Provincial Library of Yunnan Province in Kunming, the southwest of China.*

was changed to its present name. The collection has grown rapidly since 1965 and especially during the Cultural Revolution, when 130,000 books were received from different places. Today, with 1,600,000 books, it is a major public library serving a province and has in its collection a number of rare books.

Design of the new building began in 1971 and construction in 1972. It is similar to the new Peking University Library; four rectangular, connected buildings enclose an open courtyard. The main building and stacks building occupy an area of 8,120 square meters. There are four stories with six reading rooms and one conference room, which also serves as a reception room. The stacks building has eight levels of stacks and the two wings have six levels of stacks. An excellent view of the surrounding city and mountains is offered from the flat roof and an outside balcony. The Circulation Desk is located on the first floor. To speed up construction of the library, staff members took part in the work of making steel frames and installed altogether 900 window frames, besides preparing the library for the readers. The move from the old building was also carried out mainly by the library staff, gradually throughout 1974 and until the opening in March 1975. Five reading rooms have been opened so far: Political, Newspapers and Periodicals, General, Science and Technology, and Chinese Classics and Rare Books.

Administration of the library is carried out by a Revolutionary Committee, to which the director and department heads belong. The library is divided in five divisions: (*a*) Library Office (director and department heads, ordering and processing), (*b*) Circulation, (*c*) Propaganda and Training, (*d*) Science and Technology, and (*e*) Chinese Classics and Rare Books.

The staff, which includes all types of workers, consists of 64 (including 33 women). Over seven librarians are members of national minorities; one graduated from Peking University Library School and seven from Wuhan University. Thirty-one received higher education in other subject fields, for example, Russian language. Library training has undergone fundamental changes. Librarians are no longer sent to Peking and Wuhan for formal degrees. Now the "educated youth" (the name given to students who do physical labor after graduation) from different communes and factories are trained as librarians (in classes of about 20) at the library and then sent back after 2 years. The number of readers is increasing and the library staff strives to improve service. One group for propaganda and training goes to factories and the countryside to propagate socialist thought and train librarians in factories and communes.

A great effort is made to build up a network of libraries in the province as early as possible by the following two methods: first, training librarians from the countryside at the library; and second, by librarians going to the countryside and training those who cannot come to the library. In addition, librarians from various counties may come to spend some time at the library discussing their problems. Methods of instruction are short-term classes in different regions conducted by librarians who move from one region to another. These classes usually deal with one aspect of librarianship only and may last from 6 months to 1 year. Librarians also teach correspondence courses and edit some material for librarians in the countryside. As a provincial library its aim is to serve the countryside and rural area factories.

The Group of Science and Technology supplies factories with material they need for their work. Some librarians are graduates of the Foreign Language Institute. They in turn teach other librarians foreign languages, or librarians are sent to Yunnan University two evenings a week to study foreign languages, mainly English and French but also Russian and Japanese.

Before the Cultural Revolution there were some retired workers on the library staff. After the Cultural Revolution, staff members were changed and assigned different work in other units. Only two persons are 55 years old, the director and head of the Political Reading Room. The average age of the library staff is 27–28. The retirement age is 55 and 60 according to regulations by the State Council. Readers, who come from different factories, counties, and universities are asked to help librarians through their specialized training, for example, by giving comments on books, giving lectures at the library, and organizing discussions.

Since this is a public library rather than a governmental library, the archives and records of the provincial government are kept in the Bureau of Files [Tien-Chuang].

The Revolutionary Committee consists of librarians and staff members, and in accordance with national policies, includes old, middle-aged, and young members. The Provincial Bureau of Culture is in charge of the libraries.

Twice a month the library receives annotated reviews of announced publications from the Hsin-hua Bookstore in Peking. Orders are then sent in for single or multiple copies. Older publications may be acquired from secondhand bookstores, the Hsin-hua Bookstore warehouse, or from private owners, and readers' help is solicited in this respect. Books are classified according to the National Library of Peking Classification, and some librarians were sent to Peking to study classification, one of them for 8 months. The National Library of Peking supplies the catalog cards. The book budget is sufficient for the requirements.

The library is open 5 days a week from 2:30 to 6:30 P.M. and is closed Mondays and Fridays, when librarians participate in political study. At present there are 180 to 350 daily users, but the number is expected to increase. Library cards are issued to individuals (bearing the user's photo) and to units. Circulation records are kept under the name of the user and borrowed books are recorded on the user's card.

The Political Reading Room, with over 7,000 items on socialist classics of Marx, Engels, Lenin, Stalin, and Mao Tse-tung, provides material for theoretical study groups from factories, people's communes, and neighborhood committees. Most of the material is noncirculating. There are some 90 readers daily and about 70 units have been issued cards for use. Further library activities include talks given to readers in the library, reports, or organizing readers into discussion forums. Librarians also go out to communes to organize discussions.

The Periodical Reading Room contains 500 current journals and magazines and over 50 newspapers from all provinces of China. Daily readers number from 100 to 300.

The General Reading Room serves some 200 readers daily. There are two catalogs in this room; both are in Chinese, one by authors and one by titles, and both are arranged by the number of strokes. A third catalog, arranged according to classification is in the Circulation Room on the first floor. Foreign-language books are

not included in the catalog. It is the library's policy that if a book is in heavy demand and there are not enough copies, some copies are kept for use in the library and do not circulate.

The Reading Room for Chinese Classics and Pre-Liberation Material has a collection which does not circulate and may be used by units or readers with certifications. A number of rare books from the Sun and Ming Dynasty and manuscripts from the nationalities are exhibited in glass cases and preservation and restoration methods are used by the library for their care.

The Reading Room for Science and Technology contains both Chinese and foreign-language material. Major abstracts, indexes, and technical journals, especially in chemistry, physics, agriculture, mineralogy, biology, and on patents, are on display, reflecting the particular industrial and technical requirements of the province.

MUNICIPALITY: THE SHANGHAI LIBRARY

The director is Pan Hao-ping.

With its collection of 6,500,000 books, this is the largest public library of China and second in size to the National Library of Peking only (see K. T. Wu, this encyclopedia, Vol. 4, p. 638 for its history). Of a staff of about 500 (which includes all types of workers), half are women. Used by some 4,000 people per day, the library is open from 8 A.M. to 8:30 P.M. daily, 6 days a week, except Friday, which is set aside for the librarians to study politics and to process books. The library is heavily used and its 1,000 seats in the reading rooms are usually filled.

Founded after Liberation in 1952 by consolidation of older, smaller libraries, the Shanghai Library is located on a former racecourse and is using other buildings for bookstacks and for a Children's Reading Room. Besides the usual administrative offices concerned with technical services and circulation, the library provides photoduplication, a bindery workshop, and various reading rooms, such as for political material, for Chinese post-Liberation publications, for Chinese newspapers, for science and technology (with some 800 foreign technical journals), and a room for exhibits. Cards are issued for borrowing and reading books and other library material.

The collection contains 1,200,000 books of the Chinese classics and rare books, which are kept in closed stacks but are used for the study of the various movements of criticism of the past. About one-fourth of the collection are in Western languages and Japanese. Some 5,000 foreign periodicals are currently received.

The Shanghai Library serves and supervises library services to the 10 counties and 10 municipal areas of Shanghai, with each county having a library of some 20,000–70,000 volumes, and reading rooms in the communes, factories, and residential areas. Thus it establishes an extensive library network to benefit through exchange of experiences and render assistance wherever needed.

Since the main goals of the library are to promote revolutionary thinking and to provide necessary information for production and scientific experiments in factories and countryside, the librarians take the initiative in finding out the needs of these places, sending material out through mobile units and arranging discussions, forums,

exhibits, and book review sessions on the library premises, with readers being invited to write or express their comments. Many readers' contributions are posted throughout the library, and the users are alerted to new acquisitions by the new library cards being displayed in glass cases.

Most of the library staff is selected from the countryside and receives basic training through short-term courses. They are also expected to learn one or two languages, and are praised by the administration for their good progress. None are being sent to library schools, but the National Library of Peking has sent staff members to the Shanghai Library to conduct some on-the-spot training. The retirement age is 55 to 60, depending on the needs of the library and the health of the worker. Like all other institutions, the library has been run since the Cultural Revolution by a Revolutionary Committee with the usual three-in-one concept: cadres, workers, and intellectuals; and old, young, and middle-aged.

OTHER PUBLIC LIBRARIES

On all other levels of society, such as counties, places of residence, places of work in the cities, and in the countryside at people's communes, there is a vast network of library services to people, very often by means of so-called Reading Rooms. The public library system plays an important role in adult education.

Children's and School Libraries

GENERAL DESCRIPTION

Libraries of elementary and secondary schools are under the jurisdiction of the Ministry of Education. Library service to children, to whom China pays great attention in careful training, is carried out through separate children's libraries (as in Wuhan), but mostly through Children's Reading Rooms attached to so-called Children's Palaces, which are recreational and educational activity centers for children after school, or through reading rooms connected with general library facilities (as in the Shanghai Library). Schools provide reading material in support of instruction.

THE WUHAN CHILDREN'S LIBRARY

Founded in 1958, the library is housed in a former bank building in the city of Wuhan in Hupeh Province. It is one of the largest children's libraries with a collection of 200,000 books, including all socialist writings, as well as writings in science and technology, literature and art, and stories for children, with reading levels from picture books to middle-school age. The library is open every afternoon after school and serves about 1,000 readers daily. There are 500 seats in the reading rooms. Outstanding students from nearby elementary and middle schools assist as volunteers in the library, thus learning some library skills and being actively involved. Children write and edit the wall newspaper in which they discuss their readings. Many programs are organized by the library, often in conjunction with

the school librarians, such as having veteran Red Army soldiers come and talk about the Long March, or veteran workers tell the children about the misery of life before Liberation. There are regular storytelling sessions with revolutionary contents and experienced storytellers will also visit the schools. Films are shown and discussion sessions on readings are held. The library will lend books to schools, where needed, up to 300 for a period from 2 to 4 weeks.

Library Legislation

Various directives have been issued affecting libraries since Liberation.

1959: DIRECTIVE ON LIBRARIES

Libraries are defined as cultural institutions using books and periodicals to educate the people to patriotism and socialism, and to make them capable of assisting the party and the government in propaganda and education. The most important functions of libraries are:

To acquire, preserve, and lend books, periodicals, newspapers, and other publications making propaganda for Marxism-Leninism.
To give people the opportunity to acquire a knowledge of culture and science.
To provide professional assistance to smaller libraries in the area.
To serve the area with books, material, and bibliographies.
To increase circulation, improve library techniques, collect bibliographies, and plan development.

1955: CONFERENCE OF THE CENTRAL ORGANIZATION OF TRADE UNIONS TO ESTABLISH LIBRARY POLICY

The conference established policy, planning, a budget, and organization in the library field.

1956–1957 PROGRAM FOR RURAL DEVELOPMENT

This program contained plans for the establishment of a basic cultural network in the rural districts within the space of 7 to 12 years.

1957: ACT ON THE PRODUCTION AND DISTRIBUTION OF BOOKS

This act provided, among others, for the following measures:

The creation of national and regional library centers.
The compilation of union catalogs on the national book collections.
The responsibility of libraries to serve scientific research, to collect publications, and to compile union catalogs and lists of new publications; the international exchange of publications; and the compulsory supply of library copies.
The establishment of training in librarianship.

1959: RESOLUTION BY REPRESENTATIVES FROM THE PROVINCES, THE RURAL COMMUNES, AND THE AUTONOMOUS REGIONS

The resolution includes the following goals:

To develop study clubs for the masses under the leadership of the Party, and in collaboration with related institutions.
To increase book circulation.
To assist counties, factories, and units to establish libraries and reading rooms.
To provide services for the Production Brigades in the People's Communes.
To support collaboration between libraries and related institutions.
To develop library services in a socialist direction.

Although conceived for public library services, these resolutions serve as guidelines for other types of libraries.

Library Education

The revolution in education and de-emphasis of formal education and degrees has also affected library education. China, which prior to Liberation had only two library schools, one at Peking University and one at Wuhan, always had a strong tradition of in-service job training. Since the opening of the new building of the Peking University Library in 1975, the Library School no longer functions independently, but has been incorporated into the library, with both students and teachers working as staff members. Thus, practical experience is combined with short-term instruction and the emphasis is on the solution of practical and actual problems and the acquisition of the necessary skills. In some libraries the staff goes outside the library, attending evening courses at a local university. Learning a foreign language is frequently desired (for sufficient reading and translating ability, not spoken conversation) and the study of some subject specialization at certain types of libraries.

Today's library training appears to be an on-going learning process. When figures for the staff of a library are given, usually all types of workers are included, from janitor and gardener to cataloger and administrator, and no special effort is made to identify "professionals."

Major libraries, particularly the National Library of Peking, give training assistance where needed, either by having librarians come and stay there for study, or by sending staff members to other libraries in China to conduct short-term training.

Library Associations

China has no formal library association at present and does not belong to any international library association (see *International Guide of Library, Archival and Information Science Associations*, by Josephine Riss Fang and Alice H. Songe, Bowker, New York, 1976, pp. 88–89).

Publishing and Mass Media

The publishing and distribution of books in China is highly centralized and some of the trends are discussed in an article by Henry H. Noyes, president of China Books and Periodicals, which is the importer of Chinese books in the United States (*Publishers Weekly*, March 15, 1976, pp. 44–46).

Due to lack of statistics and a national bibliography, the accounts available are incomplete and only some of the characteristics can be discussed.

The best current source of information on Chinese publishing activities is the monthly newsletter [*Shu k'an pao tao*] published by the Joint Publishing Company [San lien shu tien] in Hong Kong, which is affiliated with Guozi Shudian, the official China Publications Center, the government agency in Peking which handles the distribution of all Chinese publications to foreign countries.

The Cultural Revolution's (1966–1968) impact was evident in a decrease and discontinuance of various publishing activities and changes in certain directions. Publishing activities have steadily increased since and some journals, such as *People's Literature* and *Poetry* have reappeared in 1976.

The major publishers in China are the People's Press [Hsin-hua] in Peking, the People's Literature Press in Peking, and the Shanghai People's Press. Due to the size of the population, with some 800 million potential readers, China's publishing is characterized not so much by a great number of titles, but by the size of editions, which average 600,000 copies and may run into billions as was the case for the *Quotations from Chairman Mao Tse-tung*. An official release states that between January and September 1974, 8,400 titles were published in 3.1 billion copies, and this number is expected to increase.

Works by Marx, Engels, Lenin, Stalin, and Mao Tse-tung have been printed, reprinted, and circulated in unprecedentedly large numbers since the Cultural Revolution and indicate the importance of political literature for China. According to a *China News Agency* report of May 22, 1976, 4,800 million copies of the works of these five men have been distributed in the past 10 years, with 22.8 million copies of the *Selected Works of Mao Tse-tung* alone. (These statistics do not include the *Quotations from Chairman Mao Tse-tung*.)

These figures underline the great emphasis that is given to the reading and study of socialist thought. Political publishing increased considerably in 1974, following the ideological movements of criticism, when over 2,100 million copies of socialist works were published, and the popular works of the Chinese writer Lu Hsun were reprinted in more than 30 million copies. The various study campaigns and theorist groups initiate publications of such material.

Scientific and technical publications that serve the Chinese economy are next in importance. Besides that, there are publications in various subject fields, as well as those for children (including the popular pocket-size cartoon series) and a number of publications in minority languages. As to the field of literature, a total of 117 novels were published in China between 1972 and 1975 by the People's Literature Publishing House in Peking, 47 of which were published in 1975, indicating a slow increase. Editions usually run in the million figures. One has to keep in mind the

ideological principle underlying the literature and arts, as stated in the famous "Talks at the Yenan Forum on Literature and Art" (May 1942) by Mao Tse-tung: "All our literature and art are for the masses of the people, and in the first place for the workers, peasants and soldiers; they are created for the workers, peasants and soldiers and are for their use." Therefore, not only does the content reflect the socialist thinking, but there is a strong trend toward collective authorship, involving worker-peasant-soldier amateurs in producing cooperatively not only literary, but also technical and other works; and so-called three-in-one editing and writing groups have been formed, which are comprised of leading cadres, worker-peasant-soldier amateurs, and professional writers.

Before a book is published, the People's Publishing House sends out lists of proposed titles to the provincial book centers, organized by Hsin-hua Shudian [New China Bookstores], which forward them to the local city or rural centers and the some 20,000 bookstores in the country managed by Hsin-hua Shudian. Besides, there are thousands of small stores or distribution centers owned by rural communes and other mass organizations and units. Based on the orders that have been returned through the same channels, the People's Publishing House determines the size of an edition. Only the number of copies are printed which are expected to be sold and distributed. Books are then shipped directly from the printing press to the bookstores and no advertising or warehousing (except for some technical or scientific material) is necessary. Should there be more demand, a second edition will follow soon. Great attention is given by the publishing houses to determine what type of material is needed, and research teams are involved in constant investigations of needs. The majority of books are paperbound and, compared to American books, rather low-priced. The Foreign Languages Press in Peking publishes books for export in some 50 different languages, predominantly in English.

Today's writing and publishing in China is a collective effort and the emphasis is on content and not on the individual author. The bookstores are usually large, well attended, and crowded; and since illiteracy under the age of 40 no longer exists, there is great interest in the printed word as a major form of mass communication. The radio with its news broadcasts all over China at the same time three times a day, reinforced through loudspeakers in factories and communes, is the most significant mass media. Television appears not to have such mass impact yet, since it is not used widely.

Conclusion

The library system of China emerges as a vital force in the remolding of an entire nation into a socialist society, where the differences between mental and physical labor, between urban and rural areas, and between intellectuals and workers and peasants are being reduced with an aim for complete elimination.

Since the 1975 National Party Congress, libraries have received an added challenge to contribute to the economic, scientific, and technological development of the country. They have adapted and expanded their services beyond traditional

concepts and have demonstrated great commitment and dedication in their work; they have developed successful networks of cooperation and mutual assistance and utilization of human resources. Further progress in the use of technology for library operations can be expected in the near future.

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PERMUTED INDEXES

See also *Concordances; Index, Indexer, Indexing*

Definition

Permuted indexes are concordances (word indexes) (*1*) that guide users to words of authors. Words may be used other than those in the titles of the works indexed. Concordance heading words are usually displayed in partial context of the title. For some kinds of permuted concordances, for example Key-Word-Out-of-Context (KWOC), words of the title may be printed out of context but with the context words of the title provided just following the heading.

Introduction

Permuted concordances are produced to save the cost and delay of indexers and index editors. Concordances require a keyboard operator and computer, but not human indexers. Human editorial intervention (generally not used) may be employed before or during production of permuted concordances. Also, concordances can be produced without the use of computers.

Permuted concordances guide users to subjects only insofar as the heading words represent indexable subjects. About a third of the headings in permuted concordances are not suitable guides to subjects reported by the authors. Instead, this third generally consists of terms that modify subject heading words.

By way of contrast to key word indexes that provide only heading terms without modifications (modifying phrases or subheadings), permuted concordances supply partial context also. These context words are useful in defining the subjects reported by the author much more precisely than do the subject heading words alone.

Permuted concordance entries display *combinations* of words, for example, *a,b* or *a,b,c*, of *a*, *b*, *c*, and *d*. Some concordances present a limited number of *permutations*, for example *a,b*, and *b,a* of words. In no case at present are all permutations of all title words used. Use of words in titles in succession ("rotation") as headings is employed, for example, in KWIC (Key-Word-in-Context) concordances. In KWOC concordances, title words are extracted in succession and placed in the left margin to serve as headings. Permuted term-pairs are used in the *Permuterm Subject Indexes* (*2*). Not all words in titles are alphabetized in these concordances. "Stop lists" have words that are not used as headings in concordances. Stop lists are discussed later in this article.

Modifications (modifying phrases or subheadings) are used in indexes to increase the specificity of headings. They modify headings in much the same way that adjectives modify a noun. Modifications help the index user to say "Yes, I do want to look up the entry," or "No, I do not want to look up the entry," rather than to say, "Maybe I want to look up the entry." In permuted concordances, context words and titles function as modifications. In *Permuterm Subject Indexes*, the second term

(co-term) functions as a modification. These analogs of coined modifications greatly increase the specificity of entries in the concordances.

History

M. Veilleux reported in 1962 that consumer demand balanced against availability of manpower and machine time were the factors that led to the establishment of the permutation title word indexing project that has been in operation ever since 1952 (*3*). According to M. E. Stevens (*4*), other names that have been associated with the early development and use of machine-produced concordances are Baxendale, Carlsen, Citron, Dale, Heumann, Luhn, Netherwood, Ohlman, and Wood. Several approaches were concurrent with H. P. Luhn's. Netherwood in 1958 at the Wright Air Development Center, Carlsen et al. in the same year at Rocketdyne Division of North American Aviation, Citron also in 1958 at the System Development Corporation, and Ohlman in 1960 are included in these efforts. The chronology of Luhn's work as privately communicated to Stevens is:

May 1957	Routine 1 Program for word isolation within 60 characters per card, written by H. C. Fallon.
1957–1958	Concordances of scientific papers on cards with the key word in the center of 60 characters. Experimental special thesauri from these cards. Idea of automatic indexing by significant- or key-words-in-context conceived by H. P. Luhn.
May 1958	KWIC index, for titles only, initiated by Luhn and samples produced with Routine 1 Program.
June 1958	Start of punching of titles for KWIC index for literature in information retrieval and machine translation.
August 1958	Simplified version of Routine 1 Program written by H. C. Fallon and delivered to the Service Bureau Corporation in New York City.
September 1958	The first edition of *Bibliography and Keyword-in-Context Index on Information Retrieval and Machine Translation* published by the Service Bureau Corporation.
January 1959	J. Havender, Jr., started writing a program for an improved version of the KWIC index, including a derived identification code.
June 1959	The second edition of the *Bibliography and KWIC Index on Information Retrieval and Machine Translation* was published by the Service Bureau Corporation. It included derived identification codes.

Early acceptance of KWIC concordances was enthusiastic. They were hailed as "the miracle of the decade" and "the greatest thing to happen to chemistry since the invention of the test tube" (*5*). Such enthusiasm was engendered, in part, by publisher's visions of reducing indexing costs through dispensing with the services of indexers, index editors, typesetters, proof checkers and proofreaders. The use of a few keypunch operators and a relatively small amount of computer time was

estimated to reduce the cost of indexes to publishers by at least one order of magnitude below that of quality human indexing, editing, and printing. In this enthusiasm for saving publishing costs, the costs of the product to users of indexes were underestimated. Underestimated were the cost of finding synonyms and other related words, the cost of finding all related terms in a series of indexes, and, most important, cost of missed information—because the titles that are generally used in producing KWIC indexes do not carry the necessary words and because the words carried are not standardized. Also, these concordances generally provide no guidance to related terms. Since users are almost totally naive about all kinds of indexes—as are many publishers—and since nearly all of those authorizing funding of permuted concordances did not view the total economic picture, the exuberance of this early enthusiasm is quite understandable.

Analyses of Examples of Permuted Indexes

The following analyses explore the structure and content of two KWIC concordances, *Chemical Titles* and *Bioresearch Index*; of the *Permuterm Subject Index*; and of a KWOC concordance, *MEDI-KWOC Index*.

CHEMICAL TITLES

Figure 1 shows page 139 of *Chemical Titles* [CHTIAM (15) 1–280 (1974), ISSN 0009–2711], Number 15, July 29, 1974. Each page is divided into two columns of concordance entries, and each of the two columns is subdivided into three subcolumns. The subcolumn to the left has the wrap-around feature that carries part (sometimes all) of the title of a journal article that would not fit into the 36 spaces allotted to the second subcolumn. The second (central) subcolumn starts with the entry-heading word. For example, SUBUNITS is the entry-heading word in the first entry on the sample page. The entries in all central subcolumns are alphabetized by this word. It is the first word of this subcolumn that the eye skims in use of a KWIC concordance having this representative format. The words following this alphabetized word in each entry are those words of the title that follow the alphabetized word, up to a maximum of 23 keystrokes (symbols plus spaces), unless the alphabetized word is the last "significant" word in the title. A period and an equals sign (=) are used to indicate the end of the title in this concordance. In other concordances a virgule (/) or other symbol may be used for the same purpose. In this concordance a plus sign (+) shows that part of the title has been omitted. An example of an entry giving a partial title in Figure 1 is: "HYLAXIS (SRS-A) BY ARYL SULFATASES. SUBSTANCE OF ANAP JOIMA3-0113-0316." This entry is alphabetized under SULFATASES. Title words occupying more than the 36 keystrokes of the second (central) subcolumn are, as indicated above, "wrapped around" by printing them in the first subcolumn of 23 keystrokes. The words before and after the alphabetized words of the central subcolumn supply

OF THE TWO NONIDENTICAL SUBUNITS OF LOMBRICINE KINASE FROM EJBCAI-0045-0243
E FREE MINIC+BETA-BETA/ SUBUNITS OF RNA POLYMERASE IN EPISOM JDBAAY-0119-0332
AND RECOMBINATION OF THE SUBUNITS OF THE CHOLERA ENTERO TOXIN JOIMA3-0113-0145
OBTAIN SMALL FUNCTIONAL SUBUNITS OF THE HEMOCYANINS FROM BCSTBS-0002-0333
NTERACTIONS OF TROPONIN SUBUNITS WITH DIFFERENT FORMS OF JULRA7-0048-0033
FERTILE EGG ON HATCHING SUCCESS AND EARLY CHICK PERFORMANCE. BECTA6-0011-0511
WITH PHEN OXY ACET OXY SUCCIN IMIDE.= +RNA THAT REACTS BICHAW-0013-2932
ACETATE +DUAL ACTION OF SUCCINATE IN THE REDUCTION OF ACETO IJBOBV-0005-0207
MICAL MODIFICATION WITH SUCCINIC ANHYDRIDE.= +AFTER CHE ABBIA4-0163-0200
CYTOPLASMIC AND MESOSO+ SUCCINIC DE HYDROGENASE ACTIVITY OF BICMBE-0056-0571
ROUPS OF SOYBEAN CALLUS SUCCINYL CO ENZYME A SYNTHETASE.=+ G IJBOBV-0005-0129
S.= DYES, SUCH AS B-ISO THIO INDIGO DERIVATIVE UKZHAU-0040-0629
LY VISCOUS COMPOSITIONS SUCH AS MASTICS.= +OF HIGH INFZA9-0026-1118
DES OF CARBOXYLIC ACIDS SUCH AS N-METHYL DI ACYL IMIDES.=+NI ZPKHAB-0047-1381
OELEMENTS IN THE BANANA SUCKER.= +ON THE CONTENT OF NACR AGACAX-0018-0194
USING AND REFOCUSING IN SUCROSE DENSITY GRADIENTS.=+OF DEFOC ABBIA4-0163-0113
S FROM CHLAMYDOMONAS ON SUCROSE GRADIENTS.=+MICROBODY ENZYME PLANAB-0118-0035
TION OF DNA IN ALKALINE SUCROSE. SUBUNIT HYPOTHESIS IN MAMM BBRCA9-0059-0092
CHIA COLI DUE TO SALTS, SUCROSE, AND GLYCEROL, WITH PARTICUL JGMIAN-0082-0125
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M INDEPENDENT UPTAKE OF SUGARS BY BRAIN CORTEX SLICES.=+ODIU BCSTBS-0002-0295
CS OF OXIDATION OF ALDO SUGARS BY CERIUM(IV) IN AQUEOUS SULF JOCEAH-0039-1788
IDE +REACTIONS OF NITRO SUGARS. ADDITION OF N-BROMO ACET AM CJCHAG-0052-2257
PPROACH TO 2,3-DI AMINO SUGARS. SYNTHESIS OF DERIVATIVES CJCHAG-0052-2257
D 2,3-UNSATURATED NITRO SUGARS. A NEW APPROACH TO 2,3-DI CJCHAG-0052-2257
LYSIS OF CARBO METH OXY SULF ANIL AMIDE DERIVATIVES.= HYDRO KHFZAN-08-06-053
IN THE SYSTEM DI METHYL SULF OXIDE - WATER - THIO CYANATE MIACAQ-1974-0769
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FIGURE 1. *A sample page of* Chemical Titles. *(Material reprinted from* Chemical Titles *is copyrighted by the American Chemical Society and is reproduced with permission.)*

title context for the alphabetized word. This feature makes this kind of concordance a title Key-Word-in-Context index. It was hypothesized by Hans Peter Luhn, who invented this format (*6*), that the eye in skimming the alphabetized words in the central subcolumn would pick up the context words on both sides of the alphabetized word and that these context words would aid immediate decision as to whether or not the entry was pertinent to the search. He believed that the KWOC (Key-Word-Out-of-Context) format was inferior to the KWIC format because context was not provided immediately adjacent to the alphabetized word. Luhn's hypothesis remains to be validated. If the title has more than 57 keystrokes in it, including the terminal period, those symbols that do not fit are omitted. Thus, some entries omit the period and equals sign. In these cases, the beginnings and ends of the titles had to be omitted because there were too many symbols in the central parts of the titles for the length of the central line in the concordance. The first subcolumn may be blank or only partly filled, for example, "ING.= SULFATE ELECTROLYTES OF RHODIUM PLAT ZPKHAB–0047–1275." This entry is alphabetized under SULFATE in Figure 1.

The third subcolumn of each of the two columns on the page comprises the locator (reference code) that enables the searcher to find the work from which the entry was derived. In Figure 1, for example, the entry "LYSIS OF THE REVERSIBLE SULFITOLYSIS OF GLUTATHIONE OF DI SULFI ABBIA4–0163–0283" has the reference code "ABBIA4–0163–0283." The five letters "ABBIA" and the check character "4" represent the journal *Arch. Biochem. Biophys.*, in which the article appears, "0163" means Volume 163, and "0283" refers to the first page number, 283, of the article in this volume of the journal. In this way, the searcher is led to *Archives of Biochemistry and Biophysics,* **163**, 283–289 (1974); the three author names, "MANNERVIK B," "PERSSON G," and "ERIKSSON S"; the edited title, "ENZYMIC CATALYSIS OF THE REVERSIBLE SULFITOLYSIS OF GLUTATHIONE DISULFIDE AND THE BIOLOGICAL REDUCTION OF THIO SULFATE ESTERS"; and the inclusive pagination, "283–9" are all in the "Bibliography" shown in Figure 2.

Before processing, titles are edited to spell out chemical symbols and the names of chemical elements, radicals, and chemicals compounds. This is done to avoid the confusion that results from use of all capital letters in concordances. For example, "CO" might appear as the symbol for COBALT (Co); chemists would confuse it with the chemical formula for carbon monoxide (CO). Greek letters are spelled out, except for alpha and beta, which are represented by "A" and "B," respectively, where they occur in a chain of atoms in the name of a chemical compound. Some words, such as THIOUREA, are divided into THIO and UREA to give two entries in the concordance instead of only one. The thought here is that some searchers might find entries relevant to a search about THIOUREA under the entries starting UREA. The probability of this occurring can be determined by the reader for himself by looking under the UREA entries in this issue of the concordance while ignoring those entries in which THIO precedes UREA, since these entries, of course, relate to, and are also indexed under, THIOUREA.

At least a third of the 248 entries on the sample page shown in Figure 1 would not have been used in a quality subject index for the same articles. Examples of such entries start with words such as: SUBUNITS, SUCCESS, SUCH, SUCKER, SUSCEPTIBILITY, SUCTION, SULFATE, SULFIDE, SULFITE, SULFO, SULFONATE, and SULFONIC. Not all entries starting with these words would be unused as subject headings in a subject index. Many or all of the entries under the starting words of the above example do not treat subjects studied by the author for which the word would be suitable as a guide. Thus, one article does not report a study of "SUCCESS" as a subject; instead, the paper is a study of the "hatchability of eggs." SUCCESS is not the subject of this study on hatchability of eggs anymore than "PERCENTAGE" would have been the subject of study had the title been "percentage of eggs hatched." It is, of course, possible for another author to study "success" as a subject, for example, for a study on "An analysis of the concept of 'success' held by career executives." In this case, "SUCCESS" would be suitable and necessary as a starting word (heading) for an entry in a subject index or in a concordance. The third or more of the entries that do not lead to subjects take up space in the concordance and take the time of the searcher to separate such irrelevant entries from those entries that are relevant to his search. Irrelevant entries increase not only the cost of producing the concordance but also the cost of using the concordance. For example, 31 of the 42 entries alphabetized under SULFATE (about 74% of them) would be unsuitable as entries under the subject heading "Sulfates" in a subject index. In many of the unsuitable entries the sulfate ion simply counterbalances the positively charged ion and has no significance, in itself, as a subject studied.

Since concordances are indexes to words rather than to subjects, there is scattering, mainly among synonyms and generic terms. In Figure 1 there is scattering of this nature among SUCROSE, SUGAR, and SUGARS; SULFATE and SULFATES; SULFIDE and SULFIDES; etc. For example, "sucrose" is "sugar" to the layman; to the chemist, "sugar" and "sugars" are generic terms for a subclass of carbohydrates. In Figure 1, studies of sucrose are found under SUCROSE, SUGAR, and SUGARS. It is fortunate that these words are alphabetically near to each other to remind the searcher to look under all three words. Since most of the entries under SUGAR and SUGARS are unrelated to SUCROSE, the user must sort out those few entries that are related to sucrose if he is interested in something about this chemical compound. In Figure 1, only two entries under SUGAR may possibly refer to SUCROSE; the rest of the entries refer to sugar derivatives, to sugar beets, and to carbon made from sucrose. Only two entries under SUGARS might possibly refer to SUCROSE; the rest are sugar derivatives. In most cases synonyms and otherwise related entries are scattered alphabetically in the concordance. For example, entries related to BLOOD SUGAR would also appear under BLOOD, DEXTROSE, GLUCOSE, and SUGAR, at least, as well as possibly under DIABETES, HYPERGLYCEMIA, HYPOGLYCEMIA, and similar headings. This concordance provides no cross-references among these headings for the guidance of the searcher. The editorial effort to supply complete cross-references can be compared to the cost of producing a quality subject index.

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0275 BRANCA C GAETANI E MARRE CE
1,2-BENZ ISU THIAZOL-3-YL ACETIC ACID, A NEW SYNTHETIC AUXIN.= 275-80

0289 PALMARINO P LUCARELLI P IANNETTI P RUBERTO U
CORSO PM
DIFFERENCE IN THE ACID PHOSPHATASE ACTIVITY IN ERYTHROCYTES FROM NORMAL NEWBORN BABIES AND THEIR MOTHERS.= 289-92

0309 BIANCHI A GIORDANA B REPETTO F CAPRARO CV
CHLORIDE TRANSPORT IN RABBIT JEJUNUM AND ILEUM.= 309-11

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0001 WEBER RH STORM MC
ASSESSMENT OF THE EXCHANGEABILITY OF WATER MOLECULES IN THE INTERIOR OF CHYMOTRYPSINOGEN IN SOLUTION.= 1-6

0007 GOTS RE BESSMAN SP
FUNCTIONAL COMPARTMENTATION OF MITOCHONDRIAL HEXO KINASE.= 7-14

0015 SCHULTZ J
INHIBITION OF 3',5'-NUCLEOTIDE PHOSPHO DI ESTERASE IN GUINEA PIG CEREBRAL CORTICAL SLICES.= 15-20

0021 HUSAIN M SADANA JC
NITRITE REDUCTASE FROM ACHROMOBACTER FISCHERI. AMINO ACID COMPOSITION AND HYDRODYNAMIC PROPERTIES.= 21-8

0029 SULLIVAN CW VOLCANI BE
ISOLATION AND CHARACTERIZATION OF PLASMA AND SMOOTH MEMBRANES OF THE MARINE DIATOM NITZSCHIA ALBA.= 29-45

0046 SLOANE NH DAVIS TK
HYDROXY METHYLATION OF THE BENZENE RING. MICROSOMAL HYDROXY METHYLATION OF BENZO(A)PYRENE TO 6-HYDROXY METHYL BENZO(A)PYRENE.= 46-52

0053 VAN-BAELEN H MANNAERTS G
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0057 WEDLER FC GASSER FJ
ORDERED SUBSTRATE BINDING AND EVIDENCE FOR A THERMALLY INDUCED CHANGE IN MECHANISM FOR ESCHERICHIA COLI ASPARTATE TRANS CARBAMYLASE.= 57-68

0191 CHOU AC WILSON JE
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0200 JONAS A SEIDEL D
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0211 SHIN YS BUEHRING KU STOKSTAD ELR
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0225 MURTHY LI BERRY HK
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0231 KIDA S
BIOLOGICAL FUNCTION OF THE R2A REGULATORY GENE FOR ALKALINE PHOSPHATASE IN ESCHERICHIA COLI.= 231-7

0238 DALTON C HOPE H SHEPPARD H
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0246 CHEN TM DITTRICH P CAMPBELL WH BLACK CC
METABOLISM OF EPIDERMAL TISSUES, MESOPHYLL CELLS, AND BUNDLE SHEATH STRANDS RESOLVED FROM MATURE NUTSEDGE LEAVES.= 246-62

0263 NICOLETTE JA BABLER M
ROLE OF PROTEIN IN THE ESTROGEN STIMULATED IN VITRO RNA SYNTHESIS OF ISOLATED RAT UTERINE NUCLEOLI.= 263-70

0271 HIGGINS MJP BRADY D RUDNEY H
RAT LIVER 3-HYDROXY-3-METHYL GLUTARYL CO ENZYME A REDUCTASE. COMPARISON AND IMMUNOLOGICAL STUDY OF PURIFIED SOLUBILIZED PREPARATIONS, AND ALTERATION OF ENZYME LEVELS BY CHOLESTYR AMINE FEEDING.= 271-82

0283 MANNERVIK B PERSSON G ERIKSSON S
ENZYMIC CATALYSIS OF THE REVERSIBLE SULFITOLYSIS OF GLUTATHIONE DI SULFIDE AND THE BIOLOGICAL REDUCTION OF THIO SULFATE ESTERS.= 283-9

0290 MURPHY AJ
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0297 JOHNSSN WT COLILLA W NORDLIE RC
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0306 CHASE R TENER GM GILLAM IC
CHANGES IN LEVELS OF AMINO ACID ACCEPTORS IN TRANSFER RNA FROM ESCHERICHIA COLI GROWN UNDER VARIOUS CONDITIONS.= 306-17

0318 BETZ G ROPER M TSAI P
STEROID 17,20-LYASE FROM TESTIS MICROSOMES. PARTICIPATION OF NADPH

0069 MEDLER EC GASSER FJ
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0079 KITTENHOUSE JW MCFADDEN BA
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0087 BRATCHER SC KNIGHT KL
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0095 WAGNER H SMITH TW YOUNG N
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0099 CAPALDI RA
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0106 WEISS GH CATSIMPOOLAS N ROBBARD D
TRANSIENT STATE ISO ELECTRIC FOCUSING. THEORY.= 106-12

0113 CATSIMPOOLAS N YOTIS WW GRIFFITH AL ROBBARD D
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0122 TAYLOR RT HANNA ML
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0133 SATO Y MARUYAMA M
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0146 GIELEN J AVIV H LEDER P
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0155 MILLER RE SHELTON E STADTMAN ER
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0172 MANGEL WF
INITIAL STEPS IN THE LARGE SCALE PURIFICATION OF ESCHERICHIA COLI DNA DEPENDENT RNA POLYMERASE.= 172-7

0178 PRICHARD PM STATON GH CUTRONEO KR
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0185 LLOYD MJ HARRISON R
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0324 KATIYAR SS PORTER JW
SUBSTRATE INHIBITION OF PIGEON LIVER FATTY ACID SYNTHETASE AND OPTIMUM ASSAY CONDITIONS FOR OVERALL SYNTHETASE ACTIVITY.= 324-31

0332 LIU SC WORTHINGTON CR
ELECTRON DENSITY LEVELS OF SARCOPLASMIC RETICULUM MEMBRANES.= 332-42

0343 GRAY JC
INHIBITION OF RIBO NUCLEASE ACTIVITY AND THE ISOLATION OF POLYSOMES FROM LEAVES OF THE FRENCH BEAN, PHASEOLUS VULGARIS.= 343-8

0349 WOLFF DJ BROSTROM CO
CALCIUM BINDING PHOSPHO PROTEIN FROM PIG BRAIN. IDENTIFICATION AS A CALCIUM DEPENDENT REGULATOR OF BRAIN CYCLIC NUCLEOTIDE PHOSPHO DI ESTERASE.= 349-58

0359 PITTS OM PRIEST DG
STEADY STATE KINETIC INVESTIGATION OF THE URICASE REACTION MECHANISM.= 359-66

0367 ZELITCH I
EFFECT OF GLYCIDATE, AN INHIBITOR OF GLYCOLATE SYNTHESIS, ON PHOTORESPIRATION AND NET PHOTOSYNTHESIS.= 367-77

0378 MIZIORKO HM NOWAK T MILOVAN AS
SPINACH LEAF PHOSPHO ENOL PYRUVATE CARBOXYLASE. PURIFICATION, PROPERTIES, AND KINETIC STUDIES.= 378-89

0390 BOEHLEN P STEIN S UDENFRIEND S
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0400 STEIN S BOEHLEN P UDENFRIEND S
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0404 TESCHKE R HASUMURA Y LIEBER CS
HEPATIC MICROSOMAL ETHANOL OXIDIZING SYSTEM. SOLUBILIZATION, ISOLATION, AND CHARACTERIZATION.= 404-15

0416 BARNES EM
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FIGURE 2. *Sample page of the "Bibliography" section of* Chemical Titles. *(Material reprinted from* Chemical Titles *is copyrighted by the American Chemical Society and is reproduced with permission.)*

The introduction of this concordance does not instruct the searcher concerning his responsibility to look under all synonyms, etc.

The examples in the above paragraph are not unique; scattering of subject matter pervades concordances and makes users responsible for knowing of the possibility of heterogeneity of entries under a given alphabetized word, for knowing of the scattering among headings, and for knowing the necessity for seeking and sorting out subjects related to his/her interests. Searchers must, as in subject indexes, read all of the entries under the heading of interest to decide upon which entries are of possible relevance. Then they must look up all of the entries judged to be possibly relevant in order to make sure that they do not miss important information. In concordances, this imposes a much heavier load than that imposed by quality subject indexes. The average drug name, for example, has about six synonyms; some drugs have more than 50 synonyms. Searching for all synonyms is a load that quality subject indexes do not impose on searchers. In quality indexes, "see" cross-references guide users from synonyms to the chosen subject heading (usually the most popular synonym) and the heading may carry a parenthetical synonym following it, for example, "Blood sugar. See Glucose," and "Glucose (blood sugar)." Guidance of this nature is lacking in this KWIC concordance; the user provides his own guidance.

For the field of research in chemistry and chemical engineering, about 34% of the index entries (human generated) come from the titles and about 66% of them come from the bodies of abstracts (or from the original articles) (7). Thus a chemical title concordance omits 66% of the valid subject index entries that are found in a quality subject index. Guidance to articles from which all of the omitted entries were derived may not be lost, because titles generalize, and the entry from the body of the abstract or paper may, in some cases, be inferred from the title or from the concordance entry derived from the title. For example, "Thermodynamic properties of twenty-three hydrocarbons" as the title of an article on physical chemistry could readily guide an alert searcher to possible data on the heat of formation of methane. In a paper with this title there is, of course, no guarantee that METHANE will be one of the 23 hydrocarbons reported in the paper, nor that HEAT OF FORMATION will be one of the thermodynamic properties reported for methane. However, there is a possibility that this could be the case. In any event, any of the entries that might be derived from the title alone should be looked up just to make sure that the information sought will not be missed. This entry is a "maybe" that is to be looked up to avoid possible loss of information. Since there are millions of hydrocarbons, there is a high probability that this lead will prove to be fruitless. This title in the example employs generalization to avoid listing in the title all of the thermodynamic properties and all of the hydrocarbons that were studied. In this case, the author may also have generalized about thermodynamic properties, not only of the 23 hydrocarbons, but also of all hydrocarbons. There is no way to tell from the title if this did occur. The loss of entries from the body of the abstract or article in use of a title concordance can potentially be

very serious for the concordance user and for his organization. He may be held responsible for the loss of the information from the missed material. There are many entries in subject indexes that cannot be inferred from the titles of articles or books. In the humanities, titles such as *Gone with the Wind* and *Thunder in the Valley* give few clues as to actual content. By way of contrast, titles in the sciences are often highly informative. An example is "Simultaneous determination of chloramphenicol and prednisolone in ointments by a photometric method." However, even such informative titles carry, on the average, only about one-third of the subject index entries actually required for complete indexing.

Since the 57 keystrokes of the title permitted by the line length of this concordance is less than the number of keystrokes in about half of the titles, it is sometimes difficult to imagine what some amputated titles mean. An example from Figure 1 is "OXIDE AND MANGANESE(II) SULFIDE.= +WIDTHS IN MANGANESE(II) PYLAAG–0048–0081." Another example is "INGLE IONS IN DI METHYL SULF OXIDE, N,N/–DI METHYL FORM AMID BSCJAB–0047–1334." If the searcher is unable to imagine the meaning of the title and if it is essential for him to know the meaning, then he must treat the entry as a "maybe" and also look it up. If the reference proves to be unproductive, as will often be the case, then the searcher's time has been wasted. The cause of this waste is, in part, the desire of the publisher to keep two legible columns per page so as to reduce the number of pages to one-fourth and to make the concordance match the size of another publication. This represents quite a saving for the publisher; the cost to the user is generally quite invisible.

The use of all capitals and sans-serif type comes about because the computer-operated printer has a print chain with this type face. There is evidence that sans-serif type is less legible than is type with serifs (*8*). Also, the printers with chains that have upper and lower case type are slower than are those with only upper case chains. Use of upper case necessitates prediting to spell out symbols for the elements because, for example, "I" for iodine could be confused with the personal pronoun or a roman I. "V," "CO," and other symbols are also confusing. "H2SO4" is queer as well as incorrect to chemists, so SULFURIC ACID is used instead.

The stop list is shown in Figure 3. The 540 words or symbols of the "List of Words Prevented from Indexing" could be used as the basis for a stop list when starting a new concordance. Many words on the list could be good guides to subjects studied by authors. However, for the field of chemistry, all of the words on the stop list have been found to be generally unsuitable as guides to subjects. Additions to, and deletions from, the list are made at any time.

In addition to the features already covered, this concordance also has an introduction that deals with some of the items in this article. *Chemical Titles* has an "Author Index" and a "List of Periodicals" indexed by the journal titles. The former is simply a list of author names followed by the locator (reference code). The lack of modifications, for example, titles of the articles, generally forces the user to look up all entries under the selected author name just to make certain

LIST OF WORDS PREVENTED FROM INDEXING

A
AA
AB
ABBREVIATION
ABILITIES
ABILITY
ABNORMAL
ABNORMALITY
ABNORMALLY
ABOUT
ABOVE
ABRUPT
ABSENCE
ABSOLUTE
ACCELERATED
ACCIDENT
ACCIDENTAL
ACCIDENTS
ACCOMPANYING
ACCORDING
ACCOUNT
ACCOUNTING
ACCUMULATED
ACCUMULATING
ACCUMULATION
ACCUMULATIVE
ACCURACY
ACCURATE
ACHIEVEMENTS
ACQUIRED
ACROSS
ACTED
ACTING
ACTION
ACTIONS
ACTIVATE
ACTIVATED
ACTIVATING
ACTIVE
ACTIVITIES
ACTIVITY
ACTS
ACUTE
ADDED
ADDING
ADDITIONAL
ADDITIVELY
ADEQUATE
ADMINISTERED
ADMINISTRATION
ADULT
ADVANCED
ADVANCES
ADVANTAGES
ADVICE
AFFECT
AFFECTED
AFFECTING
AFTER
AGAINST
AGENT
AGENTS
AGREEMENT
AID
AIDS
AIMS
ALL
ALLEGED
ALLOW
ALLOWED
ALLOWING
ALMOST
ALONE
ALONG
ALONGSIDE
AUTHORS
AVAILABLE
AVERAGE
AVERAGING
B
BACK
BACKGROUND
BASED
BASIS
BE
BECAUSE
BEFORE
BEGINNING
BEGINNINGS
BEHAVIOR
BEHIND
BEING
BEINGS
BELONG
BELONGING
BELOW
BEST
BETTER
BETWEEN
BEV
BEYOND
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BRING
BUILT
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C
CALCULATE
CALCULATED
CALCULATING
CALCULATION
CALCULATIONS
CALLED
CAMPAIGN
CAN
CAPABILITY
CAPABLE
CAPACITY
CAPTURE
CAREFUL
CARRIED
CARRYING
CASE
CASES
CAUSE
CAUSED
CAUSES
CENT
CENTRAL
CERTAIN
CHAIN
CHAINS
CHALLENGE
CHALLENGING
CHANCE
CHANGES
CHANGING
CHARACTER
CHARACTERISTIC
CHARACTERISTICS
CHARACTERIZATION
CHARACTERIZED
CHEAP
CHECK
CHECKERED
CHEMICAL
CHEMICALLY
CHEMICALS
CHEMISTRY
CONTINUED
CONTINUOUS
CONTINUOUSLY
CONTRIBUTED
CONTRIBUTION
CONTRIBUTIONS
CONTROL
CONTROLLED
CONVENIENT
CONVENTIONAL
CONVERSION
CORRECTION
CORRECTIONS
CORRELATE
CORRELATED
CORRELATION
CORRESPONDING
COUNT
COUNTRY
COUNTS
COUNTY
COURSE
CRAFTS
CREATION
CRITERIA
CRITERION
CURVE
CURVED
CURVES
D
DAILY
DATA
DAYS
DECREASE
DECREASING
DEDUCED
DEDUCTION
DEDUCTIONS
DEFEATING
DEFICIENCY
DEFINED
DEFINING
DES
DEGREE
DEGREES
DELTA
DEMONSTRATED
DEMONSTRATING
DEMONSTRATION
DEPARTMENT
DEPARTMENTS
DEPENDENCE
DEPENDENT
DEPENDING
DERIVATION
DERIVATIVE
DERIVATIVES
DERIVED
DERIVING
DESCRIBED
DESCRIPTION
DETAILED
DETAILS
DETECTED
DETERMINING
DEVELOPMENT
DEVELOPMENTS
DEVIATIONS
DI
DIAGRAM
DIAGRAMS
DIAMETER
DIAMETERS
DIFFERENCE
DIFFERENCES
EVENTS
EVENTUAL
EVIDENCE
EVIDENCED
EVIDENCES
EVOKED
EXACT
EXAMINATION
EXAMINING
EXAMPLE
EXAMPLES
EXCESS
EXCESSIVE
EXCLUDED
EXCLUSIVE
EXCLUSIVELY
EXEMPLIFIED
EXHIBITED
EXHIBITING
EXIST
EXISTENCE
EXISTING
EXPECTED
EXPERIENCE
EXPERIENCES
EXPERIMENT
EXPERIMENTAL
EXPERIMENTALLY
EXPERIMENTATION
EXPERIMENTS
EXPLANATION
EXPOSED
EXPRESSION
EXTENDED
EXTENSION
EXTENT
EXTRAORDINARY
EXTREME
EXTREMELY
F
FABRICATION
FACTOR
FACTORS
FAILURE
FALL
FALSE
FAMILIAR
FAR
FAST
FAVOR
FEASIBILITY
FEATURE
FEATURED
FEATURES
FED
FEW
FIFTH
FIGHT
FIGURES
FILL
FILLED
FILLING
FILLS
FINAL
FINDING
FINDINGS
FINDS
FINE
FINELY
FIRMLY
FIRST
FIVE
FIXED
FIXING
FLOW
III
ILLUSTRATE
ILLUSTRATED
IMMEDIATE
IMMEDIATELY
IMMERSED
IMPLICATIONS
IMPORTANCE
IMPORTANT
IMPORTED
IMPOSSIBILITY
IMPREGNATED
IMPROBABILITY
IMPROVED
IMPROVEMENT
IMPROVEMENTS
IMPROVING
IN
INACTIVATION
INADEQUATE
INCIDENCE
INCLUDING
INCOMPLETE
INCONGRUENT
INCORPORATED
INCORPORATING
INCORPORATION
INCREASE
INCREASED
INCREASES
INCREASING
INDEPENDENT
INDICATION
INDIFFERENT
INDIVIDUAL
INDIVIDUALITY
INDIVIDUALS
INDUCED
INDUSTRIAL
INDUSTRY
INEFFECTIVENESS
INEXPENSIVE
INFLUENCE
INFLUENCED
INFLUENCES
INFLUENCING
INGREDIENT
INGREDIENTS
INHERENTLY
INITIAL
INITIALLY
INITIATED
INITIATION
INNER
INSIDE
INSTEAD
INTERACTION
INTERACTIONS
INTEREST
INTERMEDIATE
INTERPRETATION
INTERRELATION
INTERRELATIONS
INTERRELATIONSHIPS
INTO
INTRODUCED
INTRODUCING
INTRODUCTION
INVESTIGATED
INVESTIGATING
INVESTIGATION
INVESTIGATIONS
INVOLVED
INVOLVEMENT
INVOLVING
LXX
LXXI
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LXXXV
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LXXXVII
LXXXVIII
M
MADE
MAGNITUDE
MAIN
MAINLY
MAINTAINED
MAINTENANCE
MAJOR
MAKE
MAKING
MANNER
MANUFACTURE
MANUFACTURING
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VIII
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VITRO
VIVO
VS

FIGURE 3. *A stop list: "List of Words Prevented from Indexing," from* Chemical Titles. *(Material reprinted from* Chemical Titles *is copyrighted by the American Chemical Society and is reproduced with permission.)*

that he has the correct reference. The entries of the author index are looked up in the "Bibliography," just as are the entries in the concordance part itself.

BIORESEARCH INDEX

Figure 4 is from the *Bioresearch Index*, **9**(4), S297 (April 1973). The page is divided into three subcolumns, the same as for *Chemical Titles*. The first two subcolumns are the same as in *Chemical Titles*. The reference (locator) in the third subcolumn is the serial number of journal articles that can be found in the "Bibliography" and that leads to the names of author(s) and journal, the volume number, and to the title and the pagination.

The entries have been edited before computer processing. Key words have been added by editors from the text or from their knowledge of the subject in order to give additional concordance entries that may aid the searcher. Some words have been divided to give additional entries. Organism names are hyphenated to prevent an entry under the species name; an example is *Escherichia-coli*. The hyphen causes the computer program to treat this example as one word and prevents COLI from appearing alphabetized in the central subcolumn. The Greek letters alpha and beta, for this concordance are spelled out rather than being changed into "A" and "B." A virgule (/) indicates the end of title and key words.

There is also scattering in this concordance among synonyms, terms related other than as synonyms, singulars and plurals, variant spellings, etc. The user is warned of this in the "Instructions for Use." Cross-references among synonyms, etc., are not provided.

There is an author index; it is the same as that described under *Chemical Titles* above. Other indexes are the *Biosystematic Index* for taxonomic categories and the *CROSS Index* of subject headings found in *Biological Abstracts*.

PERMUTERM SUBJECT INDEX

Figure 5 shows columns 7671–7680 of the *Permuterm Subject Index*, **7** (1969). The page carries 10 columns of entries. Each entry has a heading term ("primary term"), a modification ("co-term"), and the name of the first author that serves as locator (reference code). Heading terms after the first one in a column are indicated by a vertical line to the left of the modification. The user selects two terms most closely related to his interest of the moment and searches for the heading of either term in the concordance. Under the heading term he may find the second term as modification. For example, if he were interested in chromium purity, he would look down column 7673 under the heading, CHROMIUM, to find the co-term, PURITY and the two author names, BIGOT J and DEBRUN JL. He would then locate these two author names in the "Source Index" of the *Science Citation Index* in order to find the complete reference including possible coauthors, title of the article(s), journal name(s), volume number(s), first page(s), and year(s). If these references turned out to be important, as determined by consulting the original works, then references to them could be sought in the "Citation Index" part of the

Science Citation Index to find later works that cited these important works. Use of the "Citation Index" is found to be one of the fastest ways to get into the important literature of a field (9). In the case of the above example, one would expect to find studies on purity of chromium metal, chromium compounds, chromium salts, etc., as well as studies on purity of things other than chromium, since there is no guarantee that the "purity" is of "chromium" in the title indexed. The study might be, for example, on the "Effect of chromium in stainless steel on the purity of foods cooked in it." For the search in the above example, one should also look under the headings (primary terms) CHROMIUM–3, CHROMIUM–51, CHROMIUM–51–LABEL, CHROMIUM(III), and CHROMIUM(3).

In the production of the *Permuterm Subject Index,* three stop lists of words are used:: "Full Stop," "Semi-Stop," and "Paired-Word Stop." Full-stop and paired-word-stop terms are not used in the concordance; semi-stop terms are used only in modifications (as co-terms). Knowledge of these stop lists may be vital in searches.

A number of "see also" (SA) cross-references have been introduced to alert users to the scattering among synonyms. An example is AMERICIUM. SA AM. This cross-reference guides searchers from the name of the chemical element, americium, to entries under the symbol for this chemical element, Am. In subject indexes such scattering would be eliminated by the use of a "see" cross-reference in the reverse direction. A "see also" cross-reference in either or both directions informs the searcher that there is scattering between americium and Am and that he is responsible for looking under both headings. Had there been six synonyms, as is the average for drug names, then "see also" cross-references among all of them would instruct the user to look under six headings in each index. This gets to be quite a chore. In the above example, users who looked under Am would also be guided to americium. Actually, in a subject index for chemists, a "see" cross-reference from Am to americium would be unnecessary because chemists know the symbols for the elements. However, for other than chemists, such a "see" cross-reference would be helpful. As in all concordances, there is much scattering in this concordance among synonyms, and also among generic and specific headings. An illustration of generic-specific scattering is given above for the CHROMIUM headings. For example, CHROMIUM is a generic heading; CHROMIUM–3 is a more specific heading. There are some entries related to trivalent chromium under the CHROMIUM heading. In quality subject indexes this type of scattering is eliminated as far as possible. In this concordance an attempt has been made to eliminate spelling variations, but the user must still consult synonymous and otherwise related terms. To a large extent, British or other spelling variants of the same word have been replaced by their American forms. Readers are so informed in the "Introduction."

MEDI–KWOC INDEX

Figure 6 is from the *MEDI-KWOC Index,* 1(2). 379 (April 1973). The KWOC (Key-Word-Out-of-Context) concordance has, as headings, words extracted verbatim from titles, etc. Heading terms are displayed in the left margin of a

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FIGURE 4. *A sample page from* Bioresearch Index. *(Reproduced with permission.)*

CHROM

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- RENUCCI
HIGH-TEMPE. - MIZUTANI K
- TIMOFEEV VA
HIGHER - LESNIKOW AI
HOMOGENEOUS - FRANKEL EN
HUMOR - WEESE W
HYDRAZINE - VOLTER J
HYDRIDE - OCONNOR S
HYDROGEN - ARIAS A
- DEBECDEL J
- EDDES YS
- RIGG T
- ROYBERE C
- WILDE BE
HYDROGEN-T - FRANKEL EN
HYDROGENAT -
HYDROSOLS - DEMCHAK R
HYDROXIDE -
- DEO AV
HYDROXYPRO - ARONSON AL
HYPERCHOLE - STAUB HW
HYPERFINE - BERGER SB
- GARIFYAN NS
- GUZY CM
III - POGINSKI EE
- STEVENSO KL
IMAGE - PETRAKEV A
IMMUNE - KINNAERT P
IMPORTANCE - WRONSKI AS
IMPURITIES - DUCLAUX AM
- GILBERT A
INCIDENCE - KOSTYUK VP
INCINERATI - MINK CJK
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INCUBATION - PREMI PR
INELASTIC - MEADEN GT
INFLUENCE - BAUM BA
- DONCHENK EA
- LUZHNIKO LP
- MYASNIKO VV
- SHECHTMA D
INFRARED - DEO AV
- FRAISSAR J
- GAYLES JN
INGOT - BOLSHAKO LA
INITIATION - WEISS BZ
INJECTED - PEDERSEN NB
INORGANIC - MELONI S
INSULIN - WEESE W
INTENSIFIER - PETRAKEV A
INTENSITY - DEBECDEL J
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INTERACTIO - BERGER SB
INTERFERON - GAYLES JN
INTERPHASE - DEBECDEL J
INTERPRETA - FORSSELL J
- GOUZERH P
INTERSTITI - GILBERT A
INTESTINAL - ARONSON AL
- POGINSKI EE
INTRACUTAN - PEDERSEN NB
INVESTIGAT - NIGAVEKA AS
INVESTIGAT - FROMBERG MG
- HENNING JCM
IODIDE - LASWICK JC
- GRIBOV BG
IODINE - ALBRECHT JM
ION - DINGLE R
- FRAISSAR J
- KANSKAYA LM
- KISLJUK P
- STEVENSO KL
ION-EXCHAN - BETTERID D
IONIZATION - MULLER J
IONS - COPLAND GM
- MOHANTY AK
- TKACHUK AM
IRON - BOLSHAKO LA
- BROWN DB
- CHAN KK
- DEBRUN JL
- ENGELHAR JL
- FROMBERG MG
- GANIVET M
- GUZY CM
- INGLIS HS
- KOGES YS
- KRLEZA F
- MOYER ES
- PANDE BM
- PAVLINOV LV
- PRUSAKOVS VV
- SCHENCK H
- SPEIGHT FA
- VOLTER J
- WANG CC

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MECHANICAL - WATKINS RV
MECHANISM - DEO AV
- FASMAN AB
- GASWICK DC
- HUGHES WL
- KAPUSCIN A
MECHANISMS - MICHEL H
MECHANIZED - YUZVENKO YA
MEDIA - FLORENCE TM
MEDIUM - HIGAKI T
MELTING - BIGOT J
- CHEAMOMO OM
- RENUCCI
MELTS - MOHANTY AK
- SHCHERKAL VS
MEMBER - NIXON PH
METAL - DIMANT AB
- FISCHER EO
- HUGHES WL
- KAPUSCIN A
- SHELEF M
- TUCKER RC
METAL-FREE - GUZY CM
METALLIC - FUKUDA N
METALS - ROSTOVTS LI
METEORITES - SCHAUDY R
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METHOD - DIMANT AB
- LAMBERT MJ
- VINOGRAD MI
METHODS - DUTKIEWI T
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METHYL(+) -
MICROALLOY - ROSTOVTS LI
MICROSCOPIC - IZOTOV VI
- KOSEVICH VM
MICROSTRUC - HEDE A
- MYASNIKO VV
MINIMUM - SABINE TM
MIXED - BUNEL S
- LESNIKOW AI
MIXTURE - ARNOULD M
MODE - KINNAERT P
MODIFICATI - FORSSELL J
MOLDS - BOLSHAKO LA
MOLECULAR - KOSTYUK VP
MOLECULE - OCONNOR S
MOLECULES - BORNONG KL
MOLTEN - FROMBERG MG
- GILLET AC
- SCHENCK H
- ZANGEN M
MOLYBDATE - GESMUNDO F
MOLYBDENUM - ALLEN BC
- BACHMAN RZ
- BOYD POW
- BRUNNER H
- DE AK
- DICKSON DS
- ENGELHAR JL
- FELTHAM RD
- FISCHER EO
- GARIFYAN NS
- JOHNSON TR
- JONES LH
- MOSER E
- MULLER J
- PETILLON F
- RUSSO PJ
- VINOGRAD MI
- YATIRAJA V
MONOCRYSTAL - DEBECDEL J
MONOCRYSTA -
MONOCRYSTA - DUCLAUX AM
MONOOXALATE - STEVENSO KL
MONOPHOSPH - FISCHER EO
MUTANTS - WANG CC
MZXCR30 - WILHELMI KA
N,N'-DIMET - HORN HG
NANOGRAM - BEYERMAN K
NARROW - DEMCHAK R
NEEL - MATSUMOT T
- MEADEN GT
NEIGHBORHO - ARAJS S
NEODYMIUM - MYASNIKO VV
- TIMOFEEV VA
NEUTRAL - BEHERA B
NEUTRON - BACON GE
- JOHNSON PF
- SIMKOVA M
- WERNER SA
NEW - ARNOULD M
- BEHERA B
- FORSSELL J
- HUYDUNG N
- NIXON PH
- PARRY PJ

CHROM

CHROMIUM (CONT)
PAROUS - HAMBIDGE KM
PARTICLE - DEMCHAK R
PARTICLES - SLEPTSOV VM
PARTICULAR - FROMBERG MG
PARTNERS - VENUTO PB
PASSIVE - BEAUMONT JL
- WILDE BE
PATIENTS - RYNKIEWI H
PATTERNS - FORSSELL J
PENTAVALENT - PETILLON F
PEPTIDOGLY - HEILMANN HD
PERCENT - DICKSON MJ
- ERLER J
- HEDE A
- HIGAKI T
- HUNTZ AM
- LIZLOVS EA
- LUZHNIKO LP
PERCHLORAT - GUSTAVSO KH
PERMEABILI - ARONSON AL
- KODES YS
PERSONS - RYNKIEWI H
PH - SINGH M
PHASE - DOMRACHE GA
- LYUTAYA MD
- POPMA TJA
- SRIVASTA VC
PHASES - LEBECH B
PHENOMENON - MEADEN GT
PHOSPHATE - DHAR NR
- KINNAERT P
PHOSPHIDE - ROGER A
PHOSPHIDE- -
PHOSPHIDE- -
PHOSPHIDE- -
PHOSPHINE - MOSER E
PHOSPHITE - POWERS DR
PHOSPHORUS - FISCHER EO
- SCHENCK H
PHOSPHORUS - JOHNSON TR
PHOTOCENTE - DITTMANN R
PHOTOGRAPH - PETRAKEV A
PHOTOGRAPH -
PHTHALOCYA - GUZY CM
PI-ALLYL - ORESHKIN IA
PLAIN - HERMANNS M
PLANAR - DEBECDEL J
PLANTS - MOULINIE H
PLASMA - FELDMAN FJ
- SLEPTSOV VM
PLASTIC - BLOCK RJ
PLATES - PETRAKEV A
PLATING - ARSENEV VI
- HERMANNS M
PLUTONIUM - GANIVET M
POINT - MEADEN GT
POLAR - BORNONG BJ
POLARIZATI - LIZLOVS EA
- STAUSS GH
POLYCRYSTA - WRONSKI AS
POLYMERIZA - CLARK A
- ELDRIDGE JW
- HOGAN JP
- KRAUSS HL
- ORESHKIN IA
POLYMORPHI - GIBSON JG
POLYVINYLP - GUSTAVSO KH
POTENTIAL - DEBECDEL J
- MULLER J
POTENTIALS - BANCROFT GM
POWDERED - BOYD POW
PRE-TREATM - HERMANNS M
PRECIPITAT - CLARK JW
- DHAR NR
- DOMRACHE GA
- MICHEL H
PREDISSOCI. - OCONNOR S
PREFERRED - STERN E
PREPARATION - ANGHILER LJ
- DEMCHAK R
- FISCHER EO
- LARILAVA A
PREPARED - BIGOT J
- RENUCCI
- SLEIGHT AW
- WAKEFIEL GF
PRESENCE - HARTLEY FR
- KRLEZA F
PRESENT - ESSLINGE P
PRESERVATI - LAMBERT MJ
PRESSURE - SLEIGHT AW
- SRIVASTA VC
PRESSURIZED - BALL A
PREVIOUS - GANIVET M
PRIMARY-RE - DICKSON MJ
PROBE - KOWALSKY A
PROBLEM - PARRY PJ
PROCESS - FUKUDA N
PROCESSES - HUNTZ AM

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RESONANCE - GARIFYAN NS
- GUZY CM
- MOYER ES
- ORTELLI J
- STAUSS GH
- VISHNEVS GP
RHENIUM - VOLTER J
- YATIRAJA V
RHODIUM - BEHERA B
- GIBSON JG
ROLE - WEESE W
ROLLING - HERMANNS M
RUBY - ARKHANGE GE
- KANSKAYA LM
- KISLJUK P
SACCULE - HEILMANN HD
SALTS -
SATIN - MELDRUM JF
SCATTERING - COSTELLO JM
- KWOK PC
SECOND - SABINE TM
SELENIDES - HUYDUNG N
- WEHMEIER FH
SELENIUM - YATIRAJA V
SEMICONDUC - WEHMEIER FH
SENSITIVITY - WANG CC
SENSITIZAT - DUBOIS MP
SEPARATION - GANIVET M
- GOPAL NGS
- KOYAMA M
- MELONI S
- YATIRAJA V
SERUM - SAVORY J
- SCHROEDE HA
- STAUB HW
SESQUIOXIDE - ROYBERE C
SESQUISULF - SLEIGHT AW
SHAPE - KOSTYUK VP
SHEEP - DUBOIS MP
SHIFT - BUNEL S
SIGMA-SILY - RUSSO PJ
SILICIDE - ALBRECHT JM
- STEPHENS JR
SILICON - BAUM BA
- DONCHENK EA
- FROMBERG MG
- MICHEL H
SIMULTANEO - DEBECDEL J
- GALMICHE P
- SALAMON MB
SINGLE - BLOCK RJ
- CHAN KK
- CRUTCHLE D
- DUCLAUX AM
- MATSUMOT T
- SHEN LYL
SITUATION - ESSLINGE P
SIZE - DEMCHAK R
SKELETON - FASMAN AB
SLAGS - FROMBERG MG
SLOW - SINGH M
SMALL - LOBANEVA OA
- TRIBBECK TD
SMOOTH - DEBECDEL J
SOAPS - MALIK WU
SODIUM - DEO AV
- GUZY CM
- MOHANTY AK
- SCHAUDY R
SOIL - PREMI PR
SOLAR - ROYBERE C
- WARNER B
SOLID - CLARK JW
- DICKSON DS
- KOPP WU
- ROGER A
SOLID-STATE - BROWN DB
SOLS - SINGH M
SOLUBILITY - DHAR NR
SOLUTION - CLARK JW
- DEBECDEL J
- YATIRAJA V
SOLUTIONS - GANIVET M
- LOBANEVA OA
- MIZUTANI K
- ROGER A
- STEVENSO KL
- TIMOFEEV VA
- VISHNEVS GP
- WILDE BE
SOLVENT - DE AK
SOLVENT-FR - ELDRIDGE JW
SOLVENTS - MALIK WU
SO2 - LESNIKOW AI
SPECIAL -
SPECIES - JONES LH
SPECTRA - ARKHANGE GE
- BANCROFT GM
- GARIFYAN NS

CHROM

CHROMIUM (CONT)
SUBSTITUTED - MULLER J
- SAKANISH K
SUBSTITUTI - GILBERT A
SUBSTRATE - KOSTYUK VP
SUBSTRUCTU - KOSEVICH VM
SUGARS - SCHROEDE HA
SULFIDES - POPMA TJA
SULFUR - GILLOT J
- WELLS RG
SULFURIC - ARSENEV VI
- DEBECDEL J
- WILDE BE
SUPERALLOYS - GALMICHE P
SUPPORTED - CLARK A
- SHELEF M
SURFACE - COSTELLO JM
- DEO AV
- KAWAMURA K
- KRAUSS HL
SURFACE-WE - DONCHENK EA
SURFACES - MELDRUM JF
- WILDE BE
SURFACING - YUZVENKO YA
SUSCEPTIBI. - KOPP WU
SYNDROME - RYNKIEWI H
SYNTHESIS - ARNOULD M
- RUSSO PJ
SYSTEM - NEGAS T
SYSTEMATICS - BERGER SB
SYSTEMS - MERTZ W
TANTALUM - ARAJS S
- BACHMAN RZ
TECHNIQUE - DUTKIEWI T
TEKTITES - PINSON WH
TELLURATE - SINGH M
TELLURIUM - YATIRAJA V
TEMPERATURE - BIGOT J
- CADIOU L
- CRUTCHLE D
- ESSLINGE P
- MATSUMOT T
- RENUCCI
- SABINE TM
TEMPERATUR - CADIOU L
- ENGELHAR JL
- KALISHEV GI
- PAIDASSI J
TERVALENT - BOYD POW
TETRAAQUOD - LOBANEVA OA
TETRACARBO - FISCHER EO
- POWERS DR
TETRACARBO - FISCHER EO
TETRAHYDRO - GUZY CM
TETRAVALENT - LUNKIN SP
TEXTURES - DICKSON MJ
TH - HUYDUNG N
THENOYLTRI - DE AK
THEORY - KAPUSCIN A
THERMAL - COSTELLO JM
- GRIBOV BG
- LEE EW
- MATSUMOT T
- MEADEN GT
- YAGGEE FL
THERMODYNA - LIDSTER PC
THERMODYNA - RELAN PS
THIANAPHTH - VENUTO PB
THIN - MORANA SJ
THIOCYANATE - ZANGEN M
THORIA - LIDSTER PC
THORIUM - FLORENCE TM
TI - WEISS BZ
TIMBER - LAMBERT MJ
TIME - GAYLES JN
- KOPP WU
TIN-FREE - FUKUDA N
TITANATE - DITTMANN R
- NOVAK I
TITANIUM - ALBRECHT JM
- BOLSHAKO LA
- FASMAN AB
- INGLIS HS
- KOPP WU
- LUZHNIKO LP
- LYUTAYA MD
- MICHEL H
- YAGGEE FL
TITANIUM-C - SLEPTSOV VM
TITRATIONS - FLETCHER KS
TITRIMETRIC - HARTLEY FR
TN - SALAMON MB
TOLUENES - SAKANISH K
TRACE - DEBRUN JL
- ROSS WD
TRACER - GOPAL NGS
- JOHNSON PF
TRACES - GANIVET M
- GILLET AC
- TIMOFEEV VA

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WOLLASTONE. - ARNOULD M
WOMEN - HAMBIDGE KM
WORKABILITY - PARRY PJ
WROUGHT - CLARK JW
X-RAY - BEYERMAN K
- COSTELLO JM
- KAWAMURA K
- NIGAVEKA AS
YCRO3 - VANDERZI JP
YTTRIA - LIDSTER PC
YTTRIUM - MYASNIKO VV
- TIMOFEEV VA
ZEEMAN - KANSKAYA LM
ZINC - BENNE D
- PREMI PR
ZIRCALOY-2 - PANDE BM
ZIRCONIUM - BACHMAN RZ
- LYUTAYA MD
ZONE - BIGOT J
- DONCHENK EA
- RENUCCI
1-PROPANOL - DEO AV
1,2-BISIDI. - POWERS DR
1,6-METHAN - GUNTHER H
1H-NMR - MOSER E
10-25-KBARS - BALL A
12-PERCENT - CAUBO
19-NORCHOL - CAMBIE RC
2,2,2,4,4, - HORN HG
2,5-DIPHEN. - VENUTO PB
2H(PMP) - JOHNSON TR
3+)-ION - DUCLAUX AM
3HE ALPHA - DAVID P
31P-NMR - MOSER E
32P - KINNAERT P
35-70-PERC. - PARRY PJ
51CR - GOPAL NGS
- KAPUSCIN A
- RYNKIEWI H
- WOJCIECH JM

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DEPOSITION - MILSTEAD CF
IODINE -
LOW -
STEEL -

CHROMIUM-ALLOYED
CARBON - POTTERS F
CONTRIBUTI -
ELIMINATION -
IRON -
KINETICS -
MELTS -
PRESSURE -
REDUCED -

CHROMIUM-ALUMINUM
ALLOYS - FELTEN EJ
ANALYSIS - OLARU I
BEHAVIOR - FELTEN EJ
CATALYSTS - OLARU I
CHEMISORPT -
DIFFERENTI -
OXIDATION - FELTEN EJ
OXIDE - OLARU I
THERMAL -

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BLAST-FURN -
CHARGING -
GEAR -
HARD-FACING -
SMALL -

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SULFUR-CON -
SYNTHESIS -

CHROMIUM-COBALT
ALLOY - VERNIK VS
CARBON -
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HEAT -
HIGH -
INTERMIT -
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TREATMENT -

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CARBIDE - JELLINGH W
GRAPHITE -

CHROM

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HIGH -
HIGH-PRESS - STICHA EA
HYDROGEN -
JOINTS - ZEMZIN VN
LOCAL -
LOW-ALLOY - PRNKA T
METALS - SHRON RZ
MOLYBDENUM - DICKSON DS
NITRIDING - ERLER J
PERCENT -
PRECIPITAT - PRNKA T
REPARTITION -
RESISTANCE - FELIX
- SHRON RZ
RUPTURE - PRNKA T
SLIPPING - FELIX
SOLID - DICKSON DS
STEEL - KONDRATE JA
STEELS - ERLER J
- FELIX
- PRNKA T
- STICHA EA
- ZEMZIN VN
STRENGTH - PRNKA T
STRESS-RUP - STICHA EA
STRUCTURE - FELIX
- SHRON RZ
TEMPERATUR. - ZEMZIN VN
TEMPERING - SHRON RZ
TESTING - STICHA EA
THERMAL - SHRON RZ
TREATING - ERLER J
TUBULAR - STICHA EA
VANADIUM-C - PRNKA T
WELD - SHRON RZ
WELDING -
WIRE - KONDRATE JA

CHROMIUM-NICKEL
ACTIVITY - TUMA H
ALLOY - ZUBAREVA AA
ALLOYS - DYATLOV VI
- GLADKII PV
- SOROKINA KP
ANODIC -
APPEARANCE - GORBATEN IV
APPROXIMAT - TUMA H
AUSTENITE - DESESTRE A
AUSTENITIC - DYATLOV VI
- KOHL H
- KOZLOV RA
- MEDOVAR BI
- SCHUMANN H
- VASUDEVA R
AUTOMATIC - DYATLOV VI
BORON - GLADKII PV
BOUNDARIES - PUGLIESE LA
CARBON - KAKHOVSK NI
- POUR V
- TUMA H
CAST - ZUBAREVA AA
CATALYSIS - POUR V
CAUSES - GORBATEN IV
COEFFICIENT - GOTALSKI YN
CONDITION - KOHL H
CONTAIN - GLADKII PV
CONTENT - GOTALSKI YN
- KAKHOVSK NI
- KOHL H
CORROSION - DESESTRE A
- WELD RES C
CR - TUMA H
CRACKS - MEDOVAR BI
DELTA-FERR - KOHL H
DEPOSITED - KOZLOV RA
DEPOSITION - GLADKII PV
DETERMINAT - PUGLIESE LA
DIFFERENT - ZUBAREVA AA
DIOXIDE - POUR V
DUCTILITY - ZUBAREVA AA
EFFECT - DESESTRE A
- KOZLOV RA
EFFECTS - GOTALSKI YN
ELECTRODES - KAKHOVSK NI
ELECTROLYTE - PUGLIESE LA
EQUILIBRIUM - KOHL H
EUTECTIC - MEDOVAR BI
EXPANSION - GOTALSKI YN
FISSURES - GORBATEN IV
FURNACE - ANTIPOV VM
HARDENING - VASUDEVA R
HIGH - DESESTRE A
HOT - MEDOVAR BI
- ZUBAREVA AA
HYDROGENAT - POUR V
IMPROVING - BRUSILOV BS
- STAL R
IMPURITIES - ANTIPOV VM

CHROMIUM-SILICON (CONT)
RESISTORS - BEYNON J

CHROMIUM-TITANIUM
CERAMIC - YAWS CL
CHEMICAL -
COATING -
COMPOSITION -
CVD -
DEPOSITION -
IMPROVED -
PROCESS -
VAPOR -
VIA -

CHROMIUM-3
ALCOHOL - NAKAHARA M
COMPLEXES -
PREPARATION -

CHROMIUM-5
CHRONIC - PFISTERE K
LABELING -
LEUKEMIA -
LYMPHOCYTES -
LYMPHOCYTIC -
NORMAL -
PATIENTS -
SUBJECTS -

CHROMIUM-51
51 51CR
ACHETA - VANHOOK RI
ACTIVITY - DEOSSO FJ
APPLYING - SHIBATA N
ASSIMILATI - VANHOOK RI
ATOMS - YEH SJ
AVIAN - INMAN DL
BEHAVIOR - YEH SJ
BIOLOGICAL - VANHOOK RI
BLOOD - GOULSTON K
BROWN - VANHOOK RI
CELL - GOLSTEIN P
- PEARSON GR
CELLS -
CESIUM-134 - VANHOOK RI
CHEMICAL - YEH SJ
CHROMATE - DEOSSO FJ
CORRELATED - GOULSTON K
CRICKETS - VANHOOK RI
CYTOTOXIC - PEARSON GR
DETACHMENT - GOLSTEIN P
DETERMINAT -
DIFFERENT - PEARSON GR
DIGESTIVE - INMAN DL
DISTRIBUTI. - LYON GL
DOMESTICUS - VANHOOK RI
EFFECT - DEOSSO FJ
ESTIMATION - GOULSTON K
EXTRACTS - LYON GL
FECAL - GOULSTON K
GUAIAC -
HAEMATEST -
HIGH - DEOSSO FJ
IODINE-131 - VANHOOK RI
IRRADIATION - DEOSSO FJ
- YEH SJ
L - VANHOOK RI
LABELED - PEARSON GR
LABELING - GOLSTEIN P
LEPTOSPERM - LYON GL
LOSS - GOULSTON K
LOW - YEH SJ
LYMPHOID - PEARSON GR
MANUKA - LYON GL
METHOD - SHIBATA N
NEUTRON - DEOSSO FJ
OCCULTEST - GOULSTON K
OXIDATION - SHIBATA N
POPULATIONS - PEARSON GR
POTASSIUM - DEOSSO FJ
POTENTIAL - PEARSON GR
PREPARATION - DEOSSO FJ
PROCESS - SHIBATA N
PRODUCED - YEH SJ
PRODUCTION - SHIBATA N
QUANTITATI - GOLSTEIN P
RAPID - DEOSSO FJ
RECOIL - YEH SJ
SAP - LYON GL
SCOPARIUM -
SPECIES - INMAN DL
SPECIFIC - DEOSSO FJ
STUDIES - INMAN DL
SZILARD-CH - SHIBATA N
TECHNIQUE - GOLSTEIN P
TEMPERATURE - YEH SJ
TESTING - GOULSTON K
TISSUES - LYON GL
TRANSPORT -

CHROM

CHROMIUM(0) (CONT)
MOLYBDENUM - FISCHER EO
PHOSPHORUS -
PREPARATION -
TRIBROMIDE -
TRIIODIDE-P. -
TUNGSTEN(0) -

CHROMIUM(V)
ELECTRON - GARIFYAN NS
MOLYBDENUM -
RESONANCE -
SPIN -
STUDY -
THIOCYANAT -
TUNGSTEN(V) -

CHROMIUM(VI)
GLYOXYLATO. - SHUGARMA AL
OXIDATION -

CHROMIUM(0)
CIS-TRICAR - HUTTNER G
CRYSTAL -
STRUCTURE -

CHROMIUM(2)
- LAMAR GN
ACIDIC - CARLYLE DW
APPLICATIO - HANSON JR
AQUEOUS - HARTMANN H
BASIC - DENK G
BRIDGING - ULRICH JJ
CHELATES - LAMAR GN
CHEMISTRY - EARNSHAW A
CHLORIDE - HANSON JR
CIS-DICHLO - MOVIUS WG
COMPLEXES - CARLYLE DW
- WANG YI
CONFORMERS - GOULD ES
DELOCALIZA - LAMAR GN
EFFECT - HARTMANN H
ELECTROCHE - ULRICH JJ
ELECTRODES -
ENEDIONES - HANSON JR
EUROPIUM(2) - CARLYLE DW
HALIDE - ULRICH JJ
HYDROGEN - HARTMANN H
IRON(3) - CARLYLE DW
- LAMAR GN
ISOTOPE - HARTMANN H
KINETIC - CARLYLE DW
LIGAND - ULRICH JJ
LOW-SPIN - LAMAR GN
MAGNETIC -
MERCURY - ULRICH JJ
MONOSUBSTI - CARLYLE DW
NUCLEAR - LAMAR GN
O-PHENANTH -
OXIDATION - ULRICH JJ
PHOTOCHEMI - HARTMANN H
PHOTOLYSIS -
PHOTOOXIDA -
PROTON - LAMAR GN
PYRIDINEPE - WANG YI
REACTIVITY - GOULD ES
REDUCTION - CARLYLE DW
- GOULD ES
- HANSON JR
- MOVIUS WG
REDUCTIONS - WANG YI
RESONANCE - LAMAR GN
SALICYLATO - GOULD ES
SALT - HARTMANN H
SALTS - DENK G
SOLUTION - CARLYLE DW
SOLUTIONS - HARTMANN H
SPIN - LAMAR GN
STATES - HARTMANN H
STUDIES - CARLYLE DW
- LAMAR GN
SUBSTITUTED -
- WANG YI
SYMMETRICA - LAMAR GN
TRANSITION - HARTMANN H

CHROMIUM(2-XNRON
ALLOYS - KALLEL A
ANTIFERROM -
ORDER -

CHROMIUM(3)
ABSORPTION - WASGESTIAN F
ACETATES - DUBICKI L
ACETYLACET - GAINAR I
- INDICTOR N
- IRVING HMN
- IRVING HMN
ACETYLACET - FUJII Y
ACID -

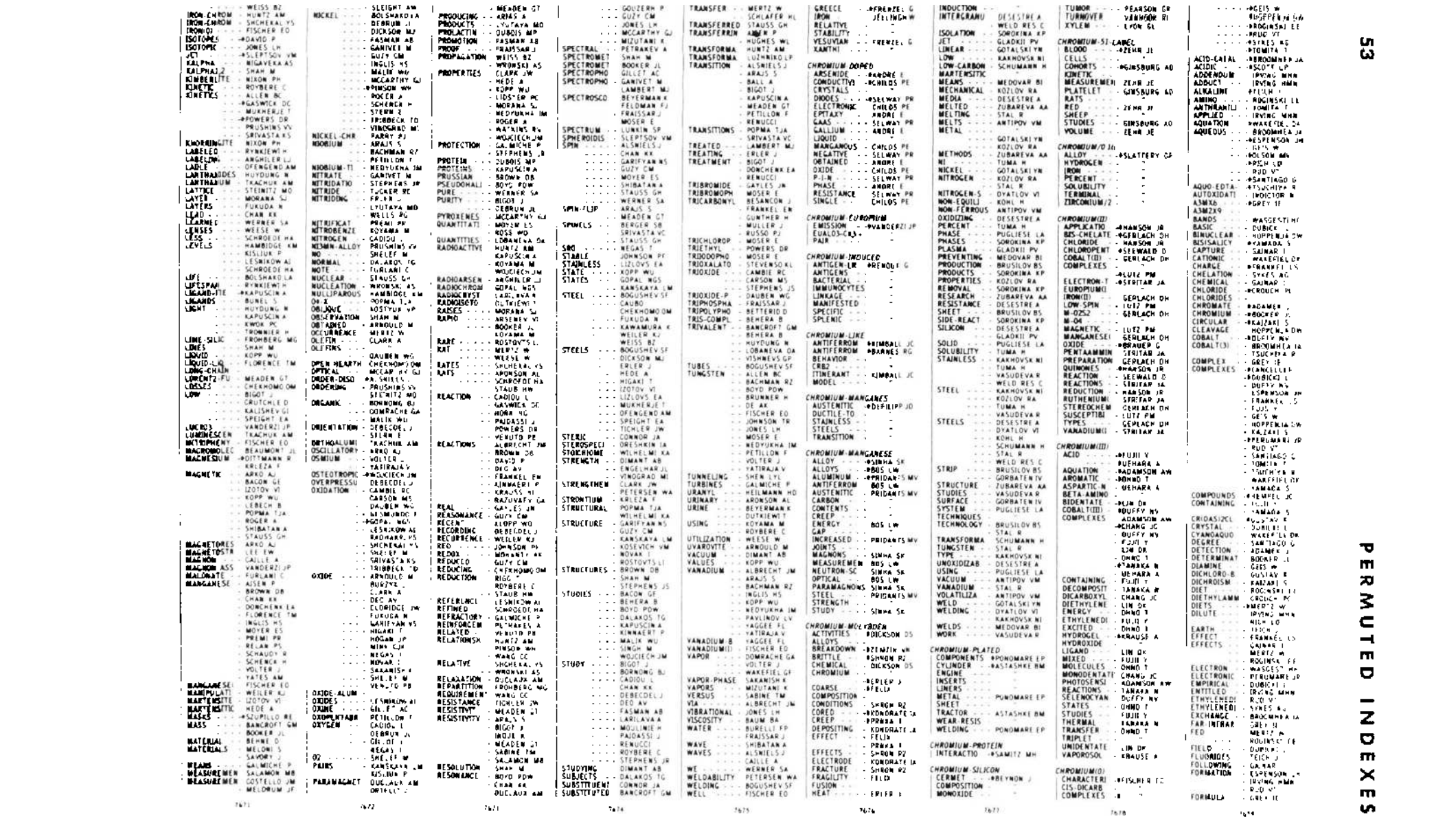

FIGURE 5. *Sample page from the* Permuterm Subject Index. *(Reproduced with permission.)*

SUITABLE
STABLE STANDARD SUSPENSIONS OF WHITE BLOOD CELLS SUITABLE FOR CALIBRATION AND CONTROL OF ELECTRONIC COUNTERS P.230 7005327 C 16
A LOW POWER BATTERY-OPERATED ELECTROMAGNETIC FLOWMETER SUITABLE FOR IMPLANTATION P.43 7006934 C 5

SULFADIAZINE
ANTIBACTERIAL ACTION OF SILVER SULFADIAZINE AND DNA BINDING P.133 7004151 C 27
TOPICAL USE OF COLLAGENASE WITH SILVER SULFADIAZINE IN BURNS P.145 7006155 C 17

SULFAMYLON
SULFAMYLON AS A BURN DRESSING P.123 7004151 C 25
CORRECTION OF RETARDED EPIDERMAL REGENERATION DUE TO SULFAMYLON BY ADMINISTRATION OF ORAL ZINC P.129 7004151 C 26

SULFATE
VINBLASTINE SULFATE IN THE TREATMENT OF GERMINAL TUMORS OF THE TESTIS P.4-335 7003609 C273
CHOLINE SULFATE PERMEASE: TRANSFER OF INFORMATION FROM BACTERIA TO HIGHER PLANTS: II. INDUCTION PROCESSES P.201 7003823 C 18
THE EFFECTS OF THE ADMINISTRATION OF ZINC SULFATE ON THE HEALING OF WOUNDS IN THE BURNED PATIENT P.623 7004151 C166

SULFHYDRYL
HISTOCHEMICAL DEMONSTRATION OF PROTEIN-BOUND SULFHYDRYL AND DISULFIDE GROUPS IN PERIPHERAL MYELIN DEVELOPED IN CULTURES OF MOUSE DORSAL ROOT GANGLIA P.521 7006177 C260

SULFONAMIDE
ON THE RELATIONSHIP BETWEEN BLOOD GLUCOSE LOWERING AND ANTILIPOLYTIC ACTION OF NEWER SULFONAMIDE DERIVATIVES P.130 7004187 C 10

SULFONAMIDES
TREATMENT OF TOXOPLASMOSIS WITH LONG-ACTING SULFONAMIDES P.251 7003798 C 22

SULPHADIAZINE
ALTERNATIVE METHODS OF PREVENTING INFECTION OF BURNS. THE USE OF SILVER SULPHADIAZINE, TRIMETHOPRIM AND ISOLATORS P.138 7004151 C 28

SULPHATE
S35 SULPHATE UPTAKE IN THE RABBIT INTERVERTEBRAL DISC COMPLEX P.47 7003732 C 7
IN VITRO CONJUGATION OF 4-14-C-DEHYDROEPIANDROSTERONE INTO 4-14-C-DEHYDROEPIANDROSTERONE SULPHATE IN THE SKIN OF HEALTHY WOMEN AND OF WOMEN WITH HIRSUTISM AND THE EFFECT OF SYNTHETIC HUMAN ALPHA-1-39-ACTH UPON THE PROCESS P.121 7006050 C 16

SULPHATED
SULPHATED GLYCOPROTEINS BY FLUORESCENT ELECTROPHORESIS AND BY A SELECTIVE FLUOROMETRIC REACTION IN VITRO P.181 7006177 C 91

SULPHATES
AMOUNT OF THE CHANGES IN 17-KETOSTEROID SULPHATES EXCRETED WITH HUMAN AXILLARY SWEAT FOLLOWING SYNTHETIC HUMAN ALPHA1-28-CORTICOTROPIN TREATMENT P.127 7006050 C 17

SUMMARIZING
CONCLUDING REMARKS SUMMARIZING RADIOBIOLOGICAL FACTORS IN THE DESIGN OF NEW CLINICAL TRIALS P.414 7006242 C 73

SUPERALLOYS
ELECTRON MICROSCOPY OF HAFNIUM-MODIFIED SUPERALLOYS P.120 7006281 C 60

SUPERCOILED
BINDING OF DRUGS TO SUPERCOILED CIRCULAR DNA: EVIDENCE FOR AND AGAINST INTERCALATION P.216 7003661 C 18

SUPERCONDUCTING
A SUPERCONDUCTING MICROSCOPE P.10 7006281 C 5

SUPERINFECTION
EFFECTS OF SUPERINFECTION IMMUNITY ON PLASMID REPLICATION FOLLOWING CONJUGATION P.309 7005937 C 34

FIGURE 6. *A sample page from the* MEDI-KWOC Index. *(Reproduced with permission.)*

column of entries. The headings of the entries may be double-struck during printout of the concordance, as in Figure 6, to make the letters blacker and stand out better. In this KWOC concordance, after the heading, the entire title is printed, followed by the page of the publication from the conference or proceeding on which the title appears. The locator (reference number) is located to the right of the title. Through the locator, the searcher can turn to the "Register of Conferences" to find the name of the conference or meeting, the editor, the publisher, the volume number, number of pages, and the presence of illustrations.

Figure 6 can be used to illustrate several characteristics of this KWOC concordance. As in other concordances, there is scattering among headings, for example, GLUCOSE, SUGAR, SUGARS, and probably other headings. The second entry under SUGAR in Figure 6 refers to blood sugar (glucose). Under GLUCOSE there are 42 more entries, many of which refer to glucose in the blood. The third entry may include glucose. There is scattering between SULFATE and SULFATES. Added scattering has occurred because SULPHATE and SULPHATES appeared in titles of this issue. There is also scattering between SUBSTRATE and SUBSTRATES. Repeated headings have been suppressed as a bit of elegance that also saves user time and irritation. Genus-species names are not hyphenated, so that both names print out as headings in the concordance. This is in contrast to the practice in *Bioresearch Index*, described above. In the computer program for this concordance, hyphens prevent the second word from becoming a heading, as for example, SUPERIOR-OBLIQUE and SUBSTRATE-SPECIFIC. Many of the headings do not represent subjects studied by authors. Examples are SUBSTRATE, SUBSTRATES, SUBUNITS, SUCCINATE, SUCCINIC, SUCTION, SUDDEN, SUFFERING, SULPHATE, SULPHATED, SULPHATES, SUMMARIZING, SUPERCONDUCTING, SUPERNATANTS, and SUPERPLASTIC. The last example would seem to indicate from the heading that a material might be studied; actually, the entry refers to a kind of flow. Some of the headings are adjectives, others are nouns. The scattering and the entries not leading to subjects put extra loads on the user. There is an author index that also provides titles which save the time of searchers. There are no cross-references in Figure 6; there could have been, for example, "SUGAR. (See also GLUCOSE.)," or "SUGAR, BLOOD. See GLUCOSE."

Improvement of Permuted Indexes

TITLE SUPPLEMENTATION (ENRICHMENT)

Because of difficulties experienced with verbatim titles in title concordances, some concordances employ human preediting of titles despite the added cost and delay. One form of editing is supplementation. Words believed to be useful as guides to subjects reported by the author are selected from the body of the original work or the abstract, or are added by the editor. Such words added to the inadequate

title are usually in the form of a list placed at the end of the title. This list can inform the reader that, in addition to the title words, the listed words also lead to material in which he may be or may become interested. The list may be alphabetical. A list of words derived from the body of a document does not convey precise meaning and so may confuse the reader. However, the reader should realize the purpose of the list and not attempt to extract precise meaning from it.

Some forms of supplementation make more specific the general words in titles. For example, "Oil prices in 1975" might be supplemented to read, "[Cottonseed] Oil prices in 1975." This kind of supplementation may add the most valuable of all guidance to the work. Supplementation of this nature is also used in abstract journals. This type of supplementation is a kind of title enlargement.

TITLE ENLARGEMENT

Although adding individual words or terms to titles to make general terms more specific, as just mentioned, is a form of title enlargement, much more extensive enlargement may be practiced. For example, "Silvery barque on black velvet sky" might be enlarged to read "Silvery barque on black velvet sky [Hardware on the moon]." This type of enlargement is especially useful with confusing, cryptic, and cute titles. The enlargement is often carried in square brackets (to indicate clearly the part added) after the author-given title. Enlargement of this nature takes considerable time of an editor, who must first read or skim the work to find the material needed for the enlargement.

TITLE SUBSTITUTION

In the effort to improve titles, some editors have replaced titles submitted by authors with titles that are more suitable for use in a KWIC concordance. This technique has been used in the literature of surgery. The new titles substituted for those of authors are about twice the length of the authors' titles and carry, in detail, exactly what the surgeon reported. The substitute titles, if prepared by one editor, will be more standardized than are the original titles because editors standardize subconsciously as well as consciously. People, in general, find it difficult to do things completely at random even if they wish to do so.

PREEDITING OF TITLES AND POSTEDITING OF THE CONCORDANCE CARDS

The two main opportunities for editing in the production of permuted concordances are in changing titles before they are keyboarded and in changing punched cards carrying the entries prepared by the computer for the index. The former has been discussed above. The latter is done by replacement of incorrect cards and by removal of entry cards that seem to be useless as guides to subjects. Since the stop list has a limited number of words, sometimes words not on the stop list appear

and are seen to be undesirable as guides to subjects. These undesirable words then appear as headings in the central column of a KWIC concordance or are extracted and used as headings in a KWOC concordance. In both cases they can be removed by editing. Editorial effort of this nature definitely improves the product; however, it is questionable as to whether the improvement justifies the cost and delay involved. Luhn felt it did not. Generally, he opposed any action that would delay or increase the price of KWIC concordances. No editorial effort to date has brought title concordances up to a quality even approaching that of subject indexes (*10*).

STOP LISTS

Since computer programs have not been successful in selecting words that are useful in guiding searchers only to subjects, and to all of them, in the work indexed, human-selected stop lists are commonly used to prevent the program from selecting all of the words of the title or other source of words. Words such as prepositions, articles, pronouns, and conjunctions are rarely useful in guiding users to subjects studied by authors. An exceptional case is that in which the word itself is the subject studied. For example, "Etymology of the word 'and' " is a title in which the conjunction "and" should be indexed and appear as a subject heading. The stop list prevents filling the concordance with useless entries that would more than double the price of the concordance and would seriously inconvenience searchers for subjects. Users would have to eliminate more than half of the entries because they would be found to be irrelevant. Stop lists have been developed pragmatically. The list is started for a given index with prepositions, conjunctions, articles, and pronouns. The concordance cards produced are skimmed for other frequently used words and symbols that are found to be useless in guiding searchers to subjects. Surprising new additions to the stop list may appear. For example, I, V, and X as found in roman numbers that are used in titles for parts of a series of papers may appear as headings in the concordance. Heavily used words, such as manufacture and synthesis may be found to have little use in guiding searchers to subjects reported by authors. Such words are added to the original stop list. It may turn out later that some of the words on the stop list are actually useful in guiding searchers to subjects. For example, the word USE in a concordance to information science would be helpful in guiding searchers to studies on the use of information sources and services. Such helpful words are then removed from the stop list. A stop list for a new concordance can be started by adopting a list from another concordance and then modifying it during use.

TITLE EFFECTIVENESS AND GENERALIZATION IN TITLES

Since titles of papers related to chemistry and chemical engineering supply only about one-third of the subject index entries (*7*), it seems likely that similar ratios may be found in other sciences. In the humanities the proportion of subject entries supplied by titles may be much lower than in chemistry since many titles in the

humanities are cryptic and may supply no entries for the subject index. Judging from the many complaints about the inadequacy of titles in communication of technical information, it is astonishing that concordances for titles are as useful as they have been reported to be. For the sciences and technologies, effectiveness of titles may be judged by percentage of recall (percentage of relevant items selected based on the total number of relevant works in the collection). A cryptic, confusing, or misleading title might be more likely to remain unselected although the work was relevant than an informative title. From a positive point of view, an informative title helps to prevent loss of information, especially via title concordances.

There are practical limits to the lengths of titles; thus, all words of use in indexing the work are seldom carried in its title. To make titles more encompassing of the work, authors generalize solely for the purpose of condensation. That is, they may not use most generalization in titles to indicate general application of their results, but only to shorten the title. Of course, some titles carry valid scientific generalization. From the title alone the differentiation between the two is difficult. Human indexers find it difficult to separate valid generalization in titles from generalization used to shorten the title. Computers have not yet been programmed to make this distinction. Thus, subject guidance in a title concordance produced by a computer will confound valid scientific generalization with generalization for the purpose of shortening. The user of the concordance is burdened with separating these two kinds of generalization. In a good subject index, the indexer, within the limits of his abilities, takes care of this separation for the user. Thus, a book entitled "Safety of Automobiles" might accurately be indexed under "Automobiles," whereas a paper entitled "Tune-up of three new models" might better be indexed under the names of the three automobiles rather than under "Automobiles," since the author did not deal with all automobiles. Titles may use rhetorical tropes, allegory, analogy, and the like to make them attractive as well as short. This causes difficulty in computer-produced title concordances. For example, "Toxic compounds in eight foods" would be found in a computer-produced title concordance under: TOXIC, COMPOUNDS, FOODS, and possibly under EIGHT. In a subject index, this work would be found under the specific names of the toxic compounds and under the names of all eight foods. There would be no entries under "Toxic compounds" (or "Toxic" and "Compounds"), or under "Foods." Thus, the subject indexer would separate generalization for the purpose of condensation, from generalization for the purpose of consolidating scientific knowledge. The computer would provide entries for all of the generalizations, including those that had been used for the purpose of condensation. Human editing could be used to eliminate entries of this nature.

CROSS-REFERENCES

One of the ways in which editorial effort can effect a major improvement in concordances is by the addition of cross-references—especially "see" cross-references from synonyms to a chosen term with all synonyms assembled at the chosen term.

Lack of the guidance provided to the searcher through cross-references is a major deficiency of many concordances. Cross-references can be added to concordances, and they have been, for example, at Exxon Research and in the *Permuterm Subject Index*. Most conveniently, they are added as punched cards at the stage after the entries have been alphabetized. Cross-references should be checked for validity; that is, dangling, frustrated, or blind cross-references should be avoided to save time and irritation of users. Adding checked cross-references takes time and delays the appearance of the concordance. Cross-references cost money. Whether the delay and added price are justified is certainly debatable. Use of the investments for editing concordances and adding cross-references, instead of for the production of high quality subject indexes should certainly be an alternative to be considered. If use of a concordance is a temporary stage in the development of a publication, then prompter substitution of subject indexes for concordances might be a better course of action than extra effort invested in a relatively minor improvement in the concordance.

GLOSSES

Since some index heading terms are ambiguous, glosses may be used in subject indexes to inform the searcher (and incidentally to remind the indexer) as to what is included under the heading. For example, LEAD (electrical connection) should be distinguished in an index from LEAD (metal), LEAD (ore vein), LEAD (guidance), LEAD (ions), and LEAD (graphite). Such glosses have been called "notes," "scope notes," and "definitions." Without glosses and separate headings, all of these completely different things would be confused under one heading. The index user would be inconvenienced by the task of sorting entries by meaning, a task that the indexer could and should have accomplished. In those cases in which the index user was unable to make the separation, he would have to accept the added load of looking up the entries. Confusion among homographs and homophones, such as LEAD, is avoided in quality subject indexes. It is standard practice to use glosses. In concordances, the addition of glosses requires human editorial effort; computer programs to separate all homographs under all headings are still unavailable. Whether this extra editorial effort in the production of concordances is justified is worth considering.

Production and Economics of Permuted Indexes

METHODS OF PRODUCTION (MANUAL AND AUTOMATED)

Now that computer programs have been written to produce concordances, production is simple. Programs can be obtained and their documentation and directions for use studied. The material, usually the title, is first converted into machine-readable form. This can be done by punching cards according to the directions. The

material may be typed with a character-recognition type face and then translated automatically into machine-readable code by character-recognition machines. Also, magnetic tape can be produced first. The program selected and the machine-readable medium are then entered into the specified computer for processing. The output can be in the form of punched cards that have been interpreted (made readable for humans) so that the cards can be edited before the concordance is printed. Editing may be mainly to remove blocks of entries starting with words that should have been on the stop list but which, for some reason, were not put on it. Editing can be to ensure that the computer and printer have operated satisfactorily. Need for cross-references can be determined. At least some of them can conveniently be added as cards. Errors can be corrected at this stage. Cards for words that have been concordance headings can be removed easily. Once the editing, if any, is completed, then the concordance can be printed on high-speed printers and the copy photographed, usually at reductions up to one-half. The plates produced are used in printing the concordance. Compared with the procedures used in human subject indexing and editing, the above is very inexpensive, simple, and rapid. There is no proofreading for content—only to make sure that the computer functioned properly and that the quality of printing is adequate.

Concordances can be produced manually. Words of titles (edited or not) are extracted by people for use as concordance headings. The titles are used as modifications with a locator (reference number or code) at the end of each entry. Interleaf (snap-out) forms may be used to save retyping the titles and locators for more than one entry for the same title.

ECONOMICS OF PERMUTED INDEXES

Since there are, hopefully, many more users of a given index or concordance than there are indexers and clerical help that produced the guide, the cost of using an index or concordance may, over a period of time, be greater than was the cost of producing it. It is important to consider the total economic picture that includes users and use as well as indexers and clerical help. The balance between cost to users and to producers can be estimated.

It is convenient for the producer to view the savings in cost and time in production of title concordances over those involved in production of quality indexes and then to opt for the former. He is greatly aided in this choice by the naiveté of users, supporters, and professional society members who may be unable to distinguish a concordance from a subject index. These people may be totally unaware of the importance of avoidance of scattering and of the responsibility of the indexer and index publisher for elimination of scattering. They may be unaware of syndetic systems and their importance. They are nearly always unaware of the entries omitted, because these are difficult to detect.

In the future, publishers of concordances and indexes will be held responsible for considering the total picture, coming up with the best solution, and convincing users, purchasers, and sources of support that quality is worth the cost.

Use of Permuted Concordance vs Subject Indexes

Ease of use of guides to the literature saves time and effort and also stimulates repeated use of the guides. All indexes are entered by terms in mind or terms derived from glossaries, thesauri, dictionaries, computer displays, etc. The more terms needed for a given search, the longer the search takes and the more costly it is. In concordances that permit scattering of like entries among spelling variants, misspellings, genus-species terms, and the like, there are many more concordance headings to look up than there are headings to search in a subject index in which scattering is controlled. Concordances load the user far more than do subject indexes. If unrelated entries are permitted under a given term, the user must sort out the wanted entries. This is an added load. Entries that are ambiguous or confusing take extra time of the searcher because (s)he must look up all of them. Lack of internal guidance via a syndetic system causes the user to turn elsewhere for guidance. (S)he is loaded with the task of providing her/his own guidance. For example, what are all of the synonyms of ASPIRIN and of THIAMIN(E)? Loss of relevant references may or may not be charged to the searcher. The organization for which the searcher works, society in general, or the searcher may have to pay for the information missed on the search. Cost to society may be in the form of death, suffering, cultural lag, unnecessary expense, delayed income, and lack of progress.

Concordances place a greater load on the searcher than do quality subject indexes. The economic consequences of this load are important and should be explored before a decision to start or to continue a concordance.

Despite their limitations, permuted concordances have uses. Luhn pictured them as enabling a new organization to provide guidance to users until better indexes had been developed. He was dismayed to learn that a high quality, human-produced index was replaced by a KWIC concordance (*11*). For young organizations getting started into publishing abstracts, extracts, journal articles, etc., the permuted title concordance may be far better than no index at all. The choice is easy—between losing a part of the information or all of it.

For collections of documents for which nearly all questions are those of recall (*12*) and if recall is nearly always accurate, permuted concordances are ideal and inexpensive. For rapid, accurate search, it is merely necessary to recall even one word in the title. However, for questions of discovery (*12*) for which relevant documents are not known to exist, and for questions of reasonable inference for which it is reasonable to infer the existence of document(s), the permuted concordance may be very costly to use. For small, for example, personal, collections, the permuted concordance may be entirely satisfactory. So, if the searcher should forget the title and all of the words in it, he can in a reasonably short time skim all of the entries in his concordance to find the entries that have been forgotten. KWIC concordances to personal collections have been proposed as a way of sharing the evaluation, knowledge, skill, and wisdom that went into building the collection (*13*).

Permuted concordances are used by the searcher through the preparation of an array of search terms (*14*) that includes synonyms, class terms, subclass terms, parts

of wholes, wholes made up of parts, causes, effects, products, uses, and terms expressing other relationships. Terms of the array are arranged in an order of probable importance to the questions. All synonyms must be looked up unless the concordance is unusual and has synonymy completely controlled. Since the average drug name, for example, has six synonyms, the load on the searcher may be great, especially in searches through a series of concordances over months or years. Loss of relevant information is the price of failure to find all relevant references. Loss of information may occur because a synonym was not discovered or looked up. The price can be high to the organization and to the searcher as well as to society.

Once the heading term is found in the concordance, all entries under this term must be read because it is not possible to predict the second term following the first term, unless the question is one of accurate recall. The locators (reference numbers or other symbols) for each entry thought to be pertinent are copied and then looked up in the "bibliography." As the entries are read in the concordance or bibliography, new heading terms may come to mind. These are added to the array of search terms. As the search progresses, it may become obvious that certain search terms are unproductive and are likely to remain so. These can be dropped. Frequently, rearrangement of the order of search terms will be found useful. The most productive terms can be searched first to save search time. Searches of recall will usually terminate when the work sought is found. If the search is one of discovery, one of recall in which the remembered document is not discovered, or one of reasonable inference, it will be useful to note names of authors or relevant works and to look up these works soon after the start of the search. If the works read or skimmed are found to be useful, then the references found in them can be searched and the *Science Citation Index* can be searched for later relevant works through names of first authors and names of the journals. This is the fastest way of expanding the search. A good description of this type of search is given in the *Science Citation Index* (*15*).

Indexes in the Future

Specifications for different kinds of indexes are being developed and published by the American Society of Indexers (ASI) through its Committee on Ethics, Standards, and Specifications (*16–18*). This committee has developed a "Statement on Ethics for Indexers and Index Publishers" (*19*). Specifications prepared by this committee may eventually result in standards promoted by the ASI and the American Standards Institute. Specifications are helpful in enabling publishers to display the virtues of their indexes. Also, specifications aid purchasers and users in selection and use of indexes, and aid indexers in maintaining quality of indexes.

Indexes should provide complete and reliable guidance to all items described by the title of the index. Thus, a title concordance should provide complete and reliable guidance to words in titles of the collection of works indexed, except for prepositions, conjunctions, articles, pronouns, etc. This, and other exceptions,

should be stated in advertising and other prefatory material to the index. Hence, it is uninformed or unethical for a publisher to label a title concordance a "subject index."

Education of index searchers to understand specifications and standards is largely the responsibility of the searchers once specifications and standards have been disseminated. Courses in indexing can aid students to understand differences among indexes.

Increase in complexity of a civilization is accompanied by increase in the sophistication of the people in it. Users of indexes are becoming more sophisticated; they feel the greater load imposed upon them by concordances than by subject indexes. Courses in indexing help to increase knowledge about concordances and indexes; students in such courses become connoisseurs of indexes. Specifications for indexes help to raise the level of sophistication about indexes. Readers become conscious that there are different qualities of indexes and of concordances and that these differences affect them. It is to the advantage of a civilization to promote this sophistication since information lost can have such serious consequences. The useful place for concordances may become somewhat as follows: young organizations publishing abstracts, extracts, journals, indexes to personal collections, "terse conclusions" (*20*), and the like may find that it is best to provide immediate, temporary guidance to readers by means of concordances. Then, as these young organizations get on their feet and turn to improvement of their products, they can employ human indexers to produce quality indexes. Methods for quality indexing are already established and described (*14*).

For very small collections, concordances may be entirely sufficient indefinitely. This is especially true if the users have mainly questions of recall or of reasonable inference. For the few questions of discovery (*12*), and for questions in which the searcher has forgotten the existence of the document, the entire concordance can be skimmed in much less time than it would take to go through the whole collection item by item. That is to say, even an inadequate index may be far superior to no index at all.

At present, it doesn't seem worthwhile to invest much human effort in pre- or postediting of concordances. It seems wiser to invest this human effort in production of quality indexes. For example, adding cross-references to concordances; supplementing, substituting, enriching, or extensively editing titles; removing entries not guiding to subjects studied; and the like may not be justified economically if costs to the users are brought into consideration. It may be far better to invest this extensive human effort in the production by established techniques of high quality indexes.

Substitution of concordances for quality indexes at this stage in our knowledge should be done only as a last resort, and then only after users and others have been completely informed as to the consequences of such a change.

Use of concordances in young organizations, linguistics, identification of authorship, code breaking, guidance to remembered documents, and the like is indispensible. These are the forte of concordances, and also areas in which subject indexes may be inferior.

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CHARLES L. BERNIER

PERRY, JAMES WHITNEY

James W. Perry, born in Canada on October 21, 1907, received his early education in chemical engineering at North Carolina State College and later studied at Massachusetts Institute of Technology and the Technische Hochschule in Stuttgart. He found chemistry particularly attractive as a science in which the results of the laboratory take priority over opinion and prejudice. His later life was powerfully influenced by the attitudes he acquired during the years spent in the South, chiefly a deep sympathy for the underdog and profound admiration for those who strive against continued adversity. Passionately honest and idealistic, he remained a bold and independent thinker until his death.

In the 1930s, after a disturbing year in Germany watching Hitler's rise to power, Perry became a member of the research team at the National Aniline Division of Allied Chemical which developed the first low-cost synthetic detergent. It was during this period that his interest in and knowledge of several languages was so useful in studying background chemical literature for the research in which he was involved. Avoidance of useless repetition of previous experimental investigations was obviously an important feature in applying the chemical literature to choose between different courses of action. The objectives were to develop possible experimental programs, evaluate them, and proceed toward the desired goal—a new, salable product.

It became increasingly apparent to Perry that library methods for identifying pertinent research papers, patents, etc., had not changed extensively since about 1900. In contrast, laboratory methods and instruments had become more and more effective and efficient. It seemed reasonable to hope that something could be done to modernize library methodology.

World War II was both an interruption and impetus to further concentration on better methods for information retrieval. During these years Perry was a member of an exploratory research group working on explosives at the Ballistics Research Laboratory at Aberdeen Proving Ground. Composite rocket propellants and high explosives for use on surfaces constituted the subject contents of patents eventually issued to Perry and his immediate associates for work done while at Aberdeen. The Ballistics Research Laboratory provided background understanding of the motivation for developing ENIAC, the original prototype of modern high-speed electronic computers. The slow rate of performing computations needed to convert artillery test firing results into combat firing tables was a serious bottleneck in developing maximum military strength.

It was during the war years that Perry began studying scientific Russian and shortly thereafter published a series of papers and later the books for which he became so well known.

At the conclusion of World War II he went to MIT to resume work on improving library methodology. While there he became a member of a group of chemists who organized a series of technical information symposia at national meetings of the American Chemical Society. This group developed into the Division of Chemical

James Whitney Perry.

Literature, which Perry chaired during 1949. At that time punched cards provided the most readily available means for attempting to develop methodology to surmount the limitations of conventional indexing and classifying, the principal means of access to scientific and technical information. During his years at MIT Perry became interested in library information problems in other fields, especially law, medicine, and metallurgy, and he traveled and wrote extensively in an effort to encourage adoption of the newer methods of correlation and information retrieval. This versatility of interests brought him friends in many fields and he maintained a close working relationship with several foreign scientists, particularly in the German and Dutch patent offices.

In 1955 he joined Western Reserve University as director of the Center for Documentation and Communication Research. Here, under the sponsorship of the American Society for Metals, he designed and built the Western Reserve Searching Selector, the prototype of a computer programmed to perform literature

searches based on encoded abstracts. At about this time it seemed apparent to Perry that the methodology of document selection was being considerably advanced but that no real advance had been made toward a comprehensive theory of document selection. He moved to the University of Arizona in 1960 and began to study the design of artificial languages for computers and the translation and processing of natural languages.

Perry developed basic courses in communication systems design and the related logic for application of computers for document selection, and beyond that, for enhancing the effectiveness of the scientific method. Inherently he realized the limitations of computers and stressed the importance of the human factor in providing the logic for these new intellectual tools which have had such an impact in nearly every field. He felt that computers could only be used to supplement and extend our unique capabilities for performing creative thinking. Perry was a versatile, forward-looking scientist, philosopher, and humanitarian. His untiring patience, insight, and inquiring mind brought him the warm respect of his students. He always encouraged them in that scientific curiosity which he felt was the basis for scientific advance. Perry worked hard, published 15 books and over 100 papers, was active in many professional societies, became president of the American Documentation Institute in 1957, but perhaps was proudest of the honor he received in 1961 when the American Institute of Chemists made him an honorary fellow for his pioneer work in the use of electronic computers for library cataloging. At his death, in 1971, several book manuscripts awaited only final editing.

RUTH PERRY

PERSONAL ACCOUNTABILITY

A characteristic of libraries everywhere in the last century and of libraries in developing countries at present is a law, or rule, or practice, holding the librarian accountable for all the books in the library. If a book is lost or stolen or is not returned by a borrower, the librarian must pay for the book. Although modern librarianship long ago dispensed with the problem by regarding the bookstock of a library as a product that is consumed by the users of the collection and likely to be worn out or damaged or missing unless given special protection, libraries in countries that are just beginning to develop informational services tend to have rules that punish the librarians for the misdeeds of users. Usually books that are worn out do not incur penalties to the librarian, but all those that turn up missing in the frequent, and essential, inventories represent a custodial failure on the part of the librarian, for which he must pay. No other regulation can be relied upon to prevent development of library services as efficiently.

In Asia, Africa, and Latin America, personal accountability may be regarded as the single greatest obstacle facing librarians whose goals are other than guardianship of a collection. The primary consequence of accountability is the maintenance of

careful records supporting the purchase and whereabouts of each item in the collection. Usually the books are arranged in an order that minimizes the effort of taking inventories. Accession records are kept that become the shelflisting of a fixed location classification. Users are naturally prevented from gaining direct access to the books in the collection, and the cataloging of the material may be designed to prevent usage rather than account for it. One library in Latin America maintained only a classified catalog without an index, and another had a notice posted warning that it was "estrictamente prohibido tocar los libros" (strictly prohibited to touch the books). The collection could be seen through glass doors on the bookcases, but large padlocks reinforced the sign. Even the trays of the catalog were padlocked.

In most countries where a law of personal accountability is undergoing review and revision, the librarian is first permitted a certain percentage of loss. In an Egyptian library recently, this was 3% of the collection, a figure far beyond what any library might expect. Even so, borrowing a book from the library was rather like taking out a loan. The user was asked for collateral in the form of a deposit and threatened with loss of his status in the library unless the material was promptly returned.

Secondary consequences include reluctance on the part of the public to use the collection, in view of the behavior of those in charge of the library. The traditional dragon who guards a collection and subjects users to minute scrutiny can be found everywhere in countries where a law of personal accountability exists. Typically, students in a college or university will develop their own libraries, as happened in the United States during the 19th century, avoiding any need to consult the library of the institution they attend. Public librarianship never develops at all, it being assumed that the public is made up of inveterate thieves who survive by stealing books.

Similarly, no one really wishes to be a librarian since his only duty is to act as warehouseman, with the threat of financial ruin hanging over him continually. Those who hold the title of librarian are functionaries who either do nothing at all or at best supervise a crew of assistants whose duties end when they have rearranged and counted the books for the day. If this crew has nothing to do but clean the library, they may not even keep the collection free of dirt. A university library in Egypt which had several dozen employees was too filthy to walk through. The stacks were vast wastepaper baskets where refuse was thrown, and the dust lay thickly on all the collection. Rather typically, the librarians were concerned with automation when a general cleanup would have served them better.

Customary services of a library, such as reference works on open shelves, may be the beginning of a gradual change away from personal accountability to modern librarianship. Much of the complicated record keeping, necessary to maintain evidence that a book has been purchased and retained in the library, can be transferred to cataloging the collection. Reclassification follows if the collection, or a significant part of it, is placed on open shelves where subject arrangement encourages use of the material. Ultimately, the profession of librarianship will be recognized and will tend to develop along lines that are familiar in Western Europe.

Not infrequently, countries where a law of personal accountability has prevented library development will obtain the services of library consultants. Their work is a perfect example of wasted effort, since the law must be changed before anything else can happen. Where the law has been changed, as in Peru, library development is apt to be as rapid as the society wishes and the professionals can achieve. Legislation recognizing librarianship as a service profession usually increases the status of librarians. So long as a librarian is only a kind of transcendental bookkeeper who faces a continuing audit of the collection he supervises, there is no impetus or need for service.

JAY E. DAILY

PERTINENCE AND RELEVANCE

See also *Artificial Questions*

"Pertinence" and "relevance" are two terms that have been used in the literature of information science to express a relationship between some document and (*a*) some request for information, (*b*) some need for information, or (*c*) some individual who requests or needs information. Thus, it might be said that a particular document is relevant (or pertinent) to a particular request, to a particular information need, or to a particular individual who requests information on a particular subject. The relationship implied by these terms is one that is extremely important to the evaluation of information services. Unfortunately the two terms have been used rather loosely in the literature and a considerable amount of controversy seems to exist on what the two terms actually mean and whether or not "relevance" is in fact relevant to the evaluation of information services. Rees and Saracevic, for example, raise the following questions (*1*):

1. Is relevance an adequate criterion for measures (of the performance of a retrieval system); is it a criterion?
2. If relevance is an adequate criterion, what does it represent?
3. Can relevance be used at all in practice; is it measurable; under what conditions (restrictions, constraints) can it be employed?

In this article we will try to clarify the issues and the terminology, to present our own views on the subject, to present the views of other writers, and to mention some major research projects relating to the relevance concept.

The concept of relevance needs to be viewed within the broader context of a person needing information and coming to an information retrieval system to seek this information. Kochen attempts to distinguish among "needs," "problems," and "expressions" of needs and problems (*2*). In very simplified form the situation may be represented as shown in Figure 1.

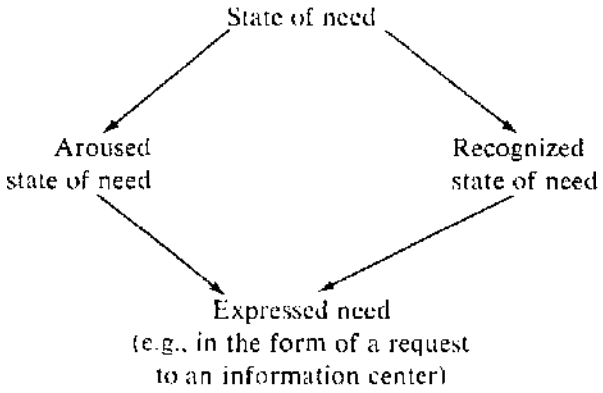

FIGURE 1.

Kochen distinguishes between the "need state" and the recognition or the arousal of this state. In certain states (e.g., hunger) a need may be aroused without being recognized or it may be recognized without being aroused. In the context of information services, it is quite important to distinguish among information needs, recognition of these needs, and expression of these needs. Information retrieval systems cannot respond to information needs of individuals as such but only to expressions of these needs. That is, an individual who needs information must recognize this need for information and must, presumably, be sufficiently aroused to take some steps to satisfy the need. Only after he recognizes his need and is sufficiently aroused (motivated) will he express his need in the form of a *request* to an information center. The degree to which he is able to recognize the exact nature of his information need and the degree to which this need is accurately reflected in the *expression* of the need (i.e., in the request statement) will very largely determine how successful the information service is in attempting to satisfy the need. That is, the information service can only operate on the basis of the stated request (expressed need) and, clearly, cannot respond to unrecognized needs or even to recognized needs that are unexpressed. As pointed out elsewhere by Lancaster (*3*), one of the major problems faced by any information service operated in a *delegated search mode* (i.e., the situation in which the person who needs information delegates the responsibility of finding it to someone else) is to ensure that expressed needs accurately reflect recognized needs. It is not always easy for the person who needs information to express this need clearly and unequivocally to the person who is to search for the information.

Let us assume, then, that some person needs information and that he comes to an information center to seek this information. Let us also assume that his need is not of a factual data type (e.g., the tensile strength of a particular steel) but of the type in which he needs to see documents that describe or discuss a particular subject area (e.g., documents discussing the treatment of *disease x* with *drug y*). The person needing information (we will call him a *user* or a *requester*) tries to make his need known to the staff of the center by means of a request statement. An information specialist on the staff of the center converts the request into a *searching*

strategy and this searching strategy is then matched against one or more data bases. We will assume that the search is conducted in a computer-based information retrieval system and that the output of the search is a printout of representations (e.g., bibliographic references) of documents that match the search strategy (i.e., documents indexed in such a way that they satisfy the logical and terminological requirements of the strategy).

We now have a whole set of possible relationships to contend with. These relationships are depicted in Figure 2.

We can be fairly sure that the document representations match the search strategy—otherwise they would not have been retrieved. We can be less sure that the documents themselves match the search strategy. Some may have been indexed incorrectly. In other cases the terms that caused the document to be retrieved may be essentially unrelated to the document (*a false coordination*) or they may be related in a different way from that wanted by the searcher (*an incorrect term relationship*). Some of the retrieved documents may match the search strategy but not the request statement (expressed need of requester). This would happen, for example, if the search strategy includes some terms that are inappropriate to the request or if the search is conducted at a higher generic level than that specified in the request.

Some retrieved documents may match the request statement but not the recognized need of the user. This would occur in cases in which the request statement does not completely and accurately represent the recognized need of the requester. Finally, it is conceivable that some of the documents will match neither the request statement nor the recognized need but, completely fortuitously, will match the actual information need. This would imply that the system has retrieved some items that the requester, when he sees them, recognizes to be exactly what he needs to meet his present information requirement. These documents were outside the scope of his request statement because he was unaware that such documents existed. Consequently he could not, in his own mind, formulate his recognized need with

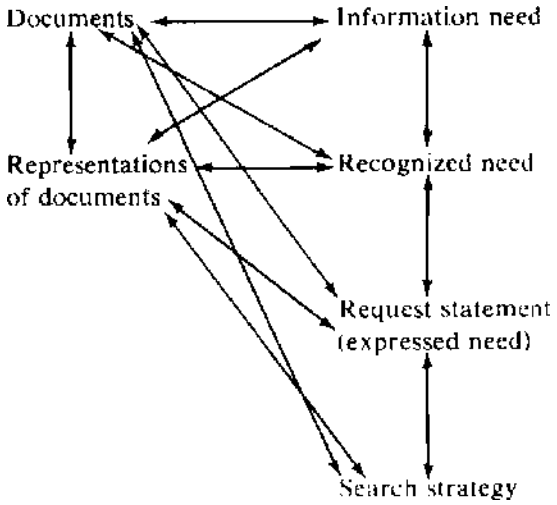

FIGURE 2.

sufficient clarity to allow this type of document to be encompassed by his request statement.

It is clear, then, that fairly complex relationships exist among the variables of information need, recognized need, expressed need, searching strategy, documents, and document representations. The whole situation is further complicated by the fact that some of these relationships are not constant over time. Both recognized needs and actual needs are quite likely to change. Thus, a document may match the recognized need of a requester one day but no longer match his recognized need on the day following. His perception of his need has changed in the intervening period.

Note that in the preceding discussion we have deliberately used the rather innocuous word "match" to refer to various relationships among requests, information needs, documents, and document representations. We now need to discuss what types of matches are involved, who can decide whether or not a match of a particular type has occurred, and what these matches might be called. The information specialist who conducts the search, or some other information specialist associated with the system, is probably the person who is in the best position to decide whether or not the document representation matches the search strategy. "Match" is really a very appropriate term for this relationship: a document representation matches if it contains a certain term, or combination of terms, included in the strategy. Anyone, in fact, who can read and understand the logic of the strategy can decide whether or not such a match has occurred.

Whether or not a particular document matches a search strategy is also best determined by the person constructing the strategy, although it could possibly be decided by another information specialist. This situation is a little more complicated than the one previously mentioned, in two respects:

1. We are concerned with more than a simple term or word match. Now we are concerned with relationships among terms or words (i.e., syntactic relationships).
2. The match we are concerned with is, in a sense, one between a document and an *intended strategy*. It is for this reason that the person formulating the search strategy is the one in the best position to judge whether or not the intended match has occurred.

This situation is perhaps best illustrated by a very simple example. Consider the case in which the searcher uses the strategy READING *and* EPILEPSY (i.e., he asks for documents that contain both words or have been indexed under both terms). Several document representations containing these terms or words are retrieved. That is, they all match the strategy. The "system" has retrieved what it was asked to retrieve and the search programs have behaved perfectly. But when the searcher looks at the set of documents corresponding to the retrieved representations he discovers that they are of two types:

1. A large group of documents discussing epilepsy caused by reading (i.e., a kind of photic epilepsy).
2. A small group of documents discussing the reading abilities of epileptic children.

It is the first group only that he intended to retrieve. The second group he did not want and, perhaps, did not expect.

In this case we can say that all the representations retrieved match the search strategy but that a few of the documents referred to do not match the intended strategy. The fault here is not with the search programs, or with the searcher's interpretation of the requester's needs, but with the indexing procedures and the indexing vocabulary of the system. If the indexing procedures were such that relationships among terms could be specified precisely (e.g., by the use of role indicators) or if the vocabulary was more specific (e.g., if the term READING EPILEPSY existed in the thesaurus) these unwanted items would have been avoided. We could hypothesize another situation in which a document representation contains the index term READING and the index term EPILEPSY (i.e., it correctly matches the search strategy) but refers to a document which, on examination, is determined to deal not with reading epilepsy but with some other form of the disease. The indexer misinterpreted the document and indexed it incorrectly. In this case the representation, as it stands, matches the strategy, but the representation is incorrect due to an indexing error.

These two relationships (between a document representation and a search strategy) are, in a sense, internal to the information system, and decisions as to whether or not appropriate matches have occurred need not involve either system users (i.e., requesters) or other subject specialists. In fact, in some cases at least, individuals not directly involved with the system may not understand why a particular failure occurred or even why a particular item was retrieved. It is probably best if we use neither the word "relevance" nor the word "pertinence" for these relationships but simply refer to document representations "matching a search strategy" and documents "matching an intended strategy."

Relevance

As mentioned earlier, however, we are concerned not only with matches between documents (or their representations) and searching strategies. We are also concerned with relationships between documents and request statements and relationships between documents and the information needs of users. After an information retrieval system has operated, and retrieved a set of document representations in response to a particular request, it would be possible to retrieve the documents referred to and to decide which of these documents match the request and which do not. Who is qualified to make such decisions? We could ask information specialists associated with the system, we could ask the requester, or we could ask one or more independent subject specialists to make these decisions. Clearly, the person making such a decision must know enough about the subject matter that he is able to agree that certain documents are legitimate responses to the request while others are not legitimate responses. "Legitimate response" is admittedly rather vague. The person making the assessment will presumably judge a docu-

ment to be a legitimate response if he feels that the subject matter of the document is sufficiently close to the subject matter requested that the system was "correct" in retrieving it. Unfortunately, these relationships are not very exact. How close is sufficiently close? Closeness of a document to a request cannot be measured precisely; the relationship is subjective and equivocal rather than objective and unequivocal. That is, different judges may make different decisions on the degree of association between a document and a request. It is also quite possible that the same judge may make different decisions on a particular request/document pair at different times. Inter-judge and intra-judge consistency, then, may both be somewhat low. Be that as it may, it seems reasonable to refer to this relationship as a "relevance" relationship. In other words, if a judge decides that a certain document is sufficiently close in subject matter to a particular request that the system was "correct" in retrieving it, it seems reasonable to say that he has judged the document to be *relevant* to the request.

Although other terminology could conceivably be used, we propose to adopt the term *relevance* to indicate a relationship existing between a document and a request statement *in the eyes of a particular judge*. It would be wrong to assume that relevance represents a precise, invariant relationship; it does not. In fact, rather than saying that a document is relevant to a request, it would be better to say that the document has been judged relevant to the request by a particular individual or group of individuals.

Since relevance decisions of this type are subjective and quite likely to be inconsistent, it may be dangerous to use a single set of relevance decisions (i.e., made by one individual) as the basis for an evaluation of the performance of a retrieval system. For a particular request for which a search has been conducted in the system, one individual may judge 60% of the retrieved items to be relevant, while a second may judge 45% to be relevant, and a third 50%. If we are interested in evaluating the performance of a retrieval system solely on the basis of the document/request statement relationship it would certainly seem desirable to involve a group of judges and try to arrive at some group consensus as to which documents are relevant to which requests. Use of several judges, working independently in making relevance decisions, would at least give us a ranking of documents in terms of "relevance consensus." We could then express the results of a particular search in the following form:

1. Thirty-five percent of the documents retrieved were judged relevant by all five judges.
2. Forty-three percent were judged relevant by at least four of the five judges.
3. Sixty-two percent were judged relevant by at least three of the judges, and so on.

Pertinence

It should be quite clear, however, that relevance decisions made on the basis of the relationship between documents and request statements have only limited

utility in the evaluation of operating information services. Such relevance decisions tell us nothing about the degree of success achieved in meeting the information needs of users (whether we consider "actual" needs or "recognized" needs)—and the service exists, presumably, to meet such needs. It is quite possible for a document to be judged of relevance to a particular request statement by all members of a panel of judges, but for the requester himself to decide that the document is of no value in satisfying the information need that prompted his request to the system. If all of the documents retrieved by a search are judged of no value by the requester (i.e., they do not contribute to the satisfaction of his information need), he will consider the search a failure *however many judges we may get to agree that the documents are relevant to the request statement.*

Significant differences between document/request relevance judgments made by a panel of judges and document/information need value judgments made by the requester himself would indicate, of course, that the request statement (expressed need) upon which the system operated was an imperfect representation of the actual information need. We should not be too surprised, in fact, if these two sets of decisions should differ widely in some searches because, as Lancaster has pointed out (*2*), it is frequently quite difficult for even a sophisticated requester to make his actual information needs known to an information center. To mention but one example, reported by Lancaster in his evaluation of MEDLARS (*4*), a search conducted on the basis of the request statement "Cancer in the fetus or newborn infant" retrieved 1,167 journal articles, most of which would be judged relevant to the request statement by any panel of medical practitioners. But the requester himself made an inexcusably bad request to the system, one much more general than his actual information need. He was really interested in "the relationship between teratogenesis and oncogenesis at the cellular level," a highly specific topic, and he judged only one of the 1,167 documents of value in contributing to the satisfaction of his information need!

Some people would argue, and have in fact argued in the literature, that a system should only be judged on the basis of the request/document relationship and that it can only be expected to do what it was asked to do. If, for example, a system is asked to retrieve documents on cancer in the fetus or newborn infant and does so—in the estimation of a panel of judges—it has behaved properly whatever the requester may think of the result. This is a very narrow philosophy, one that completely ignores the fact that it is the responsibility of the system to ensure, as far as possible, that the requests received accurately reflect the information needs of system users. A system that accepts all requests at face value, and judges its own performance in terms of how well it responds to these requests, is almost certainly doomed to failure.

If we are interested in evaluating a "real" information service (i.e., one with real users making real requests based on real information needs), it is imperative that we evaluate it in terms of how well it satisfies the information needs of its users. Clearly, only the requester can decide whether or not a particular document contributes to the satisfaction of his information need since only he knows what this need is. We could refer to these decisions as relevance decisions also. They are

"relevance to an information need" decisions rather than "relevance to a request" decisions. However, it might be more appropriate to use the term "pertinence" in this case. That is, we could use "relevance" to refer to a relationship between a document and a request, based on the subjective decision of one or more individuals, and use "pertinence" to refer to a relationship between a document and an information need, the decision in this case being made exclusively by the person having the information need. Frankly, the terms we choose to use are quite unimportant. We could as well use "buz" to refer to one of these relationships and "biz" for the other. It is important, however, that we recognize the distinction between these two relationships (request/document and information need/document), that we recognize who is qualified to make the decisions in each case, and that we consistently use whatever terminology we choose. To achieve this consistency we will use the term *pertinence* to refer to a relationship between a document and an information need and the term *relevance* to refer to a relationship between a document and a request statement. This is an arbitrary decision made purely for the sake of convenience. It is our preference to think of these relationships as "relevance to a request" and "relevance to an information need," discarding the term "pertinence" completely.

As defined above, pertinence decisions are value judgments made by requesters. The decisions reflect the value of a document, at a particular time, in contributing to the satisfaction of an information need. A particular set of such value judgments is "true" only at a particular point in time (i.e., the time at which the decisions are made) because information needs, unlike request statements, are unstable—they change, sometimes kaleidoscopically. Thus, a user may come to an information service and make a request based on a recognized information need. Suppose that the system is able to respond virtually immediately (as it might if it is based on printed indexes or on-line services) and retrieves 25 documents. The moment he sees the first document the requester's perception of his need may change, and this change will inevitably influence the remainder of his pertinence decisions. This first document may be exactly what he needs; it satisfies his information requirement completely. He may judge the sixth document he sees as of no value because it essentially duplicates the first; the information is redundant. Yet, had he seen the sixth document first he might well have judged it of value (pertinent) and the first document, coming later in the sequence, of no value. If, instead of receiving the search results on the day of his request, the results were delivered some days later, the requester's perception of his need will have been influenced by all that he has learned in the intervening period. The value judgments he makes on the 25 documents on day 10 will not necessarily be the same as the value judgments he would have made on these same documents on day 1, and both of these may differ somewhat from the judgments he would have made on day 5.

Pertinence decisions, then, are very transient things, much more transient than relevance decisions. They are influenced both by the passage of time and by the sequence in which the decisions are made. This does not make the operation of information services any easier, but it is a fact of life that designers, managers, operators, and evaluators must recognize and be able to adapt to.

By way of summary, the various relationships we have discussed in this article are shown in Table 1, along with a statement as to who is qualified to judge whether or not the relationship holds, and the reasons why we might want to determine whether or not it holds. The four relationships are listed in order of complexity. In terms of their value in system evaluation, the data reflecting these relationships may be considered cumulative. This statement can be explained as follows:

1. If we know which document representations retrieved by a particular search actually match the search strategy used, we can identify problems in the search programs. This is actually a trivial case: we would expect no failures of this type in any but a grossly inefficient system. We do not learn anything, in this level of evaluation, about the quality of the indexing, vocabulary, or search strategies.
2. If we know which documents, corresponding to the representations retrieved by the search, satisfy the intended strategy of the searcher, we can identify problems in the search programs (if any exist) plus other system problems relating to indexing, vocabulary, or search strategies (as identified in Table 1). We do not, however, learn anything about the quality of the search strategy as a representation of the request statement.
3. If we know which documents, corresponding to the representations retrieved by the search, are judged relevant to the request statement (by, say, a jury of subject specialists), we can identify problems in the search programs, in the indexing, in the vocabulary, and in the search strategies. We can also identify

TABLE 1

Some Relationships of Importance

Relationship	Question to be asked	Terminology
1. Between search strategy and document representation	Do the terms included in the representation satisfy the logic of the strategy?	*Match* between strategy and document representation
2. Between document and search strategy	Is this document the type of document (in terms of subject matter) that the searcher wanted to retrieve?	*Match* between document and intended strategy
3. Between document and request statement	Is this document a correct response to the request made to the system? (Is its subject matter the subject matter requested?)	*Relevance* of the document to the request
4. Between document and information need	Does the document contribute to satisfying the information need of the requester?	*Pertinence* of the document to the information need

cases in which the search strategy does not completely or accurately reflect the content of the request statement. We still do not know anything about how well the retrieved documents satisfy the information needs of the user and thus have no ability to identify inadequate or misleading request statements due to imperfect user–system interaction.

4. If we know which of the retrieved documents are judged by the requester to contribute to the satisfaction of his information need (i.e., pertinent documents), and if we also know the reasons why he judges the other documents to be nonpertinent, we can distinguish the relevance of the search results from the pertinence of the search results. In this situation, through appropriate analysis techniques, we can identify all types of problems that might occur in the retrieval system, be they problems of search programs, indexing, vocabulary, search strategy, interpretation of the request by the searcher, or user–system interaction. The use of this type of diagnostic analysis is exemplified in Lancaster's evaluation of MEDLARS (*4*).

It is important to note, however, that the levels of evaluation mentioned in Table 1 are based only on the documents that the system retrieves and not on the documents that the system fails to retrieve. That is, we have not identified:

Documents whose representations match the search strategy but were not retrieved.
Documents that match the intended strategy but were not retrieved.
Documents that are relevant to the request statement but were not retrieved.
Documents that are pertinent to the information need but were not retrieved.

in Information Retrieval

Person qualified to answer question	Reasons for wanting answer to question
Any information specialist who understands the system in use.	To determine if the search programs or procedures are working correctly.
The person preparing the search strategy. Other individuals knowledgeable on the subject matter and the system.	To identify the problems listed in No. 1 above. To identify cases of misindexing. To identify syntactic (relational) problems in the system and other problems relating to its vocabulary. To identify errors in the search strategy.
Someone knowledgeable in the subject matter or a jury of people knowledgeable in the subject.	To identify the problems listed in No. 2 *plus* to identify problems of misinterpretation of the request by the searcher.
Only the requester himself.	To identify the problems listed in No. 3 *plus* to identify problems of user–system interaction leading to discrepancies between the recognized information need and the expressed need (request statement).

To make these determinations we must have some method of estimating how many matching, relevant, or pertinent documents the system failed to retrieve, and we need to be able to identify some at least of these missed documents. Some possible procedures for doing this are described in the article on *Precision and Recall* elsewhere in this encyclopedia.

The Literature on Relevance

So far in this article we have restricted ourselves to presenting our own position on this subject but have made very little reference to the work or opinions of others. In the remainder of this article we will mention some other literature that has addressed the problems of pertinence and relevance. This is not intended to be a complete survey but merely to refer the reader to further literature that may help to clarify some of the distinctions made earlier and to give a more complete picture of the factors that influence relevance or pertinence decisions.

Kemp (*5*) and Foskett (*6,7*) both adopt the distinction between relevance and pertinence that has been used in this article. Kemp points out, as we implied earlier, that for some purposes of system evaluation, relevance decisions will suffice; for other purposes, however, it is necessary to obtain pertinence decisions. Kemp refers to relevance decisions as being public and objective, whereas pertinence decisions are private and subjective. We are not fully in agreement with this. Relevance is not objective. If it were, there should be perfect agreement among a group of judges on the relevance of various documents to various requests. Complete agreement of this kind is unlikely to occur. Kemp also draws analogies between the relationships of pertinence and relevance, on the one hand, and the relationships implied in alternative pairs of terms derived from other fields: denotation and connotation, semantics and pragmatics, formal communication and informal communication, and public knowledge and private knowledge. Foskett in 1970 (*6*), and again in 1972 (*7*), makes the same distinction between relevance and pertinence that has been made in this article. He defines a relevant document as one:

> . . . belonging to the field/subject/universe of discourse delimited by the terms of the request, as established by the consensus of workers in that field . . .

and a pertinent document as one:

> . . . adding new information to the store already in the mind of the user, which is useful to him in the work that prompted the request.

Foskett notes that frequently, but not always, pertinent documents will also be relevant documents, and vice versa.

Cooper discusses the subject of relevance at considerable length (*8*). Essentially he draws the same distinctions that we have. However, he uses the term "logical relevance" (or "topicality") where we have used "relevance," and the term "utility" where we have used "pertinence." Elsewhere Cooper has argued that information retrieval systems must be evaluated on the basis of the "utility" of their results (*9*):

> . . . it is really documents of high utility, and not merely relevant documents, that the user wants to see.

We are, of course, in full agreement with Cooper on this.

Goffman fails to distinguish between relevance and pertinence (*10*). He defines relevance as "a measure of information conveyed by a document relative to a query," which is comparable to the position taken by Foskett, Kemp, and ourselves, and equivalent to Cooper's "logical relevance." Goffman goes on to say, however, that:

> Any measure of information must depend on what is already known: a fact which must be recognized in any assessment of the relevance of a document with respect to a query.

This statement is somewhat confusing because the expression "what is already known" suggests the pertinence relationship rather than the relevance relationship. Goffman's point is that relevance cannot be determined for every document/request pair independently, but that a decision on the relevance of one document, with respect to a request, must be made in relation to decisions on other documents with respect to this same request. We would agree with this only to the extent that we agree that relevance is relative and capable of being judged on some type of scale. That is, it should be possible to ask our relevance judges to divide up a set of documents into at least three sets: (*a*) clearly relevant to a particular request statement, (*b*) relevant to the request statement but less relevant than the (*a*) documents, and (*c*) not relevant. In this sense the relevance decisions are relative since they group or separate documents on the basis of "extent" of relevance. We cannot, however, agree with Goffman if his statement implies that the sequence with which documents are presented to the judge will influence relevance decisions and that the judge might decide that a particular document is irrelevant because it duplicates one seen earlier. This type of decision would not be a relevance decision but a pertinence decision, a value judgment made on a document in relation to an information need. Unfortunately it is not clear what Goffman really means because he fails to distinguish between relevance and pertinence and between actual information needs and expressed needs.

Wilson has introduced the term "situational relevance," which he defines as (*11*):

> . . . relevance to a particular individual's situation—but to the situations as he sees it, not as others see it or as it "really is". . . .

He goes on further to state that situational relevance is related to *concern* and not merely to *interest*. A person might be interested in a particular object or activity without being concerned about it (i.e., caring about its condition). Wilson views items of information as situationally relevant if they "answer, or help answer, questions of concern." The notion of situational relevance is compatible with the set of relationships we identified at the beginning of this article. Although Wilson places many more restrictions on the definition of the term, situational relevance relates to the relationship between information and *perceived information need*

rather than to the relationship between information and *actual need* or *expressed need.*

Belzer uses "relevance" where we have used "pertinence" (*12*):

> Upon completion of reading the document the user would know, precisely, whether it was relevant to him or not. This is irrespective of the query posed to the system.

The second sentence indicates that Belzer recognizes the distinction between relevance to request and pertinence to information need. He chooses, however, to ignore the former.

O'Connor has discussed the subject of relevance in a series of articles. In one of these (*13*) he analyzes, in some detail, the request/document relationship and the effect of the clarity of the request (or lack of it) on relevance judgments. Elsewhere (*14*) he has reported on an empirical study of agreements and disagreements in deciding whether or not a particular document "answers" a particular question. O'Connor, although he never explicitly says so, seems to imply that relevance decisions are acceptable bases for system evaluation, but that pertinence decisions are not. At least, he is quite critical of those who claim that a system must be evaluated in terms of user needs, mainly on the grounds that "satisfaction of a user's need" is rarely defined precisely. While we might agree with O'Connor on this last point, we cannot agree that the concept of "satisfaction of a user's need" is in any way obscure or that it is not susceptible to definition. These points have been argued in the literature by O'Connor (*15,16*) and Lancaster (*17*), to the satisfaction of neither one of them.

Various investigators have explored the effect that different forms of document surrogate have on relevance decisions. Typically these studies compare relevance or pertinence decisions made by the same judge, or group of judges, when given varying levels of information about a particular group of documents. For example, the judges may first be asked to make relevance predictions on the basis of titles, then on titles plus abstracts or titles plus selected paragraphs of text. Finally, they are asked to judge the relevance of the documents themselves. The results are then compared to determine how much agreement there is between the relevance predictions made on the basis of the various forms of surrogate and the actual relevance decisions based on the documents. Studies of this general type have been reported by Saracevic (*18*), Rath et al. (*19*), Resnick (*20*), Belzer (*12*), Kent et al. (*21*), Dym (*22*), Shirey and Kurfeerst (*23*), and Marcus et al. (*24*), among others. As might be expected, relevance predictions generally improve (in the sense that the surrogate-based *predictions* agree with the document-based *decisions*) as more information is made available to the judge. Marcus et al. (*24*) refer to the quality of a surrogate, in terms of its value in making correct relevance predictions, as its *indicativity*. They point out that, in general, the indicativity of a record varies directly with its length in number of words.

Two major series of studies have investigated the factors that influence relevance decisions. One of these, conducted by the System Development Corporation (SDC), has been reported by Cuadra and Katter (*25,26*) and by Cuadra et al. (*27*). The

second, conducted by Western Reserve University, has been reported by Rees and his co-workers (*28,29*).

Many variables influencing relevance judgments were identified and investigated in the SDC studies; pertinence to information needs, however, was really not considered. Cuadra and Katter (*26*) summarize as follows:

> The studies offer clear evidence that relevance judgments can be influenced by the skills and attitudes of the particular judges, the documents and document sets used, the particular information requirement statements, the instructions and setting in which the judgments take place, the concepts and definitions of relevance employed in the judgments, and the type of rating scale or other medium used to express the judgments. These findings cast serious doubt on the wisdom of treating relevance scores, as usually obtained, as fully adequate criteria for system or subsystem evaluation.

The Western Reserve studies took into account four major variables influencing relevance decisions: stage of research, documents, document representations, and relevance judges. Again, relevance rather than pertinence was investigated. As in the SDC studies, the Western Reserve investigators were able to show that many variables affect the decision as to whether or not a particular document is relevant to a particular request. For example, the degree of the judge's subject knowledge will influence his relevance decisions and will influence the consistency with which such decisions are made by a group of judges. Likewise, somewhat different relevance judgments may be made, for a particular set of documents in relation to a particular request statement, at different stages of a research project. That is, the documents judged most relevant by an investigator when he is just beginning a research project may not be judged most relevant toward the end of his project when he is analyzing his own research results.

The most complete discussion of the relevance question is given in a doctoral dissertation by Saracevic (*30*). Saracevic has also prepared a very useful, concise summary of the major findings of various investigators working in relevance experimentation over a 10-year period (*31*).

Because so many factors influencing relevance judgments have been identified, particularly in the SDC and Western Reserve investigations, it is hardly surprising that serious doubts have been voiced on the wisdom of basing system evaluations on relevance decisions. It has to be recognized, however, that, while some of the work on relevance decisions applies equally to pertinence decisions (e.g., the influence of the research stage and of the indicativity of a surrogate), much is not directly related. In particular, many of the variables investigated relate to inter-judge consistency and do not necessarily affect pertinence decisions, which are highly individualistic. In pertinence decisions, which, as stated earlier, are essential to the evaluation of operating information services, we are concerned with factors influencing intra-judge consistency but not directly with factors influencing inter-judge consistency. Stated in more concrete terms, when we conduct a search in a retrieval system for a particular user we should be very much concerned with his evaluation of the retrieved items in terms of their pertinence to his information needs. We

should also be concerned with the factors influencing his pertinence decisions. But we need not be directly concerned with the fact that a group of subject specialists, when presented with the documents retrieved and with the user's request statement, may not agree among themselves as to which documents are relevant to the request. We need be even less concerned with the factors influencing their decisions. Such a study may have academic interest but it is not directly related to the evaluation of this particular information service. Much interesting and valuable work has been done on the relevance problem that has little direct application to the pertinence problem. Indeed, most of the investigations could not contribute directly to our understanding of the pertinence problem because they were conducted in controlled, experimental settings. Studies of pertinence can only be done within the context of a particular information system serving real users who have real information needs. This situation cannot be simulated successfully in any laboratory setting.

This is not to imply that the relevance problem is not worth investigating or that the studies of factors influencing relevance decisions have no value. Relevance is worth investigating and the studies do have considerable value. As pointed out earlier, for some purposes of evaluation we may want relevance decisions rather than pertinence decisions. There is a danger, however, in assuming that research on relevance has direct applicability to the matter of pertinence and, more particularly, that the large number of variables affecting the consistency with which relevance judgments are made are directly related to the factors influencing pertinence decisions—they are not, or, at least, not necessarily. Clearly, many factors influence the decision of a user as to whether or not a particular item is pertinent to his information needs. These may not be the same factors that would influence his decision were he asked, somewhat artificially, to judge if the same item is relevant to his request statement. The fact is that, while much work has been done on relevance, the more important problem of pertinence has largely been ignored by investigators, perhaps for the very reason that it is not amenable to controlled, experimental study.

There is another point worth emphasis. Although we may get disagreement among a group of judges as to which documents are relevant to a particular request statement, these variations in relevance judgment will not necessarily invalidate certain types of evaluation. Lesk and Salton (*32*), for example, have shown quite clearly that inconsistency among relevance judges may have no effect on certain internal aspects of system evaluation. For example, if we wish to compare three different ways of conducting searches in a particular system, we may arrive at the same relative ranking of the performance of these alternatives whichever of, say, five judges makes the relevance decisions. That is, we could get inconsistency among the judges without necessarily changing the relative rankings of the search techniques. In fact, the Lesk and Salton study revealed that even "large scale differences in the relevance assessments" did not produce "significant variations in average recall and precision" for various searching options.

In conclusion we would reiterate that, for certain evaluation purposes, we need relevance decisions, while, for other evaluation purposes, pertinence decisions are essential. Much work has been done on factors influencing relevance but very little

on factors influencing pertinence. Both are subjective and equivocal. This does not make them any the less important in system evaluation.

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PERU, LIBRARIES IN

Introduction

Peru is located in the central western part of South America on the shores of the Pacific Ocean. Its area is 1,285,215.62 square kilometers (496,222 square miles), and its population of about 15,869,000 is of diverse social groups, of differing economic levels, and of various cultures. The Andes determine the topography of sharp and varying contrasts, establishing the classic geographic regions of coastal plain, mountain range, and forest. The fundamental cultures have developed according to the topographical influences on the lives of the inhabitants of the different regions. Two basic cultures have grown up: rural and urban, the mixture of which has produced a culture that is authentically Peruvian, created by the population in thousands of years of living together and defying the physical challenge of the terrain.

PRE-INCA AND INCA EPOCH

Some 15,000 years ago, more or less, a group of hunters and fruit-gatherers penetrated what is now Peruvian national territory from someplace that cannot be conclusively determined. Archaeological remains reveal that the first human traces in the country are notable for their quality, artistic inspiration, and the advanced culture which the discoveries denote. In the 12th century, a Quechua-speak-

ing people ruled by the Incas established the Tawantinsuyo Empire in Cuzco ("the navel"), which extended from the southern part of Colombia to what is now Tucuman in Argentina and Maule in Chile. Although they respected the customs and religious beliefs of the conquered nations, the Incas imposed the Quechuan language in order to unify their empire.

The Inca "Son of the Sun" was an absolute monarch. The Amautas taught and maintained a cult of heroes and glory of the empire. A characteristic of this culture, among other manifestations, was that of no human sacrifices. We can affirm that a process of education existed which began in the home, where the moral precepts were imparted. The intellectual preparation consisted of oral instruction in the study of the Kipus, handfuls of distinctly colored cords with knots, which signified important deeds and recorded statistical facts, managed by the expert Kipucamayocs (see Figure 1).

The educational institutions established by the Inca Pachacutec and ruled over by the Amautas were Yachaywaci and Acllawasi. The goal of the system was to educate a man for collective living and to make him adept at the various functions and activities entrusted to him.

The chronicler Sarmiento de Gamboa recounts that Pachacutec called together "the historians of all the provinces subject to him" and others of the kingdom. He maintained these men in Cuzco and interrogated them about the ancient history. Having become acquainted with the most notable events, "he caused all to be painted, by his order, on great tables and designated a great room in the palaces of the Sun, where the gilded tables were set up, serving like our libraries, and he constituted authorities who were supposed to understand and declaim what was told on the tablets. No one, other than Inga [Inca] and the historians, was allowed to enter except with the express permission of the Inga." In the epoch of the conquest the word for libraries was "librerias" rather than "bibliotecas."

CONQUEST AND COLONIZATION

Francisco Pizarro, who conquered the empire of the Incas, left Panama in January of 1531. He founded the city of Piura in 1532, then he crossed the Andes and arrived at Cajamarca, where the forces of the ruling Inca Atahualpa were gathered. He took the Inca prisoner and had him put to death.

On January 18, 1535, Pizarro founded a new capital with the name of City of the Kings on the banks of the River Rimac, which was called Lima, a derivation of the original name. Blasco Núñez de Vela assumed command in 1544 as the first viceroy of Peru.

The viceroys selected by the Tribunal of the Royal Audience conducted the government of Peru for the next two and a half centuries. The Viceroyalty of Lima came to have jurisdiction over Panama and all the Spanish territory of South America with the exception of Venezuela. Some of the viceroys were distinguished by their managerial skill, as jurists, and for stimulating letters and sciences. Beginning with the execution of Atahualpa, the Inca, or with Spanish domination, the

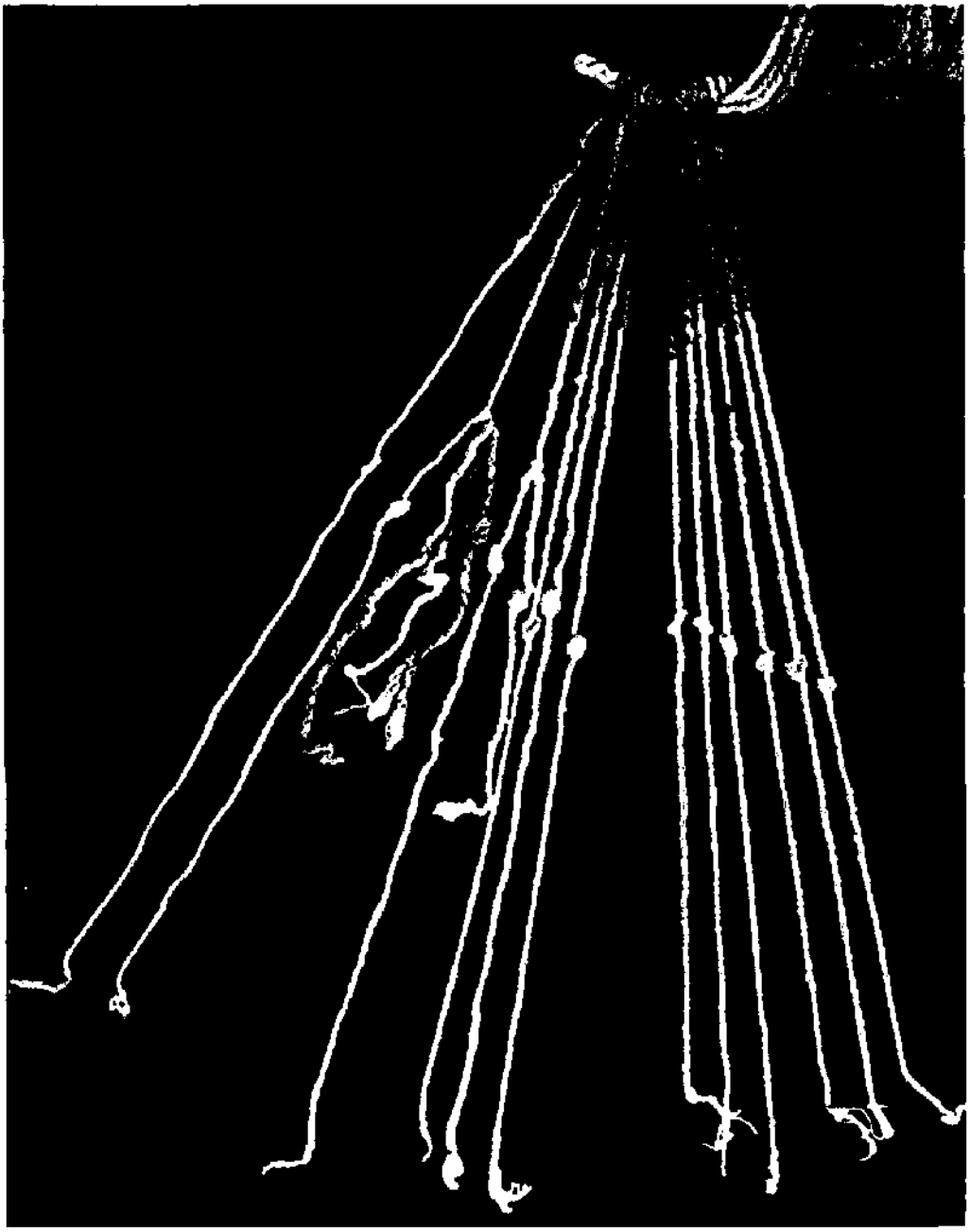

FIGURE 1. *Kipus (communication system used in the epoch of the Incas).*

stage of transculturation appears, with its greatest impact in the area of education. Writing and the book replaced the educational tools of the Incas, the Kings, the Kipus, and the Kilcas, and the official language became Spanish rather than Runasimi or Kechua.

There were two educational efforts: one was spiritual and religious, the other was devoted to practical economics and politics. The colleges and universities were directed by the members of holy congregations. Elementary schools were founded

under the jurisdiction of the bishops in order to convert and indoctrinate the native Peruvians.

University education began in Peru with the founding of the University of San Marcos on May 12, 1551, as a responsibility of the Dominican order. On August 13, 1581, the University of San Marcos sent a letter to King Philip II requesting authorization by the throne for the founding of a press in Lima. Lima had the good luck to be the first city in South America that could rely on a press.

King Philip II dispatched the authorization on August 22, 1584. However, it arrived after the installation of a press elsewhere, because at the solicitation and insistence of the Provincial Council (convened by the Archbishop of Lima, later Saint Toribio of Mogrovejo), the Royal Audience authorized the Italian Antonio Ricardo to install a press in the College of the Jesuits to print the first incunable of South America, the *"Doctrina Christiana y Catecismo . . .* [It was meant to instruct the Indians and other persons who needed to be taught our faith and was translated into the two most commonly used languages of the realm, Quichua and Aymara] Ciudad de los Reyes, Antonio Ricardo . . . 1584." (See Figure 2.)

In all the convents and monasteries of the colony, there were valuable libraries which the religious orders guarded zealously. Among the most important were those of the Franciscan order, with the library of Ocopa the first among these. This library was created with duplicate copies from the Convent of San Francisco of Lima. It should be noted that the word commonly used for libraries then, now means bookstore, and the Rules of the Franciscan order, as well as its General Constitution, contained sections that would guarantee the conservation and protection of books.

The libraries of the Jesuits were no less rich and no less famous than those of the Franciscans. Outstanding among these was the library of the College of San Pablo in Lima, the bookstock of which reached 40,000 volumes according to later calculations.

In the colonial period there were a few famous private libraries, most of the bookstock of which was obtained from the first bookstore in Lima, that of the purser Agustin de Zárate. One must take into account the fact the 15th-century books were free of every kind of import duty. In 1712 the polygrapher José Eusebio de Llano Zapata made known to the authorities the first intention to create a public library and proposed that the university library be opened to the public.

In September of 1767 the Viceroy Amat disestablished the College of San Pablo and ordered its library closed. On January 25th the University of San Marcos, which coveted the library, sent a petition to the king that he make a judgment in the university's favor regarding these books of the Jesuits. This was conceded, and the university acquired a magnificent library with an excellent bookstock representing all branches of knowledge, written in ancient, modern, and those aboriginal languages which were of most importance in the New World. It had been created over a period of two centuries with books brought from all the countries from which the Jesuits emigrated to Peru, and by importation. Its collection was so complete and thorough that the physicians of the colony begged permission to

DOCTRINA
CHRISTIANA,
Y CATECISMO PARA INSTRVC-
cion de los Indios, y de las de mas perſo-
nas, que han de ſer enſeñadas en nueſtra ſancta Fé.
CON VN CONFESSIONARIO, Y OTRAS COSAS
neceſſarias para los que doctrinan, que ſe con
tienen en la pagina ſiguiente.
COMPVESTO POR AVCTORIDAD DEL CONCILIO
Prouincial, que ſe celebro en la Ciudad de los Reyes, el año de 1583.
Y por la miſma traduzida en las dos lenguas generales,
de eſte Reyno, Quichua, y Aymara.

DVLCE TVVM NOSTRO
NOMINE NOSTRA SALVS.
SCRIBA SIN PECTORE NOMEN
NAMQVE TVO CONSTAT

IHS

Impreſſo con licencia dela Real Audiencia, en la
Ciudad de los Reyes, por Antonio Ricardo primero
Impreſſor en eſſos Reynos del Pirv.
AÑO DE M.D. LXXIIII AÑOS.
Eſta taſſado vn Real por cada pliego, en papel.

FIGURE 2. *Cover of the first imprint in Peru and South America.*

study in the library. Little by little other notable men of the epoch gained for the library the distinction of being a research center of the first rank.

The rules of the University of San Marcos of 1771 for the first time recognized the importance of the library and undertook methods for the preservation of books as a result of the incorporation of the library of San Pablo into the university library.

After the expulsion of the Jesuits in the second half of the 18th century, a new period began with the emergence of a constellation of personages whose actions renewed the orientation of education toward their movement of personal commit-

ment. Among the group were José Baquijano y Carrillo, Toribio Rodríguez de Mendoza, Hipólito Unanue, and Vicente Morales Duárez. The patriotic "Sociedad Amantes del País" was founded and published the *Mercurio peruano* (1791) in which the realities of Peru were studied. The influence of this movement was decisive in the emancipation of Peru.

From the insurrection of Tupac Amaru on November 4, 1780, until the disembarkation of San Martín in Paracas on September 7, 1820, one event followed another in the rebellion, each of which fell short of triumph but demonstrated the fervent desire of the Peruvians for independence. On July 28, 1821, San Martín proclaimed independence in Lima although the power of the Spaniards remained intact. The war continued until the signing of the instrument of capitulation at Ayacucho on December 9, 1824.

A change of internal doctrine and the replacement of old symbols with new constituted the characteristic of the emancipation as it tried to create cultural conditions appropriate for a country fully abreast of the modern world. There were created the National Library, the Patriotic Society, the National Museum, and the Normal School. Of particular note are the decrees which created primary schools and the grammar schools for the education of girls.

THE REPUBLIC

Peru has been a unitary and democratic republic for the past 156 years. It is divided, politically, into 23 departments, one constitutional province, 143 provinces, and 1,488 districts. Local government is delegated to municipal councils, formed by the mayors and councils of each of the capital cities of the departments, provinces, and districts. These councils have, among other duties, responsibility for public services, towns, and the development and preservation of the cities. From the first days of the republic a radical change was represented in the political and administrative rules of life when the Peruvian man suddenly became a citizen. But these rules continued the conditions of colonial life. Colleges were created, of note the founding of the College of Guadalupe in 1840; education for women increased; the government studied ways to encourage public education throughout the republic. Nevertheless, despite the principal universities, colleges, cultural institutions, and municipalities busy with the organization of libraries and private libraries where valuable bibliographic collections were maintained, there existed no appropriately structured library system and no proper library legislation.

The Reformation of Education

The Law of Education Reform, number 19326 of March 21, 1972, restructured the national system of education, increasing the technical capacities of students. The state offered an educational system to all the population which guarantees the formation of a work force needed for Peruvian society. Education offered by the state is free at all levels with the objective that no one in the country will be re-

strained by insufficient finances from the possibility of access to the educational system. The law is consecrated to nuclearization, introduced as an adequate creation for the Peruvian situation, with the objective of giving to the community the role of managing the educational forces.

Political Culture of the State

The Peruvian state declared the promotion of various expressions of culture to be a national need and of social interest, along with the preservation of the cultural patrimony and preservation of the cultural heritage of the nation, especially those indigenous valuables native to Peruvian culture.

There are also many private and official institutions in the country which encourage original cultural manifestations. This philosophy has brought about a notable growth. The course of history provides abundant material for young investigators in literature, the plastic arts, and music—in each of which the appreciation of the Peruvian experience is absorbed within universal forms. Science and technology, meanwhile, open the way for a response with the framework of progress.

In order to fulfill the role that corresponds with the plan for cultural, economic, and social development proposed by the homeland, libraries are empowered to cover all fields of information and to utilize techniques consonant with the needs of users which will put into practice the motto one reads at the entrance of the National Library: "Culture like wealth is fertile when used in the service of humankind."

The National Library

On August 28, 1821, even before the end of the festivities celebrating the proclamation of independence, General José de San Martín and his minister, the Colombian Juan García del Río, convinced of the influence that the arts and sciences would exercise on the prosperity of the new nation, issued the decree which founded the Biblioteca Nacional [National Library]. It stated:

1. A public library will be established with the name Biblioteca Nacional del Perú; the College of Liberty will from now on remain dedicated to this purpose as well as all other things which are connected with it.
2. While an edifice is being designed, to which the establishment of education that actually exists in that college will be transferred, the rooms designated by the minister of state as needed for the time being will be put at the disposal of the library.
3. There will be two librarians, two officers of the library, two custodians, and two helpers; their stipends will be announced in a separate decree, and their respective duties will also be detailed with appropriate regulations.
4. The prebendary D. Mariano Arce will be the first librarian and the presbyter D. Joaquín Paredes, the second.
5. All useful books that may be found in whatever public place will be deposited with due formality in the National Library.

6. The presses of this capital city will deposit two collections of all public papers and other works which have been published since the proclamation of independence, and the presses will continue to be obliged to send two copies of whatever may be printed.
7. All the funds under the control of the Directorate General of the Census and Pious Works will be applied hereafter to the encouragement of public instruction; as a consequence of the expenses incurred by the establishment of the library, its increase and preservation will be met with the yield of those funds.
8. The minister of state, charged with the execution of this decree, will be the director-designate of the National Library. This decree will be inserted in the *Official Gazette*.

Given at the Palace of the Supreme Government of Lima, this eighth day of February of 1822. Attest: (signed) Torre-Talge, by order of His Excellency, B. Monteagudo.

Understanding the influence of letters and sciences on the prosperity of a nation, It is therefore decreed:

1. A National Library will be established in this capital city for the use of all those who may be gratified to concur.
2. The minister of state of the department of the government under whose protection the library will be established will be in charge of all that is necessary in planning for it.

On September 17, 1822—with the assistance of the Supreme Commander, General San Martín—high public officials, directors of educational institutions, and much of the public celebrated the inauguration of the library, concluding the ceremony with the words of General San Martín:

> The Library is destined to be a universal illustration, more powerful than our armies in sustaining our independence. Literary works will give strength to independence, bringing together individuals for the reading of books, by stimulating the people at large to enjoy the pleasures of study. I hope it will succeed in this effort, and this establishment, the fruit of much governmental concern, will be frequented by all those who love learning and the fatherland.

At the time of its inauguration there were 112,256 volumes in the library, among which 762 had been donated by its protector José de San Martín, along with those collected from the University of San Marcos, the town hall, various religious orders, and many volumes given by leading citizens. The College of Liberty, which had belonged to the Jesuits, was reserved for the installation of the library and its hours of public service fixed, providing as much time as the customs of the people permitted: from eight in the morning until one in the afternoon, and from four until six.

Shortly after its inauguration, the library suffered the first of its many disasters. It was sacked on two different occasions by royalist troops, leaving the presbyter Joaquín Paredes, the director from 1825 to 1836, to repair the damage. In 1830 a decree required that a tax of 3% of the value be paid on all books brought into Peru, the proceeds from which were to be used for the purchase of books and for other expenses of the National Library. The tax was increased to 6% in 1840. A

Supreme Order of 1847 obliging all the printers of the territory to send copies of everything that was published by their respective presses to the library was issued and put into effect.

It is evident, as these decrees confirm, that with its founding the library was given the task of bringing together all the bibliographic production of the country.

In 1881, when Lima was occupied by Chilean troops, the rooms of the library were requisitioned as barracks for one of the Chilean battalions, and the books were considered the booty of war. The National Library, unfortunately, had been surrendered. Its director, Colonel Odriozola, using an energetic letter written by his subdirector, Ricardo Palma, protested, but both men were seized as prisoners of war.

When the government of General Iglesias arrived in Lima in 1881, it was confronted with necessity of reopening the National Library as a solution to the grave problem of a people far from the centers of knowledge. It was decided to name Ricardo Palma, a famous author, as the director. On receiving the news, he asked, "Do you select me so that I can convert myself into a beggar librarian?" Thus began the great tradition of soliciting donations throughout Peru and abroad to rehabilitate the library as the work of the director, a post Palma held for 28 years. Thanks to his patient and generous effort, investigators of political, social, economic, literary, and scientific history are able to realize their desire to have before their eyes the books and documents they anxiously need.

On July 28, 1884, the doors of the library reopened in order to proceed with its labor of cultural diffusion. The collection had reached 27,824 volumes, of which 8,315 had been private gifts. The work of obtaining this collection had been arduous, as Ricardo Palma explained in a report to the minister of justice and instruction on December 2, 1883. Under the heading, "State in which I received the establishment," he said: "There is no library. Of the 56,000 volumes it once contained, I found only 738." By the beginning of the 20th century, the collection reached 34,750 volumes, 835 periodical runs, 1,326 volumes of pamphlets and various documents, and 340 manuscripts.

On May 10, 1943, the National Library was devastated by a terrible fire that reduced the entire collection to a pile of ashes. The government called on Dr. Jorge Basadre to ask him to take charge of the reconstruction and reorganization of the library. To do so, Dr. Basadre had three conditions to be met:

1. The reconstruction would be on the basis of a technical plan.
2. He would have full authority.
3. A National School of Librarians would be created, and he recommended that in view of historic motives, the new library would be built in the same place where it had always functioned.

A vast program of publication was begun. In 1943 the first issue of the *Boletín de la Biblioteca Nacional* appeared, destined to relate the progress of the institution and provide useful information to its readers. In 1944 *Fénix* appeared, a review dedicated to library science with, from its first numbers, articles on the history of

the National Library. In 1945 the publication of *Anuario bibliográfico peruano* was begun. The National Library has the responsibility for compiling a bibliography of works published in Peru and about Peru which goes back to the year 1943.

The third period of the National Library began under the direction of the eminent historian Dr. Jorge Basadre (1943–1948). He had completed studies in library science in the United States and Europe and with a firm hand transformed the library into an institution that used the most modern library techniques. The new National Library, dedicated in 1947, was not constructed precisely on the grounds of the former building. Its area was noticeably increased. The reconstruction this time was laborious and filled with difficulties, but the indefatigable spirit of the director overcame all obstacles. He finished his task in such shape as to have assembled a bookstock of 134,000 volumes when the library was opened to the public. (See Figure 3.)

MISSION OF THE NATIONAL LIBRARY

The mission of the National Library in large part is to participate in the cultural development of Peru. It is the institution established by the nation as the bibliographic center, to integrate and technically organize the national bibliographic production in order to preserve the national cultural heritage of Peru and place it at the service of researchers and readers in general.

FIGURE 3. *La Biblioteca Nacional del Perú.*

OBJECTIVES

Article 61 of the Regulations of the National Institute of Culture, approved by Decree Law 19268, considers the National Library as the organ for the preservation of the monumental and cultural heritage and establishes the following objectives:

General Objectives

1. To unify the national bibliographic heritage and foreign production of works indispensable for the scientific and technological development of the country.
2. To protect, preserve, and technically organize its bibliographical wealth for public service.
3. To investigate bibliographic resources and other materials.
4. To make its bibliographic resources available to qualified investigators, national and foreign.
5. To maintain the national register of copyright.
6. To promote the expansion of public and school libraries and to supervise their operation.
7. To carry out projects and plans of international cooperation for school and public libraries as recommended by the director general of the National Institute of Culture.
8. To perform such other activities within its areas of competence as the director general may determine.

Specific Objectives

1. To maintain the register of national copyright legally established throughout the republic.
2. To encourage interest in research on the basis of its documentary and bibliographic resources.
3. To lead in the creation of a National Center for Documentation and Information in the fields of history, literature, bibliography, and copyright.
4. To put its bibliographic and documentary resources at the disposal of the user, and to facilitate the most advanced mechanisms for the transfer of scientific, technical, and cultural information.
5. To set in motion those actions that parallel the announcements contained in the Law for the Reform of Education.
6. To publish works in accord with the nature, goals, and practice of modern librarianship.

The National Library has the following structure to fulfill these objectives:

The National School of Librarians
The National Office of Popular Municipal Libraries
The National Office of School Libraries
The Office of Technical Processes
The Office of Consultation and Readership
The Office of the National Bibliography and the Register of Copyright
The Office of Bibliographic Research
The Office of Administration and Control

ACTUAL POLICY OF THE NATIONAL LIBRARY

"The new image" of the National Library should respond to the following:

1. Greater proximity to the public, not expecting that this will come about unless it is searched for in all ambiences.
2. Interest in the day-to-day professional development of all Peruvian librarians in proportion to the elements and opportunities of their work, increasing this benefit from foreign countries by publications and by exchange of materials.
3. To enlarge the sphere of action in the most populous sectors of the country, among those who are learning, blue-collar workers, and the young, by means of the corresponding national offices.
4. To give greater opportunity for reading, increasing the ability and the hours of public service.
5. To apportion to researchers into the actual conditions of Peru the greatest facilities for their work.
6. To modernize services and procedures until mechanization and automation of the library is reached.
7. To make the work of cultural diffusion dynamic so that it may contribute to the integral progress of the individual.
8. To generate new resources appropriate for contributing to the maintenance of the library.

The bookstock of the National Library is now made up of 640,690 volumes of books, 11,626 maps, 7,710 musical scores, 7,275 photographs, 2,926 phonodiscs, 1,515,773 issues of reviews and periodicals, 5,684 sets of audiovisual material, and 176,765 miscellaneous items.

The library has six reading rooms: Peru, Humanities, Sciences, Periodicals, Encyclopedias, and Bibliographic Investigation. About 2,000 readers are accommodated each day, and the materials most often consulted are the social, pure, and applied sciences.

It is important to note that the bibliographic resources include 41 incunables, 350 manuscripts, and 27,000 other rare and curious books. Among these, the most valuable items the library possesses are the following:

MANUSCRIPTS

The principal dispatch of the Marquis Don Francisco Pizarro, dated Lima, 1541.

Chronicle of the reign of King Enrique IV from the year 1454 when it began until 1474 when he died.

The manuscript score of the musical work "La púrpura de la Rosa," by Tomás Torrejón de Velasco, Lima, 1701.

Ordinances of the Viceroy Francisco del Toledo, dated City of the Kings, 1604.

The original manuscripts of "Los Motivos de Proteo," by José Enrique Rodó, Montevideo, 1917.

BOOKS

The oldest printed book in Peru, *La Doctrina Christiana y Catecismo para instrucción de los indios . . .*, Antonio Ricardo, Ciudad de los Reyes, 1584.

The oldest book the library owns is *Decretalium Gregorii Pape IX; compilatio de Ludovico Bolognini*, 1472.

Of particular interest is the book: Nuñez Cabeza de Vaca, Alvar, *La Relación y comentarios del governador Aluar Nuñez Cabeça de Vaca de lo acaescido en las dos jornadas que hizo a las Indias* [Report and Commentary of Governor Alvar Nunez Cabeza de Vaca on the events of his two journeys to the Indies], Valladolid, printed by Francisco de Cordoua, 1555.

PERIODICALS

The Periodical Room includes, among other valuable collections of Peruvian serials, the following:

Diario de Lima [curious, erudite, economic and commercial], Press of Niños Expósitos, Lima, 1790–1793.

Semanario Critico, Press of Niños Expósitos, Lima, 1791.

Mercurio peruano de historia, literatura, y noticias públicas, Imprenta Real de los Niños Huérfanos [Royal Press of the Orphan Boys], Lima, 1791–1795.

La Gaceta de Lima [political and literary weekly], Imprenta Real del Telégrafo por Guillermo del Río, Lima, 1792.

Minerva peruana, Press of the Niños Huérfanos, Lima, 1805–1810.

Gaceta del gobierno de Lima: Viva Fernando VII [Gazette of the Governor of Lima: Long Live Fernand VII!], 1820–1821.

La guia politica, eclesiástica y militar del virreynato del Peru para el año— [Political, Ecclesiastical, and Military Guide to the Viceroyalty of Peru for the Year—], At the royal press of Los Huérfanos, Lima, 1793–1797.

La Abeja Republicana, Press of Don José Masias, Lima, 1822–1823.

The National Library, among its services, offers a laboratory of reprography and a telephone information facility. It continually receives questions from throughout Peru and from foreign countries regarding bibliographic information on various subjects, but especially those dealing with Peru.

Decree Law 19437 of June 13, 1972, requires that authors, publishers, and printers of books, pamphlets, and musical scores; and manufacturers of sound recordings, printed reproductions of designs and pictures, maps, plans, programs of events and spectacles, and in general of all printed text within the national boundaries are required to send free of charge to the National Library within 30 days of the conclusion of printing or manufacture four copies of everything issued, for distribution in the following manner:

Three copies for the National Library.
One copy for the Municipal Library of the department within the jurisdiction of which the work was produced.

Law 13714 of September 1, 1961, regulates and defines the rights of authors and establishes the National Register of Copyright within the National Library under the direction of and as the responsibility of the director, who maintains the register and official inscription of copyright.

The National Library carries on its work of cultural diffusion through the reliable medium of bibliographic exhibits, conferences, and other activities planned for occasions of national or worldwide interest or in commemoration of passing events.

Public Libraries

The first voice in Peru proclaiming the need for public libraries was that of José Eusebio Llano y Zapata. In 1758 he asked for the establishment of a public library in what was then the Royal University of Lima, today the Major National University of San Marcos. In 1778 the Major University of San Marcos asked the authorities to effect the creation of the public library by permitting public use of the two "bookrooms," the name given at that time to libraries. *Mercurio peruano* in 1793 made reference to the necessity of public libraries in Lima similar to the public libraries of Europe, although in the modern concept of librarianship the argument was made for what is now understood to be a national or research library. After this, there were isolated efforts at spreading readership by means of libraries.

Law 4506 of March 24, 1922, in its first article stated: "Popular libraries are established in all the capitals of the provinces under the immediate supervision of the respective provincial councils."

On May 25, 1947, Law 10847 was circulated as promoted by Jorge Basadre, which included support for libraries:

> Article the First: A tax is created on the retail sale of jewelry and luxury articles of decoration for personal use or adornment. . . . Article the Fourteenth: The income from this tax will be earmarked, especially the quantity of 600,000 soles a year, to cover the expenses required for the completion of the National Library building, for its furnishings and equipment and their installation, with the ability to utilize said amount for any credit negotiation necessary. Any excess over this amount will constitute the San Martín Fund to be used as subventions for popular municipal libraries in the capitals of the departments and provinces of the republic.

The purpose of the tax having been realized with the completion of the National Library building, the formulas for the proceeds from the tax were redistributed, with 25% going to the National Library for purchase of materials and 75% remaining for the public libraries in the capitals of departments, provinces, and districts. Various resolutions and decrees arising from Law 10847 reflect the preoccupation of different governmental authorities for the more technical development of public library service in the country.

LIBRARY POLICY OF THE MINISTRY OF EDUCATION: 1956–1958

Since Jorge Basadre was minister of education for the first time only from August to October 1945, he only had time to create a public library council which recessed upon receiving its charge. Until July 1956, Law 10847 of 1947 was not applied so far as its specific purpose of aiding popular municipal libraries with the San Martín Fund. Between 1947 and 1956 the public library movement advanced little in any systematic way. The income produced by the law was pared. When Basadre was once again named minister of education on July 28, 1956, he began a campaign for which the name "library politics" is suitable.

With the help of the personnel of the National Library, Basadre began an inquiry into the true state of the municipal libraries in the provinces. In accord with the results of this investigation, the minister sent to 20 of these libraries collections of books selected as representative of knowledge in general, of Peru, and of children's books. The professional staff of the National Library selected the respective parts of these collections. Along with the books, furniture and catalog cards were sent.

A traveling library was established to visit the workers in the factories of Lima. The bookmobile, the first in Peru, was inaugurated on August 1, 1957. Packets of books were sent to factories that the bookmobile did not reach and to posts of the civil guard. Boxed bookshelves were sent to the slum districts. Library extension services were erected in Breña, Tarapaca on the Rímac River, and in Malecón del Rímac. Five more branches were created later, between 1958 and 1962, in El Agustino, Cánepa, Comas, San Martín de Porras, and Villa María del Perpetuo Socorro.

Since September 7, 1962, the National Library has been in charge of public library development in Peru, both technical and economic, the San Martín Fund having passed under its administration. The work is performed by a group of professional librarians and their assistants in the National Office of Popular Municipal Libraries. This office is engaged in furthering the work of the public library no matter how small it might be or what aid it may have received on its own. It promotes interest in the creation of new services throughout the length and breadth of Peru despite its formidable and often inaccessible terrain. It is a very important work for the country, although the office does not yet have all the means needed for its projects. The levels of socioeconomic development at present require that learning be the plan for the whole life of the individual: continuing education is particularly necessary in developing countries where adult education remains an ineluctable necessity. (See Figures 4 and 5.)

The office fulfills its mission of providing technical assistance to public libraries through the following services:

1. Training subprofessional personnel who work in the municipal libraries.
2. Evaluating the selection and acquisition of bibliographic material.
3. Advising on rules of procedure for the best operation of service facilities, for book preservation, and for formulation of plans and of budgets.
4. Supervisory visitations.

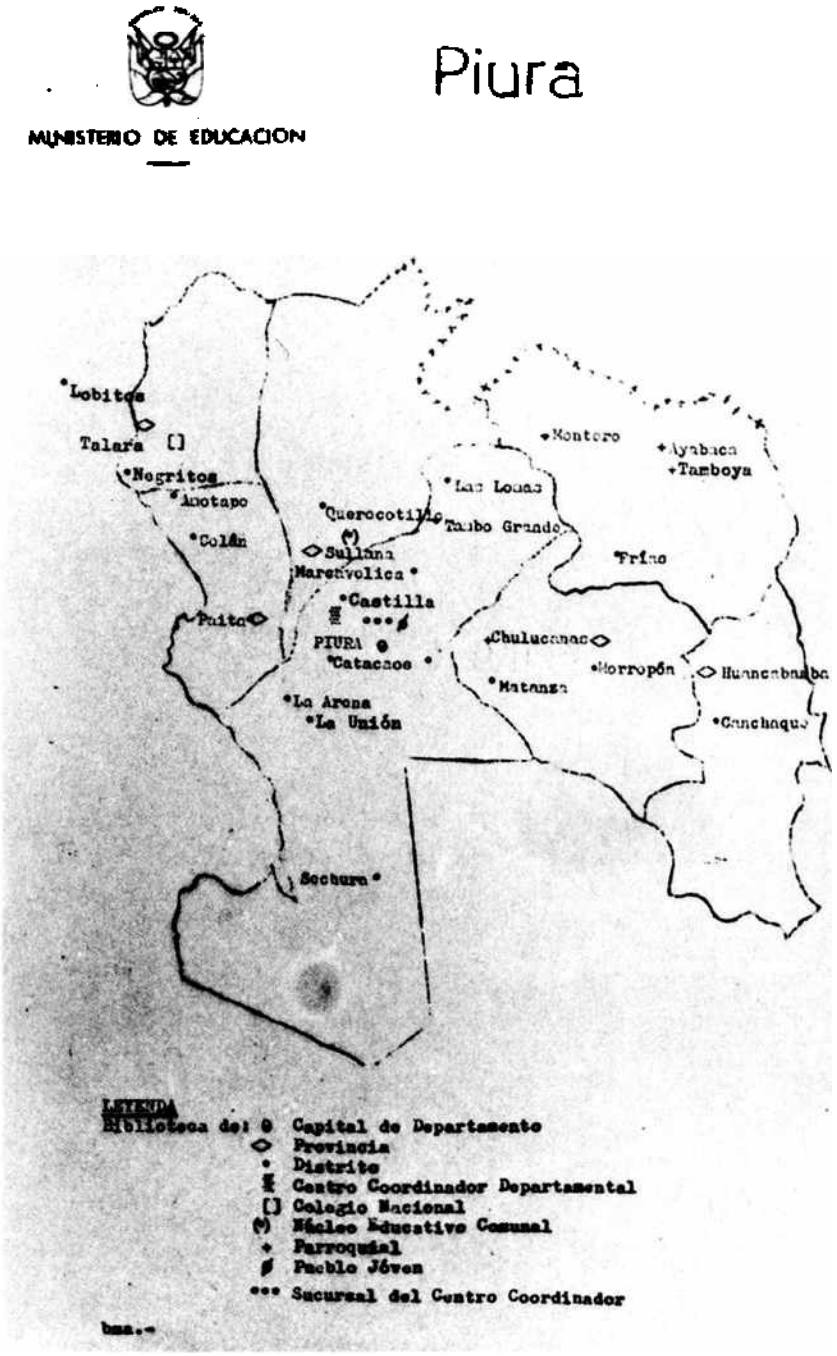

FIGURE 4. *Map of the public libraries in the department of Piura, Peru.*

The office maintains a registry of 500 public libraries in which necessary data are kept to maintain continuous cooperation between libraries of various types. When books are sent to these libraries, a full set of catalog cards for each book is included, and a union catalog of all the books sent is kept.

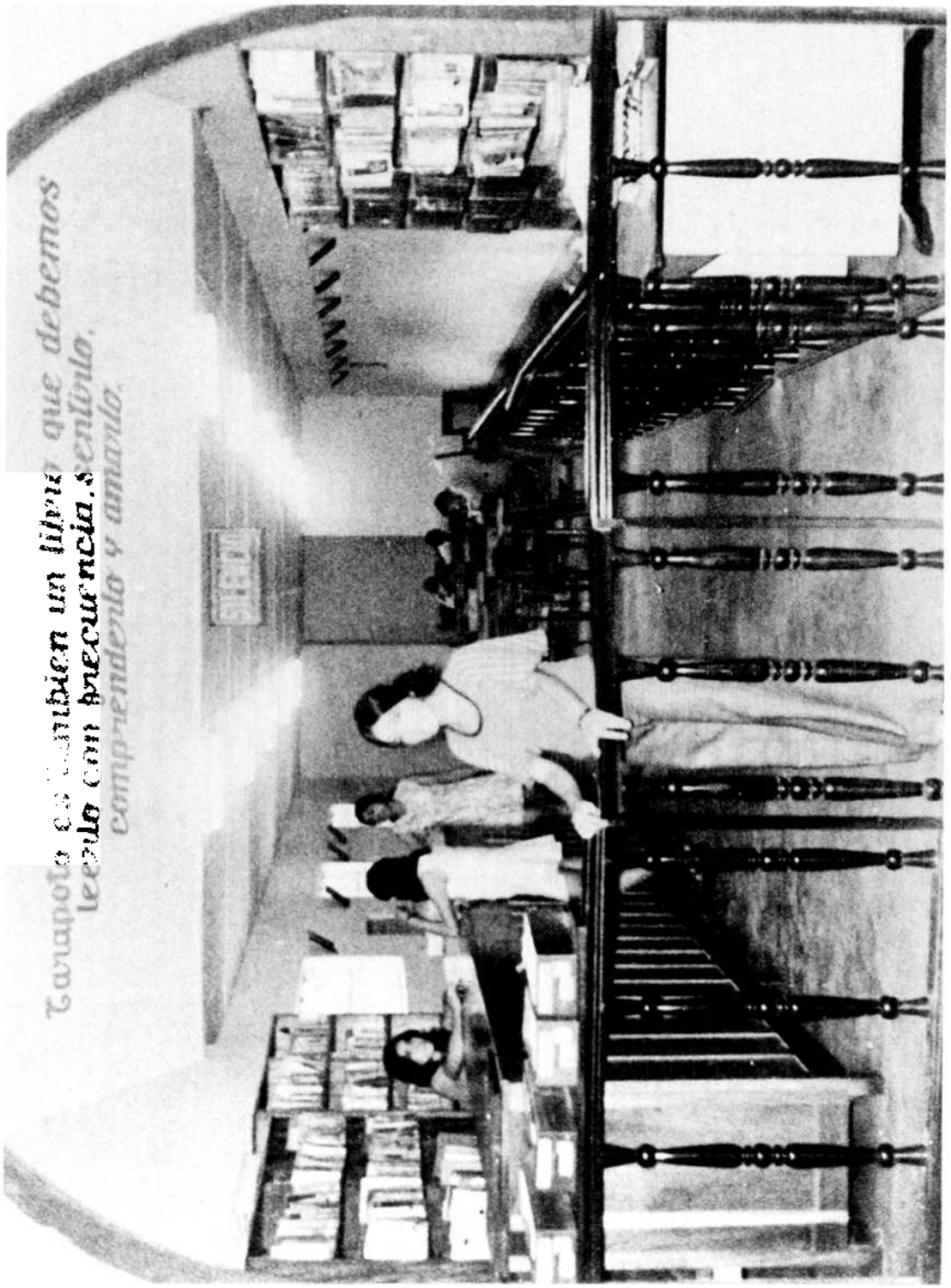

FIGURE 5. *Public Library of Tarapoto, Department of San Martín, Peru.*

EXTENSION SERVICES IN LIMA

In the Department of Lima, or more exactly within the Greater Lima area, there is a system of eight small libraries, or branches, and a bookmobile connected with a Central Library as part of the National Library, functioning in tune with the modern rhythm of services. This system was created and organized with funds resulting from the jewelry tax imposed by Law 10847 and is part of the National Library budget. The National Office of Popular Municipal Libraries takes great care of this system, constantly renewing and reviewing its operations so that it can serve as a model for libraries with similar problems in the rest of the republic.

The small, or branch, libraries are located in populous regions of Lima where there is an intense pressure on the part of young readers fighting to improve themselves by acquiring the necessary background for admission to the university. Given the scant number of openings for admission and the low cultural level of the students, it remains for the public libraries to assume the task of providing necessary reading material, to make monographs available, and to offer audio-visual aids, using all the resources that will facilitate the success of the clients of the library.

COLLECTIONS FOR LOW-INCOME REGIONS AND CENTERS OF DETENTION

Basic collections of technical and home economics materials have been prepared for underprivileged fathers and mothers in the undeveloped areas of the city. Persons trained for this kind of service have selected materials to be sent to the section named Tres Compuertas. Lurigancho Prison, the detention center for women, and El Fronton, the men's prison, have also received appropriate collections, a service that it is hoped can be improved day by day.

THE PILOT PUBLIC LIBRARY AND ITS MISSION IN PERU

In 1957 the Municipal Public Library of Callao was designated the Pilot Library of Peru, as part of the program that the San Martín Fund began that year, with the object of promoting the development of public libraries in the country. Taking into account the exceptional conditions found in Callao, it was selected to bring the experimental program to a head. The port is an independent province a few kilometers from Lima with an industrial zone and a very active commercial center. Lacking a university and cultural institution for its population of 220,000, the majority of whom were of the working class, it urgently needed stimulation to improve the cultural level of its citizens and the quality of their lives. A further decisive factor was the interest of municipal officials who had repeatedly asked for technical and economic help in order to organize the library.

With the children's library, opened February 11, 1958, and the adult library, opened May 22, the people of Callao began to receive public library service. When

the bookmobile started its service on September 20, 1958, Jorge Basadre, as minister of education, gave a speech which has come to be known as "The Declaration at Callao."

> The right of the people to culture, as distinct from the right of the people to education, has one of its examples in the public library. The basic objectives of the modern public library are:
>
> First, to assist people in finding a propitious setting for developing an eagerness to learn and an aspiration to better themselves at the fount of knowledge related to culture and science.
>
> Second, to create in children and adults a love of books and the habit of reading by facilitating, wherever and whenever possible, home loans, without hesitating to obtain and conserve the reassembled national spiritual heritage, which ought to be augmented systematically in consonance with the interests of the users and the needs of the collection.
>
> Third, to contribute to the development of occupational skills and aptitudes and to the education of those who either have not been to school or who did not find, or do not find, in the school sufficient and acceptable sources of knowledge.
>
> Fourth, to cooperate with those who wish to perfect themselves in the field of their business, profession, or activities, and to enrich and fulfill themselves with general knowledge.
>
> Fifth, to apportion mental recreation by making the employment of free time sufficient, fruitful, and enjoyable.
>
> Sixth, to collect source material in the history, geography, and other fields of knowledge in local and regional life.
>
> Seventh, to promote artistic manifestations, film exhibitions, conferences, discussions, and debates of a constructive nature and all other expressions of spiritual and civic vitality with the cordial atmosphere that a library should generate.
>
> Eighth, to progress, by means of library services, in the creation of a civic conscience, from which culture arises, understanding, and patriotic, moral, and human solidarity.

As a further step in the same direction, Basadre created a pilot library on the frontier by selecting the city of Tacna as the place for the project. The same negotiations followed and a building was constructed, the first outside Lima to be dedicated to library services. The minister, aided by the professional librarians of the National Library, undertook all the effort of acquiring a bookstock and appropriate furnishings. The new entity reached the successful conclusion of opening to the public under the management of trained personnel and in 1963 it became part of the House of Culture of Tacna.

Assistance was important in moving the Municipal Library "Ricardo Palma" of Miraflores to its new location, in adapting and repairing the facilities, and in augmenting the material resources as well as the furnishings and equipment.

The Ministry of Education published the work *Pequenas bibliotecas públicas; Normas para su organización y su funcionamiento* [Small Public Libraries: Rules for Their Organization and Function], by the librarians Carmen Ortiz de Zevallos and Cristina Duarte de Morales. This was distributed to municipal libraries in the

provinces and to school libraries and other centers where it would be useful. The supply of this work was rapidly exhausted.

Later the following works were published:

La biblioteca pública en acción [The Public Library in Action], by Carmen Ortiz De Zevallos and Antonieta Ballón.

Asociación de amigos de la biblioteca pública [Friends of the Public Library Association], by Antonieta Ballón.

Clasificación y catalogación [Classification and Cataloging], by María Teresa Pereira de Bartra and Carmen Ochoa.

Tabla de notación interna [Table of Author Numbers], by Luis Málaga.

Tabla de Clasificación Decimal de Dewey, abreviada [Abbreviated Dewey Decimal Classification Tables], by Agustina Musante.

In order to stimulate the reading habit and to create a basic resource of material, the series "Biblioteca del estudiante peruano" [Peruvian Student's Library], under the direction of Dr. Luis Jaime Cisneros, was distributed gratis to graduates who had completed academic and vocational secondary courses in the Grand Union Schools and National Colleges of the republic in 1958. This series was made up of the following booklets:

Las enseñanzas bíblicas [Biblical Teachings]
Palabras a la juventud [Advice to Youth]
Antología de la literatura fantástica [Anthology of Imaginative Literature]
Arte milenario del Perú [Peruvian Art Through the Ages]
Tres héroes peruanos [Three Heroes of Peru]
Los comentarios reales [The Royal Commentaries]
Selección de tradiciones peruana [A Selection of Peruvian Traditions]
El Perú en la independencia [Peru During the Independence Movement]
Nueva imagen del mundo físico [A New Image of the Physical World]

School Libraries

Although the General Regulations of Instruction of 1876 ordered the creation of school libraries, there was very little progress in establishing them during the 19th century and even in the 20th century until the second half, when serious consideration was given to them. Although isolated examples of school libraries had always existed because of the interest of certain teachers, parents, and students, it can be said that there was no great consideration of their importance in the educational process. Only in 1922 can legislation be found referring to the basic services needed for the development of children and young people. School library services at that time had not been able to satisfy the needs of student and users. By Supreme Resolution, the "Fiesta del libro" [Holiday of the Book] was established nationally on August 19, 1922. The goal was to obtain the indispensable books needed for

maintenance of school libraries throughout the republic to be celebrated for the first time on the tenth of November of the same year. Although the initiative of the then director of school libraries and museums, Dr. Ciro Napanga Agüero, is laudable (and it was successful in view of the collections of books sent to 25 libraries and the 19 shelf libraries built along appropriate lines), it did not continue for any length of time and was not the solution to the problem.

The Organic Law of Public Education, number 9359 of April 10, 1941, designated the Directorate of Common Education as the responsible agency for the "establishment, organization, and supervision of school libraries and museums," and specifically among the sections of the directorate, the Bureau of School Libraries and Museums to do this work. It also specified the duties of the school boards to "foster libraries, museums, and reading rooms in the schools." On the tenth of September of the same year, Law 9369 authorized the creation in all the schools of the republic of School Libraries "Javier Prado," but no budget was provided for their maintenance.

The reform of 1956 included a curriculum for the teachers colleges of the republic to be used for a School Library Course. It would teach the future instructors how to manage a library, its importance and necessity, and train them in the organization of school libraries for the high schools of the republic. These teachers were meant to provide high school libraries within a few years so that each school would have at least a small library. As minister of education, Jorge Basadre created the Department for the Promotion of Popular and School Libraries, but this succeeded only in developing a plan for helping existing libraries in a few places. Even that consisted only of sending the libraries their share of poorly selected books.

Carlos Víctor Penna, UNESCO expert, suggested the creation of a Pilot School Library in 1958. In 1961, with the Decree Law number 14 of June 22, a basic library with a progressive character was established in each of the schools of the republic. From 1966 to 1968, when he was minister of education, Dr. Carlos Cueto Fernandini accomplished his "Operation Children." This consisted of providing a small basic library in all the multiple grade schools or those which had graduates of the 5-year primary schools all in one room with a single teacher. All the cultural work of the hamlet depended on these little one-room schools. In 1967 all the work of Operation Children was concentrated in the Junta de Asistencia Nacional [Council of National Assistance]. The junta followed the usual method of having volunteers select and obtain donations of books with teachers who knew the actual needs of each level of education. The donations were enriched with maps, escutcheons of Peru, pictures, pencils, and many books on the rules and theories of pedagogy which would be very useful for the teachers.

The objectives of the junta were: (*a*) to build or reshape libraries in all the schools in Peru; (*b*) to make the children of Lima aware of the problems in the rural areas because of the lack of books and teaching materials; (*c*) to encourage the teachers who worked in remote regions of the country. The junta published a very sensible and useful manual sent with each gift that provided instruction in the accessioning of books and the maintenance of the library. In Operation Children, a

letter was added to each box of books indicating that the box would make a book shelf and stating that filling out the questionnaire included would enable the donors to know if the books were the ones most needed and if the way they were sent was the most effective.

In 1968, by Supreme Resolution 803 dated June 24, school libraries in the rural schools of the republic were established under the authority of the Directorate of Primary and Adult Education. Given responsibility for the organization of these libraries, the directorate was given the share of the Education Branch budget necessary to equip the libraries and provide for their operation. The goals were not reached because it is certain that the task requires great effort and sufficient wherewithal not only to begin but also to maintain service in an effective manner.

The Peruvian Association of Librarians named a Technical Commission to make the actual conditions of school libraries in the country known and to offer impartial cooperation with the Ministry of Education. The commission was to accomplish this by presenting a report to the minister of education, "Analysis and Program of School Libraries in Peru," prepared with the participation of the Office of Investigation and Development, and was authorized to coordinate the study and the work of investigation with such other organizations as the Division of Statistics, the reporters of the daily newspaper *El Comercio*, the Agency for International Development of the United States, the National Pedagogical Institute for Men, and the Technical Assistance Mission of UNESCO.

Ministerial Resolutions 0418 and 887, dated March 17 and May 2, 1969, authorized the naming of a Technical Commission made up of 10 professional librarians, among them various specialists in pedagogy, in order to complete an investigation of school libraries and prepare a study that would analyze and determine a program for school libraries at each of the levels of instruction: primary, secondary, and teacher training. For 6 months the patient work of investigation went on with questionnaires and statistical analyses which permitted the verification that an uneasy situation existed among the school libraries. The work made known the actual state of school libraries for the first time and served for projections of school library services possible with trained personnel, adequate space, furnishings, and library materials which would help both teacher and student meet the exigencies of the curriculum and raise the level of Peruvian education. The report included a general plan for the improvement of services based on an investigation of the possibilities, resources, and most urgent necessities of school library services in the country.

The Plan for the Promotion and Development of School Libraries worked out by the commission tried to rank the activities that would complement and reinforce the work of education by the services offered by librarians not only in making books available but also by divulging the methods for utilizing information sources. In Peru, private contributions such as occur in other countries to finance the creation and operation of cultural centers are not obtained. Therefore, the whole weight of installing school libraries falls on the government.

The country relies on the design of a long-range strategy for development that

shows the general objectives to be followed and also provides basic orientation for the development of education. Within this framework, the Program for the Development of School Libraries, along with its averages and conclusions, contains the answer to this question: What must be done in Peru for the library system to make its contribution toward reaching the goals and objectives of social and economic development through the national system of education in the period from 1970 to 1974?

Coincidental with the planning of the Peruvian Association of Librarians, the director of the National Library presented a report to the Ministry of Education which named a commission to establish a Pilot School Library in order to safeguard the collections of the National Library, devastated by excessive student use, granting that the National System of School Libraries had taken actions corresponding with the first phases of its construction, with aid from the Organization of American States. The first phase of the project installed a pilot school library that would come to be the experimental model of the system whose final form would be a network of school libraries at the national level. The minister of education dispatched Ministry Resolution number 2473 dated September 29, 1970, that established the Pilot School Library as a function of the National Library with the name "Pilot School Library José de San Martín." It was dedicated on March 29, 1971, and opened its doors to student users and the community in general on the next day. There was room for 250 readers at one time and it could accommodate 350,000 users of its various services in a year. These services consist of the following: reading and reference, home loans, audiovisual facilities, and cultural programs. The library is open from nine in the morning until eight at night on Mondays through Fridays, and on Saturdays from ten in the morning until six in the afternoon.

The technical organ that operates this function of the National Library is the National Office of School Libraries, whose location is the Pilot School Library "José de San Martín." The office includes among its goals the development of a program of training for the personnel working in school libraries in educational centers at the national level, in order to provide better operation of the system. The Ministry of Education solicited the help of the Organization of American States in order to gain better development of school libraries. An Action of Reinforcement of its Regional Program of Educational Development was granted for the period from July of 1971 through June of 1973 authorizing the National Library, as the principal technically qualified organization in librarianship, to execute the program contained in the action.

The second phase of the project for the biennium 1973–1974 was established with four central libraries in the basic centers of nuclear educational communities, in the cities of Arequipa, Ayacucho, Indiana (District of Maynas), and Trujillo. The central libraries, according to the planning of the system, will generate satellite libraries and at the same time school library services by means of mobile units and traveling book shelves that will give room for the expansion of the network of school libraries. In 1975 a project was worked out for the establishment of central libraries in the educational centers of metropolitan Lima and for the implementa-

tion of central libraries in the educational center of San Juan in the district of San Juan de Miraflores, of Tupac Amaru, and of Pascana in the district of Comas.

University Libraries

The tradition of university education, as described above, began in the earliest colonial period with the creation of the first university in South America, San Marcos. Since that time, new universities have been founded so that there are now 33 in Peru, 12 of which are situated in Lima. All these universities possess libraries, more or less important, although the majority of them have fewer books than the explosion of student populations would require. A few, like the library of San Marcos of Lima, San Antonio Abad in Cuzco, and San Cristobal in Huamanga, which began during the period of the viceroyalty, have custody of very valuable collections of Peruvian material. In the majority of the university libraries, the bookstock dates from the 20th century only and supports the teaching program, with the exception of the Pontifical Catholic University, which possesses as the result of a gift of its benefactor, José de la Riva Agüero, his important private library.

Although since 1964 the National Council for the Peruvian University has existed to study the problems of these institutions in an organized fashion, there has not existed up to the present time an infrastructure adequate for the libraries to fulfill the role that now more than ever before is required to provide depth and variety to student research and creativity. Such research cannot be completed without the aid of adequate bibliographical resources, assuming that the library has its share of the material needed. An incomplete study by a working group of university librarians revealed the following figures: There are 33 universities in Peru with a total of 89 libraries, for the most part organized along modern lines with a tendency toward centralization as a library policy. The collections of these universities, calculated approximately, reach a total of 910,113 books with 30,311 titles of periodicals. This sum, when compared with the standards for student–book ratios, indicates a deficit of approximately 4 million books.

The panorama of this study reveals that university libraries are not able to reach their objectives for the simple reason of insufficient financial resources. The working group of librarians recommends the elaboration of a national plan that would permit future integration into an international plan for the utilization of library materials, the preparation of a national university union catalog and a national university bibliography, and universal adoption of the Library of Congress Classification by all university libraries with the purpose of accomplishing the integration of libraries and the centralization of technical processes in order to modernize acquisition of materials and utilize up-to-date equipment. Recognizing the teaching functions of a professional librarian within a university library, the group recommends that librarians be included in all the faculty councils of the academic programs so that they can be informed of the educational policy of the institution.

The Directorate of Evaluation of the Universities, a member group of the Na-

tional Council of Peruvian Universities, organized and held the "First Meeting of the Libraries of the National System of Peruvian Universities," attended by representatives of 32 of the 33 universities. In this meeting the recommendations of the working group of university librarians were reaffirmed, and as a corollary the *Librarian's Guide to the System of Peruvian Universities* was published, in which the facts resulting from investigations of the working group can be found.

Lending services of books are very much needed in the university libraries, notwithstanding the programs for the sale at low prices or the rental and sale of books at many of the universities. A restricted form of interlibrary loan is taking place among the university libraries.

The library of the University of San Marcos was depleted in 1881 and only reopened its doors in October of 1904. Since that time, its services have been in constant and increasing demand. In 1947 the library system was reorganized in accord with the most modern techniques of the time, it being the first library in the country that used the Library of Congress Classification, with modifications in the schedules needed for Peruvian materials. San Marcos is truly a system of libraries with centralization of technical processes and decentralization of readers' services in 25 libraries set up in the various academic programs. It also offers rental and sale of books to students, reprographic services, and bibliographic assistance through readers' advisory work.

The national agricultural library is in the National Agricultural University [Universidad Nacional Agraria], which has a collection of 26,994 titles and 2,925 periodical runs. This material constitutes the best collection on agriculture in the country and is very often consulted through use of its reprographic services. A national plan for agricultural libraries has been prepared by this library. Its training courses and other efforts to provide further services for the agrarian sector of the country are of vital importance.

Special Libraries

Special libraries came into existence in the latter half of the 19th century in Peru, but the true expansion and recognition of this kind of library began in the 1960s. Within the framework of conventional special librarianship, there exists today such a variety of libraries—differing in their objectives, the nature of their collections, and the organizations to which they belong—that they scarcely have common characteristics. For that reason, it is very difficult to describe special libraries at the national level. There exist more than eight different specializations, ranging from astrophysics, environmental contamination, photogrammetry, and occupational health, to the more traditional fields such as economics, industrial management, and medicine. A survey was made in 1973–1974 of 100 special libraries, the results of which show that 58 of the libraries were created in the decade preceding 1970. This group of libraries had a total of 384,073 volumes in their collections and 18,817 titles of periodicals. Of these libraries, 46 did not permit the public access

to their collections and the systems of classification used in these hundred libraries, and the treatment of their bibliographic materials, ran the gamut of internationally known and used systems.

Three fields can be distinguished in which common goals and problems have been identified along with plans and distinctive successes. These fields are agriculture, medicine, and socioeconomics. Although in the examples there is a willingness to unite and work together, the forms of cooperation, action, and problems are totally different. In the first case, the efforts of the National Agricultural University Library have contributed to the organization of a network of libraries in agrarian regions formed primarily of the Universities of Piura, Chiclayo, and Amazonía, and all the experimental stations of Lima and the provinces. This has been working since 1972, the year in which the First Round Table of the Peruvian Association of Agricultural Librarians was held. Affiliated with the International Association of Agricultural Librarians and Documentalists, the Peruvian association has as one of its major interests the cooperative acquisition of materials and the training of library assistants, especially in view of the smaller number of professional librarians in this field of specialization.

Of particular note among medical libraries are the efforts of professional librarians, rather than of libraries, although an interesting action of the Medical College of Peru has—in addition to a center of information formed within the system of the Regional Library of Medicine of São Paulo—tried to achieve cooperative work through its efforts and to form regional information centers in the provinces. The Center of the Medical College has physicians as trustees and international aid through which it has been able to extend scholarships to university medical libraries in Arequipa, Trujillo, Ica Iquitos, and Huancayo. These libraries produce brief bibliographies on request, exchange photocopies and information, and maintain a close relationship with the National Library of Medicine of the United States. In addition, as a special service, they sell books to alumni at very low prices as part of the Program of Medical Texts of the World Health Organization, and there is cooperation for interlibrary loans among Lima, Arequipa, Trujillo, and São Paulo, Brazil. All this is at the national level among the university medical libraries, but there has not been substantial cooperation with hospital libraries and those of institutes of public health and of laboratories.

The Union Catalog of Medical Journals up to now is the project of greatest success in which 14 libraries have taken part. There have also been specialized publications through bilateral agreements; for example, the Medical College and Cayetano Heredia University have worked out an index to Peruvian medical journals with assistance of medical advisors and carried out by graduates of the Escuela Nacional de Bibliotecarios [National Library School]; with the same kind of help and the contribution of effort by the Dental College, the Union Catalog of Journals of Dentistry has been compiled. The Medical College is also preparing a union catalog of baccalaureate theses. There is an interesting plan for the possible formation of a stock of duplicates to establish regular exchanges in this field.

Socioeconomic libraries began a network in 1969 through the initiative of one

of the most important such libraries (ESAN) but little by little this was transformed into a working group that is now known as the Library Consortium for the Integration of Socioeconomic Information [Agrupación de Bibliotecas para la Integración de la Información Socio-Económica]. This brings together libraries whose representatives are professional librarians and has as its principal objective completing investigations and cooperative endeavors that represent contributions in the field of their specialization through their action committees. So far, the eight functioning committees are:

1. Union Catalog of Periodical Publications
2. Directory of Special Libraries
3. Bibliographic Compilations
4. Standardization of Abbreviations of Periodical Titles
5. Standardization of the Statistics of Special Libraries
6. Standardization of Socioeconomic Terminology
7. Development of a Union Catalog
8. Development of Bibliographies

The result of the first two action committees was the publication of works in 1972, as shown above, and for the following there exist plans for the publication of final reports in a series to be entitled "Action Committee Documents." The consortium brings together 30 libraries and documentation and information centers in the Lima region whose collections total 98,000 titles of books and 8,000 titles of periodicals. Among their future plans is a union catalog of books and the widening of their area of cooperation to the regional and the national level. Librarianship in the socioeconomic field is dynamic; it has appropriate financial resources and specialized personnel. Very few of these libraries have problems, since the majority belong to solvent institutions and permanent programs that favor the existence of adequate documentation and library services.

The actions of these three groups of special libraries have tended to bring existing resources into greater utilization through improved services to users, which was made possible by working together. However, these formulas of action do not correspond with a national plan of development. The most significant advances made by special libraries to date have been interlibrary lending, documentary and bibliographic publications, and cooperative information networks. In one of the rare cases of private effort, an exhaustive analysis of published materials, with an emphasis on documentation, has been brought together with profiles of users, services of translation, and reprography. In the next few years, the use of audiovisual materials and microforms should be intensified leading to the appearance of mechanized information retrieval.

It is important to note that the traditional special library is disappearing in Peru, transformed into a different entity which will be more of an information and documentation center, assuming in this way responsibility and a new role in the fields of knowledge where it will operate in the country and at the academic level for investigation and productive work in general. In 1971 within the National Council of Research, the National Center for Scientific and Technological Information was created. It was foreseen that during its first year the center would function only

as an office charged with planning pilot projects that would be carried out in 1972. The services of the center would be information, reprography, translation, and interlibrary cooperation. In the information service effort, it would work with the National Center of Documentation, another dependency of the council.

Other notable efforts in the dissemination of information underway in Peru have been supported by the National Center of Productivity, which works with the worldwide information network of the United Nations Industrial Development Organization and the Organization for Economic Cooperation and Development (OECD). These are the information center of the National Office of Integration, the organization responsible for the participation of Peru in Latin American and subregional integration, the Documentation Center of the Agrarian Sector, and the Documentation Center of INDUPERU (Peruvian Industry Association). Specialized libraries within university systems have not been considered here.

The National School of Librarians

The Escuela Nacional de Bibliotecarios [National School of Librarians] is an institution of higher education whose mission is to prepare professional personnel for service in the National Library and the other libraries in the country. It was created by Supreme Decree on June 23, 1943, and has functioned since January of 1944 as a subsidiary of the National Library, the director of which is also the director of the school. In its first years, the school was advised on its functions by a council called the trustees of the library school.

It was created, as mentioned above, by Jorge Basadre when he was put in charge of reconstructing the National Library after its destruction by fire in 1943. The decree was issued because of his insistence in view of the need to organize the new National Library along modern technical lines, for which professional personnel were not to be found. Statutory rules of November 14, 1943, and successive decrees and supreme resolutions have governed the school, its organization, curriculum, etc., from its founding to the present.

For a short period, from 1971 to May of 1974, the school was a direct dependency of the Directorate General for Higher Professional Education of the Ministry of Education. Finally, by Decree Law 10626 of May 28, 1974, it was incorporated into the National Institute of Culture.

The first graduating class (1944) followed an accelerated course of studies taught by Peruvian professors and by foreign professors from Europe, North America, and Cuba. Then a cadre of professors was maintained with the students newly graduated from the school, supplemented by university professors.

INSTRUCTION

The course of studies has evolved slowly, created and readjusted in accord with the needs of the country. The years of study have been increased, both in 1974 and 1975; the National Institute of Culture, to which both the National Library and

the National Library School belong, named two commissions charged with restructuring the curriculum to include such subjects as information science, planning of libraries, and similar studies to prepare the librarian to confront the pressing requirements of the times. From 1973 the instruction was adapted to a system of cycles, or academic semesters of 18 weeks each, to conform with the educational reform law of Peru.

The course of professional education is both theoretical and practical, requiring 6 semesters of study and 11 months of practical experience (648 hours). The courses may be divided into general cultural studies, professional and technical courses, and special studies. The school provides for the cultural development of the student with university-style courses, the orientation and objectives of which contribute to the complete education of the librarian.

The technical courses and the library science disciplines proceed with direct use of bibliographic sources and documents, utilizing methods of investigation and analysis that train the student for the professional tasks of technical processes and public services. Professional experience completes the education offered. The new method was begun in 1948 and later increased in length to 648 hours of supervised work. The students rotate through the various departments of the National Library and in the libraries of Lima of whatever type—school, public, research, institutional—that have been enlisted for this purpose. Attendance at classes and in the practical work is mandatory, and the evaluation of the student's work is by means of oral and written examination, practical exercises, and research papers.

THESIS AND TITLE

The graduates must have presented a thesis in library science on a subject of their choice but approved by the school, which assigns an advisor from the teaching faculty to each of the students.

In the first years of the National School of Librarians, the students were given the title of library technical assistant. Having met the requirements of the curriculum and the practical work, students whose theses are approved, along with their other studies, are granted the title of librarian, as authorized by governmental provisions in the respective supreme resolutions.

ADMISSION

To enter the library school, applicants must take a competitive admissions examination after submitting the required personal documentation for approval. The admissions examination begins in the month of February of each year and lasts for 30 days. The same requirements exist for admittance to a university: completion of the 5 years of accredited secondary education with a certificate, knowledge of a foreign language (principally English), and typing ability. The admissions examination covers the following: psychometric evaluation, general knowledge test (covering English as well), typing, and a personal interview.

There are 50 vacancies for students each semester, and three semesters function simultaneously with about 130 students.

FACULTY

There are 25 professors, appointed on the basis of personal qualifications to teach the courses. They are high-level librarians and instructors with university experience.

In addition to the regular instruction of the school, postgraduate courses are given on subjects related to information science such as the planning of documentation and information centers. Short courses for vacation periods are given, and the school has agreed to give training courses to the personnel of universities. In addition, seminars, discussions, and conferences are held for foreign and Peruvian professors, and guest librarians and subject specialists. The school also provides short courses at the local and national level for library assistants.

LIBRARY

The school possesses a library devoted to library science. Its collection consists of 500 titles and 200 periodical publications. It is organized and has its own structure. The two librarians in charge take care of technical processes and readers' services including reference work, circulation, and specific research in the area of librarianship. It is open to the users 8½ hours a day, without interruption, and available for students, faculty members, and graduates of the school. The library is also used as a laboratory in the course work of the students.

ALUMNI

Since its beginning, there have been 29 graduating classes with 461 professional alumni who sustain the library movement as well as the only library school in the country. The work of its graduates has resulted in the technical organization of the National Library, the creation of the national system of public libraries and the national system of school libraries, the network of special libraries, the organization of university libraries, and instruction in the library school. Some of the alumni have served in international organizations and in the library systems of foreign countries.

In the services of the National Library, the public libraries, and the school libraries, the graduates are active participants in the education of the community. Faced with the modern need for scientific and technical information through special library services and documentation centers, the alumni contribute to the development of the country by publishing union catalogs, bibliographies, and other useful tools, aiding in the dissemination of scientific and technical information.

The school is located on the fourth floor of the National Library. Its address is Abancay 4a, Cuadra-Apartado 2335, Lima, Perú.

The Peruvian Library Association

The Asociación Peruana de Bibliotecarios [Peruvian Library Association] is a completely professional entity which brings together and represents the graduate librarians of Peru. It was founded on August 6, 1945, with the name of Asociación

de Bibliotecarios del Perú [Association of Librarians of Peru], whose purposes, according to its bylaws, are:

1. To further the improvement of the professional level of librarians in its economic, cultural, and technical aspects.
2. To promote understanding of the profession.
3. To contribute with its resources to the success of cultural dissemination in its field of action.
4. To create and strengthen cooperation among its members.
5. To assume the professional defense of its members.
6. To establish and maintain cultural relations with similar national and foreign institutions.
7. To negotiate with public authorities for the library legislation useful for the profession and for the needs of a technical system of the libraries of Peru.

Since the statutes reflect the professional yearnings of Peruvian librarians, the activities of the association during the 30 years of its existence always followed a course of professional ethics. It fought for success in implanting good library service through the country and in pursuing full recognition of its rights.

The association publishes an information bulletin (*Boletín informativo*) of its activities, with news of events at the national or international level related to the profession and a listing of books published in the field of librarianship. It has brought about various events of importance, among them the First Seminar of Library Science, which met in Lima on August 18, 1958, in which the problems were revealed and up-to-date solutions discussed. The Seminar of Consultants and Librarians of Nuclear Energy took place in Lima in 1962, an event sponsored by the association in order to bring about discussion among Peruvian librarians. On March 19, 1963, the association organized the Seminar on the Planning of School Library Services; Lima was the site of the Regional Congress on Documentation on the theme of mechanized information transfer. The National Seminar on the Administration of Libraries and the Planning of Information Systems took place July 5–19, 1973, organized by the association and the North American Peruvian Cultural Institute under the auspices of the Consejo Superior de Investigación [Higher Research Council]. At the end of its session it named a commission that worked with great enthusiasm.

The Peruvian Library Association has organized short extension courses of library technology and general culture for nonprofessional personnel and postgraduate courses for the alumni of the Escuela Nacional de Bibliotecarios [National Library School] on public administration, map cataloging, and the Library of Congress and Universal Decimal Classification systems. It has participated in radio and mass media campaigns to encourage the habit of reading at the national level.

Its activities for the benefit of the public have brought it into collaboration with the Cámara Peruana de Libro [Peruvian Book Chamber] in the organization of libraries for young people and those in the prisons. Recognizing its capacity for work, the government always takes into account its members when appointing commissions for the discussion of national-level problems that affect libraries.

The association meets periodically and each year solemnly celebrates Librarians' Day, the 14th of November, in commemoration of the date when the Supreme Resolution was issued which established the professional title of librarian, November 14, 1955.

Future of National Information Policy

An information policy has not been formulated in Peru. The final report of the seminar mentioned above on the Administration of Libraries and Planning of Information Systems recommended the creation of a national system of library and information services based on the existing infrastructure. The need for coordination with the national information system can be seen clearly in the document. This system should be created to take advantage of computer services with priority in the training of the manpower needed in the field of information science.

To excite greater interest among the users, Peruvian universities included courses on the use of the library and of information sources. Centers of information disseminate sources and services which have contributed to the increase in use.

Work is being done toward the organization of union catalogs and cooperative purchasing programs within certain areas of specialization among different libraries. The establishment of data banks of scientific and technical information and interlibrary loans are receiving increased attention, as well as plans for the automation and systematization of various university libraries and information centers.

By the end of 1975 the necessary coordination among library systems and their incorporation in a general plan was being studied along with the integration of libraries into the plans for the further development of the country. Taking the future needs of the country into account, the curriculum of the Escuela Nacional de Bibliotecarios [National School of Librarians] was being modified to include the latest advances in library and information science so that a cadre of qualified personnel would be available for the system that would be created.

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PETROLEUM DIVISION, SPECIAL LIBRARIES ASSOCIATION

Aims and Objectives

The origin of the Petroleum Division of the Special Libraries Association (SLA) had its roots in a special interest membership of the Science-Technology Division. Therefore, its major objectives coincide in substance with those of the Special Libraries Association. Specifically, as is implied in the name of the division, one of its basic objectives is to emphasize communication and cooperation among the Special Libraries Association members working in the petroleum industry, as stated in its *Bylaws* (*1*). The *Bylaws* also state that one objective shall be "to provide an association of individuals and organizations having professional, scientific or technical interest in library information science, especially as these are applied in the recording, retrieval and dissemination of knowledge and information in areas such as the physical, biological, technical and social sciences and the humanities" (*2*). These broad aims and objectives are exemplified in the programs and projects which the Petroleum Division has sponsored through the years.

Historical Development

PETROLEUM COMMITTEE

The evolution of the special interest segments of the Special Libraries Association is a study, in reality, of the development of the SLA. Even though the association was organized in 1909, it was not until 1923 that the organization of "groups" began to bring librarians together who were working in similar or closely related subject areas or whose employers represented certain subject fields of interest. The Technology Group was one of these subject organizations. This group, in its formative years, combined with others, and divided, as is characteristic of a dynamic organization, until it emerged in 1933 as the Science-Technology Group (*3*). The Petroleum Committee was one of the more active specialized interest components within the Science-Technology Group (Sci-Tech).

PETROLEUM SECTION

At this same time, the designation "committee" was changed to "section," and each section became autonomous, with its own officers, bylaws, projects, programs, etc. Therefore, 1933 is cited as the founding date of the Petroleum Section. The first chairman was Albert Althoff, librarian of the General Petroleum Corporation, Los Angeles.

The members of the petroleum industry-oriented section were active in various

projects, and at the SLA Annual Conferences always managed to organize and present programs which were imaginative and constructive, and frequently attracted many attendees affiliated with other sections and groups within the association.

The membership of the Petroleum Section numbered over 300 at its peak. It was one of the smaller sections within its parent organization, the Sci-Tech Group. The group continued to add sections as petitions were granted to specialized interest, industry-affiliated, or activity-oriented members of SLA in the subject fields of science and technology.

Unhappy with its indeterminate name, the Science-Technology Group petitioned the SLA Executive Board to change the ambiguous term "group" to "division," and this change was effected in 1950, when all groups became divisions within the association (*4*).

Being broadly inclusive in scope, the Sci-Tech Division continued to grow in numbers and sections until it was disproportionately large with respect to the total membership of the SLA. In addition, the total membership of its sections was greater than the Sci-Tech's total divisional membership, since more than one section could be selected for membership by a division member. Therefore, after considerable study, the Sci-Tech Division limited membership in its sections to one section only. The net result to the Petroleum Section was a drop in membership from over 300 to 211 in 1963–1964. This was not alarming to Chairman Marilyn Johnson, of Shell Development Company, Emeryville, California (*5*). Her conviction that this should serve as a unifying and strengthening factor in the development and growth of the section proved to be correct. While never so large in numbers afterward, the membership was composed of those who elected to affiliate with the Petroleum Section because of a common major interest and professional association.

PETROLEUM DIVISION

It probably would be within the bounds of discreet accuracy to say that the Petroleum Section was nudged gently into seeking divisional status. Its ponderous parent organization, the Science-Technology Division, was embarrassed and rendered unwieldly by a plethora of offspring which remained in the nest too long. Whether this was caused by inertia, choice, or merely a fledgling's hesitation to try its wings as a recognized division, is a matter for speculation. At any rate, the Sci-Tech Division after several years of awkward functioning simply because of its size, sought to resolve its problems by encouraging some of its qualified sections to seek divisional status. One of these was the Petroleum Section (*6*). The reasoning was attractive. Besides the general recognition, there were distinct advantages to be enjoyed by a division in SLA that were denied to sections. As a division, there was representation on the Advisory Council and therefore a voice in the affairs of the association; an allocation of funds based on divisional allotments by membership, not the mere pittance allowed by the parent division; and a greater latitude in scheduling convention programs. It also removed the one section limitation, since

more than one divisional membership was possible to cover other interests, if desired.

Eleven more signatures of members than the 100 necessary were obtained for dissolution of the Petroleum Section and formation of the Petroleum Division in 1965–1966 under the chairmanship of Virginia Lee Wilcox (now Mrs. Paul G. Herold), of the Colorado School of Mines, Golden, Colorado. The SLA Board of Directors acted favorably upon the petition for divisional status at the 57th Annual Conference, June 1966, and the Petroleum Division was launched immediately (*7*). Bylaws were revised to conform to divisional requirements, and other administrative changes and appointments were made to meet the responsibilities of its new status. It was agreed that the *Sci-Tech News* would be the official news vehicle for the division, as it has become for nine divisions (through 1975) which have science and technology orientation.

Membership

The membership of the division has not shown any startling growth, rather it is more noticeable for its stability. It has grown from 146 in 1966 when divisional status became a reality, to over 160 as of July 1975.

Membership is open to any member of SLA who expresses an interest in the petroleum industry. The division's members are predominantly librarians and information specialists who work in the many diversified libraries and information and research centers of the petroleum corporations. Many of them are subject specialists and information systems experts in addition to being professional librarians. Some of them represent the science- and technology-oriented academic institutions or such departments in colleges and universities, and the departments of the large public libraries having special collections in petroleum, energy, and other related subjects. There are a few members from petroleum information centers in other countries, Canada in particular. They have the same problems and interests similar to other petroleum industry-oriented members of the division, and their contribution is effective and welcome.

Projects and Publications

The division is "projects conscious" and it is probably the beneficial projects pursued through the years that have given vitality to its program. Some of the more influential and useful projects are discussed here.

From the beginning in 1933 when the division was first organized as the Petroleum Committee in the Sci-Tech Group, it was concerned with the need for the establishment of an abstracting and indexing service for the rapidly growing mass of literature necessary to the petroleum industry. In a brief "History of the Petroleum Section" (*8*). Thelma Hoffman, of Shell Development Company, speaks of

the founding of the *Petroleum Technical Review* by the Petroleum Committee. Abstracts were furnished by the members, and after two issues it was apparent that preparing a competent abstracts journal was too ambitious an undertaking for the busy librarians alone, so the project was tabled. During the next 3 years, 1935–1938, under the chairmanship of Joshua Smith, Standard Oil Development Company, the need for an abstracts journal that would document the literature of petroleum technology was still the major concern of the members. Negotiations with the Institute of Petroleum concerning the intention of making the abstracting service a cooperative venture were unsuccessful.

The section became inactive during the next 2 years. It is surmised that frustration over the failure of the project to establish an abstracting service to cover the literature of petroleum was a disruptive disappointment. However, the project was not forgotten. The need was genuine and it was not to be denied.

During World War II, interest of the Petroleum Section members in the documentation of petroleum literature found its expression in the cooperative project of indexing patents in the subject area of petroleum for the U.S. Office of Alien Property Custodian (*9*).

A new project was originated in 1951, by vote of the members at the business meeting at the SLA Annual Convention held in St. Paul (*10*). A bibliography of glossaries covering terms used in the petroleum industry was developed under the guiding hand of Mignon Gill of Universal Oil Products Company. Glossaries limited to petroleum refining terms were excluded in order not to duplicate the efforts of the American Petroleum Institute (API), which was developing a refining glossary. The list of glossaries was accepted for publication by the journal *Petroleum Processing*, in 1953 (*11*).

As another project, and in cooperation with the Tulsa Public Library, the section sponsored an exhibit at the International Petroleum Exposition held in Tulsa, Oklahoma, May 14–23, 1953.

Of more long-range value was the awareness of the need and continued interest of the members in the establishment of some form of information retrieval for the petroleum industry. In 1952–1953 the section cooperated with the American Petroleum Institute by serving on a study committee to plan and develop an abstracting service for the literature pertaining to chemical and petroleum refining (*12*). This action developed into an API Abstracting Advisory Subcommittee, and after much detailed planning and the participation of a number of petroleum companies to underwrite the cost by subscriptions, the *API Technical Abstracts Bulletin* became a self-supporting reality. From the industrial sector, the Administrative Committee on Abstracting was formed, to operate under the Committee on Petroleum Products of the Division of Refining of the API. The Abstracting Advisory Subcommittee composed of petroleum librarians served in an advisory capacity to the Administrative Committee. A Petroleum Section member, Mary Banker, formerly of the Atlantic Refining Company, became supervisor of the API Central Abstracting Service (*13*). As a result, a start at information retrieval of the petroleum refining literature was well on its way.

Another useful project which ended in publication was the work of the Committee on Petroleum and Natural Gas Statistics. The composition of the committee changed during the years that work was in progress, but Chairman Margaret M. Rocq, librarian of the Standard Oil Company of California, San Francisco, guided the work to its ultimate conclusion, publication of the *U.S. Sources of Petroleum and Natural Gas Statistics* (*14*).

The members of the division continued to feel the need for the documentation of petroleum literature. Sponsored by the Petroleum Section and the API Abstracting Advisory Subcommittee, a forum was held June 5, 1959, in New York City. The forum was chaired by Jurgen G. Raymond, librarian of Sinclair Oil Corporation. The subject of the meeting was "Cooperation and Standardization of Petroleum Libraries in Machine Methods" (*15*). The abstracting, indexing, and retrieval needs of the petroleum industry were discussed, as well as the status of the indexing and coding being done at that time, and the applicability of available mechanical systems.

Then, on February 19, 1960, in Dallas, Texas, the Petroleum Section sponsored an industry-wide forum to consolidate the opinions of industry concerning the need for an abstracting and indexing service of the literature of petroleum exploration and production. Cosponsors of this significant meeting were the Advisory Committee on Fundamental Research on Occurrence and Recovery of Petroleum of the API and the Texas Chapter of the SLA. The primary objective was to stimulate the initiation of a type of retrieval service and bibliographical control best suited to the needs of the petroleum industry. The proceedings of the forum were published. Included as an "epilogue" was an "Editors Note" on the last page that gave a follow-up of the meeting in Dallas (*16*). Briefly it related that the API special subcommittee continued to study the possibilities of sponsoring and abstracting for the petroleum exploration and production literature, similar to what it was doing for the literature of refining in its *API Technical Abstracts*. However, the API decided against entering into the publication phase, and all of the data gathered in the study by the subcommittee were turned over to the eventual publisher, the University of Tulsa and its Petroleum Advisory Abstracts Committee. From this union was born *Petroleum Abstracts*, January 1961.

Maryann Duggan, chairman of the Petroleum Section, 1960–1961, and the members of the section worked both with the API and the University of Tulsa to assist in the development of the abstracting service for exploration and production petroleum technology. They also contributed to a classification system for production literature that would be compatible with the API classification scheme for the literature of refining (*17*).

The division's policy of many years was to maintain a liaison with any organization concerned with the literature pertinent to the petroleum industry. In the division's *Handbook of Procedures* is a provision for the chairman to appoint, as needed, representatives to work with such organizations as the API; American Chemical Society; National Science Foundation; and the Department of Information Science, College of Petroleum Sciences and Engineering of the University of

Tulsa, publisher of *Petroleum Abstracts*. This was particularly valuable in the formative years of documenting the literature, as well as making it retrievable by computer techniques. Division members were concerned lest the petroleum industry be caught lagging technically in the field of information retrieval.

Some publications of members and program highlights are noted to give a better indication of the scope of interests and activities of the division:

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The division has issued *Newsletters* irregularly and *Membership Directories*, the latest of which is dated 1974. The *Proceedings* were suspended with the publication of Volume 12, 1966.

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PETROLEUM/ENERGY LIBRARIES AND LITERATURE

Introduction

A petroleum library may be defined as a special library in which the major emphasis of its holdings pertains to the subject of petroleum and its related subject matter. There are many who also would think of the petroleum library as one which is identified primarily with the petroleum industry. This "fundamental quality" is characteristic of special libraries (*1*). An examination of two major directories, Ash and Lorenz, *Subject Collections* (*2*) and Young et al., *Directory of Special Libraries and Information Centers* (*3*) points up this diversity in petroleum libraries.

The various types of petroleum libraries may be grouped into five major classifications. Foremost, at least in number, are the libraries of petroleum companies, the corporate libraries. There is also the petroleum collection as subject, departmental, or professional library in colleges and universities, including its corollary subjects. Libraries of research facilities affiliated with these special educational institutions are included in this second group. In the third category are the large public library branches, divisions, or departments which have special petroleum and energy collections. Governmental agencies also have libraries devoted to petroleum, natural gas, and energy information. The fifth and last category includes the petroleum libraries which are supported by nonprofit organizations, trade associations, and scientific, technical, and learned societies.

There is a vast body of literature necessary to support the needs of petroleum libraries of all categories. The bulk of this body of knowledge has been generated within the last decade or two, even though petroleum, or "oil," has been known in the world and used for many singular and mundane purposes since about 6000 B.C. (*4*). The petroleum library must have ready access to many facets of information in order to fulfill its role to its parent organization, whether this be a petroleum company, an academic institution, public library, governmental agency, or nonprofit organization.

The more immediate and serious subject matter of petroleum libraries includes

one of the resultant problems of our technological era, the dire prospects of a shortage of this major source of energy. In today's world it is difficult indeed to think of any other aspect of petroleum and natural gas, unless it is the high cost of these energy fuels, apparently due primarily to dwindling supplies.

The crisis in energy resources, the depletion of domestic supplies, the political involvements as a result of the need for foreign sources of oil, and the difficult decisions which the U.S. Congress must face in order to establish an equitable fuel and energy policy on the one hand, and a reasonable environmental protection policy on the other, are problems of concern to all petroleum interests. These concerns are reflected in the activities and collections of all types of libraries and information centers whose common denominators are petroleum, natural gas, and energy.

Paralleling the energy crisis is the search for alternate sources of energy, an effort in which the petroleum industry finds itself deeply involved. A growing percentage of research funds is being expended in an attempt to solve the nation's energy problems. The leading alternate sources of energy at the present time are oil shale, coal (liquefaction and gasification), nuclear, geothermal, and solar power, and even the wind. Much of the research for some of the possible substitutes, and/or supplements, for petroleum and natural gas is being done in the research and engineering laboratories of the oil companies, including their libraries and information centers. Not only do they pioneer in the development of new knowledge, they must build on the available data that is currently being generated, and on what has been accumulated in the past.

Petroleum Libraries

PETROLEUM LIBRARIES IN INDUSTRY

The petroleum industry is a relatively young and powerful giant in American history. Its complexities and ramifications touch almost every facet of human life in the present "age of energy." It is an industry with a dramatic history, for it was on the apparently endless flow of "black gold" that the industrial era in the United States was swept to such unprecedented heights.

The drilling of the Drake well by "Colonel" Edwin L. Drake near Titusville, Pennsylvania, in 1859, marks the beginning of the petroleum industry in the United States. In little more than a century of time the industry's pattern of development has kept pace with the ever-expanding demands made upon it for industrial and domestic uses. For over 100 years oil and gas have been taken for granted and used as if they were inexhaustible resources, often to the extent of waste. With the phenomenal growth of an industrially oriented economy, petroleum and natural gas became increasingly indispensable sources of energy. With each new demand placed upon it, the oil industry responded by more intensive exploration, production of new wells, new oil fields, improved drilling and refining technologies, and expanded markets. The American stock market found oil stocks to be one of its most competitive and flourishing commodities. Exploration knew no national

boundaries as oil fields were discovered and developed in other countries. Many of the oil companies became multinational as they sought to answer the continuously growing demand for their products.

The exponential growth in the number of automobiles using the lengthening ribbons of super highways, the preference for oil and gas by industry over the less convenient coal, and the growing dependence of the American family upon oil and gas for domestic use has brought the country to an abrupt realization that the supply of mineral resources is not inexhaustible, that conservation of energy is in order, and that the development of new sources of energy is mandatory.

The notably impressive and powerful empires which the petroleum companies have built were based upon a solid foundation of technical knowledge and basic information. They early recognized their need for company libraries. Based on data given in the *Directory* (*5*), there was a total of 75 "petroleum and petroleum technology" libraries in the United States alone in 1974. Of the libraries for which founding dates were given, 12% were founded before 1920, 8% during the decade of the 1920s, 16% during the 1930s, 19% during the decade of the 1940s, and 42% from 1950 through 1969, with a scant 3% in the first part of the 1970s. This does not include libraries given under other, but related, subjects, and Canadian petroleum libraries.

It is probable that the nucleus of most company libraries originated as a personally selected shelf of reference books and periodical subscriptions in the office of the engineers and technical specialists. When the chief engineer of the General Petroleum Corporation discovered, around 1920, that many of his men were buying books and subscribing to technical journals through company channels and regarding them as their personal property, the books were collected and placed in a bookcase in his office. The beginning of this particular corporation library was the accumulation of these publications and the typing of a list of all of the available materials, which was circulated throughout the organization. The bookcase soon proved inadequate, resulting in a small room being designated for the library under the supervision of the secretary of the chief engineer. Within a year, however, a librarian was employed as the library and its use grew (*6*). In another instance, it was the president of a fully integrated oil company who, recognizing the value of research materials in the formative years of the company, established the company library by building around the core of his personal collection (*7*).

As the oil companies increased in size and complexity, their information needs grew apace. There were few subjects that a large American oil company or one of its subsidiaries did not need eventually in the course of a business day. Such broad and diverse topics as history of the oil and gas industry, exploration geology and geophysics, production engineering, transportation of oil, petroleum refining and chemical engineering, the extensive petrochemical industry, economic aspects, public relations, and research—as they sought continually to improve methods and to pioneer in new developments—are historical subjects which come to mind. Some of these subjects are on the shelves of a reference section in the modern petroleum library shown in Figure 1.

There are many satellite industries which have their own specific technologies.

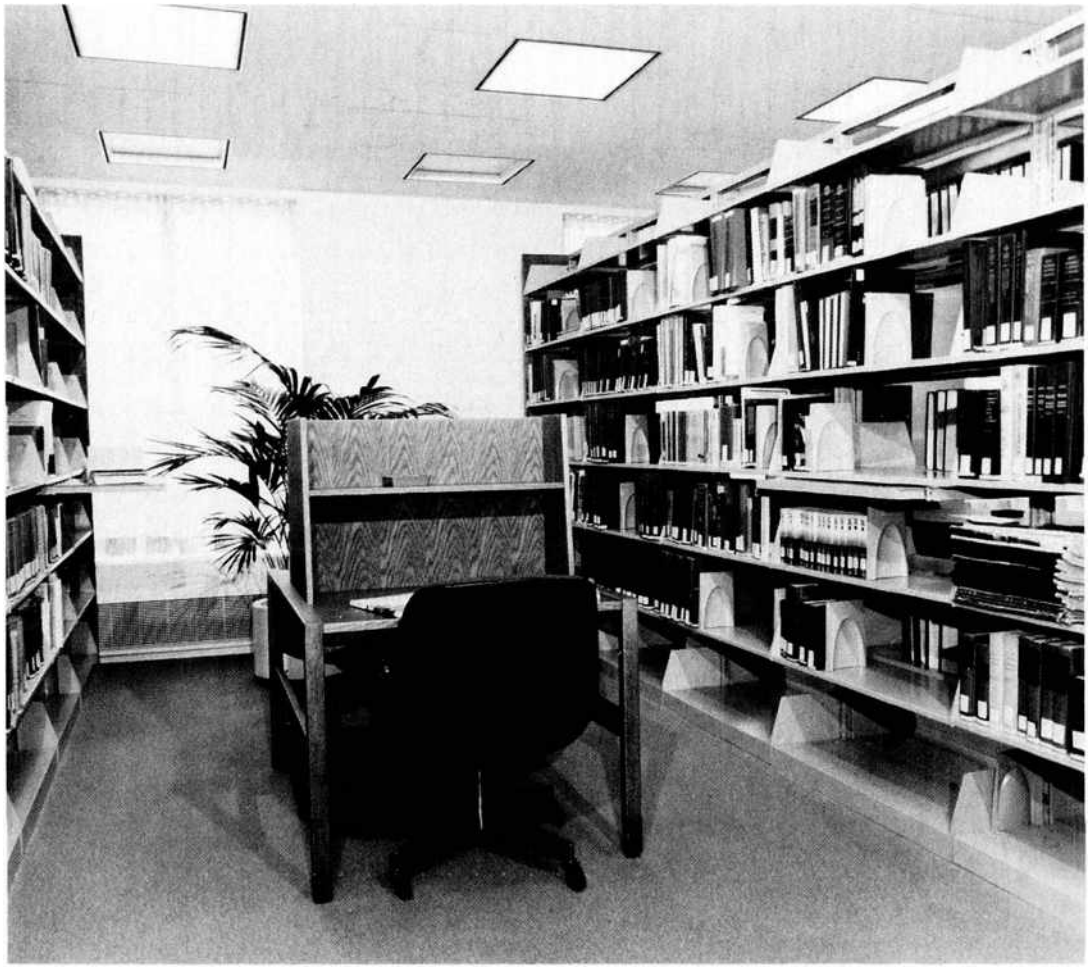

FIGURE 1. *Reference alcove in the new Corporate Library, Standard Oil Company (Indiana), Chicago, Illinois (courtesy of manager, Library/Information Center).*

Currently, there is the intensive research for alternates and substitutes for the depleting resources of this fossil fuel, the prime source of energy in an age of scientific and technological marvels.

With such multifaceted interests and information needs, oil companies found that it was advantageous to decentralize management by establishing offices, laboratories, and research centers at strategic locations. Wherever expediency and efficiency indicated, a new affiliate or subsidiary was created. Most often the location was based on utilitarian and economic reasons.

For the same reasons, the information centers and libraries were established in various divisions of a large company across the continent. One company might have a number of subsidiaries and each might have its own specialized library. In the *Directory of Special Libraries* it may be noted that there were as many as seven such libraries and information centers in different locations affiliated with one large oil corporation in the United States alone in 1973 (*8*). Also, there are others that were not listed in this source. Each has its own specialized purpose and function

depending upon the aims and objectives of the particular organization within which it operates. In this framework, the editors list the following categories of petroleum libraries, all having a close relationship to the major "Petroleum and Petroleum Technology" grouping, and some libraries are included in more than one group: Natural Gas, Fuels (excluding Coal), Oil Sands, Oil Shale, Oil Well Drilling Fluids, Oil Well Logging, Pipelines, Petrochemicals, Energy Research, and Energy Resources. They all give library service specialized or geared "to meet the increasingly complex informational needs of business and industry" (*9*).

The assignment of responsibilities for multiple libraries throughout a large oil corporation is a decision of management and does not necessarily follow any pattern. Corporate emphasis sometimes changes and the informational needs change as a result. To serve the best interests of a dynamic corporation, their libraries and information centers are combined, divided, or moved to where the action is, usually in conjunction with their administrative units, as company policy determines.

Administrative patterns of company libraries and information centers vary throughout the industry. One unusual corporate information services division is essentially an information center and a research library. In addition, three satellite libraries, one each in separate research structures supporting singular research and development needs of its laboratory's personnel, and the central research library, are under the supervision of the director of the information services division. The satellite libraries provide basic loan and reference services but look to the information services division and the central library for literature and patent searches, interlibrary loans, records control, translations, current awareness bulletins, and other information center functions. These include information systems development, selective dissemination of information (SDI), and retrieval of information through in-house computer-based files, as well as on-line searching capabilities of commercial and other data banks (*10*).

Information centers are a relatively new expression of the traditional concept of library service. Rees expressed well one of the chief causative factors, when he said:

> The bibliographical apparatus and tradition of library service so carefully created and nurtured for many decades have been severely tested by the demand for rapid access to vast stores of highly complex and diversified information (*11*).

Information centers have absorbed many of the features of libraries, and in a large system a library may be an administrative unit of an information center. In practice, the information center actually extends the reference services of the company library. It gives its users the information they need through information retrieved from commercial data bases, on-line computer techniques, and from data prepared from, and stored in, its own files. Figure 2 shows a staff member operating the computer terminal in a petroleum research library. Information centers may perform extensive literature searches, editorial services, and translations. They deal in *information* rather than the physical volume. They have subject specialists and researchers on their staffs with the capability of an in-depth comprehension and

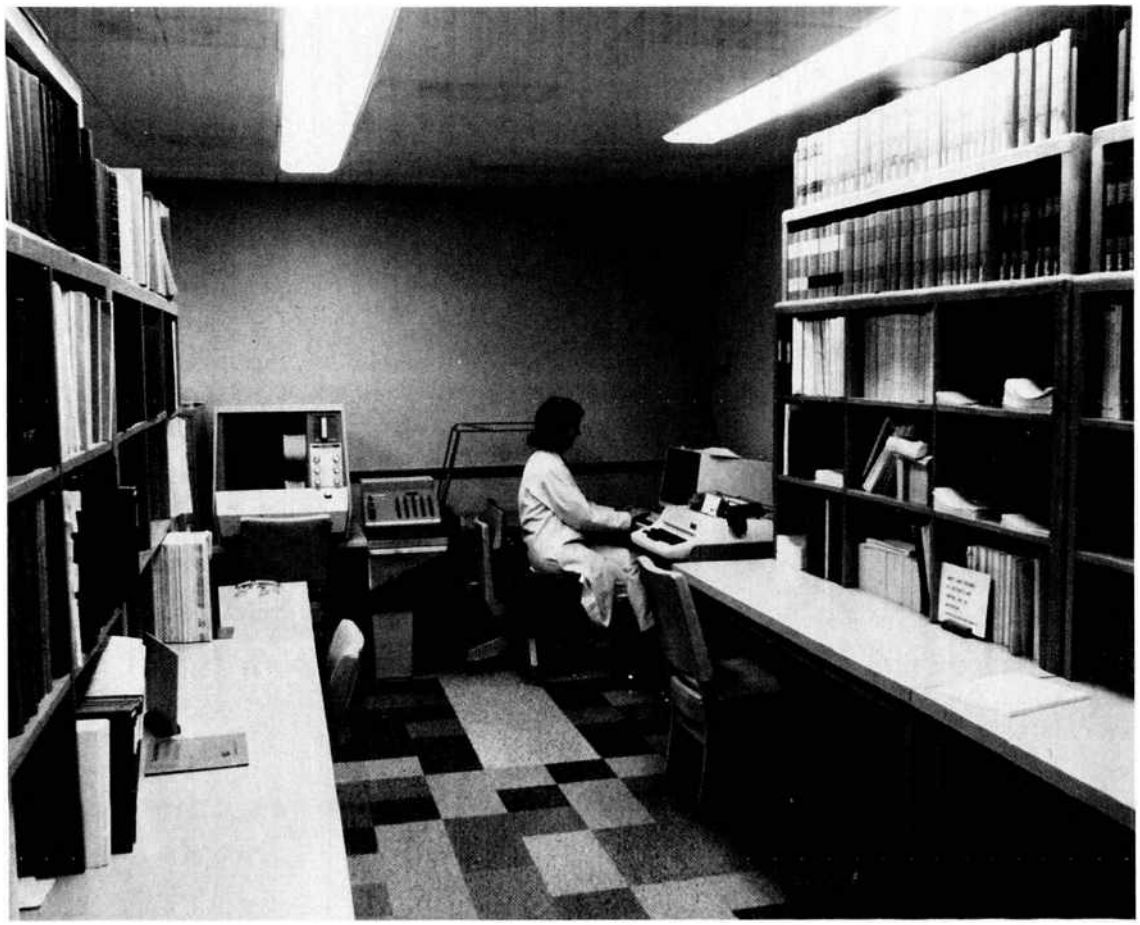

FIGURE 2. *Library technician at a computer terminal in the Marathon Oil Company Library (courtesy of Marathon Oil Company, Denver Research Center, Technical Information Section, Littleton, Colorado).*

analysis of the pertinent scientific and technical literature. It matters not what the company's center for SDI is called. As Kruzas stated in his summary:

> The Library's contributions to company objectives were based on its control of factual information. Since its sources were nearly always in the form of records, published and unpublished, its essential library nature could not be disguised by the use of such names as "documents center," "information center," or "information department". . . . Indeed, the type and origin of the record did not matter: information was the specificity, and applicability to company needs (*12*).

Of the 91 organizations in the United States and Canada appearing in the index to the "Petroleum and Petroleum Technology" section in the *Directory*, 69, or 76%, called themselves a "library," and only 22, or 24%, carried the name "information center" (*5*). However, it must be pointed out that many petroleum "libraries" give at least some of the services normally attributed to the information center, including the use of computerized data, literature searches, and abstracting and index-

ing of material not included in the major abstracting tools pertaining to petroleum interests.

Most of the petroleum company libraries are named descriptively, as a perusal of the *Directory of Special Libraries* will show, and many of them are research laboratory libraries or research center libraries for their companies. Included also are corporation law libraries, tax libraries, one medical library, a "systems" library, and others, as separate libraries serving their respective administrative divisions in the United States and in Canada (*5*).

To offer guidance and counsel in shaping broad policies, there exists in many oil companies a library committee made up of men at the management level from each of the major fields (*13*). Such a committee serves in a consulting capacity and is in a position to be aware of the need to use up-to-date methods and machines, and the economic feasibility of the expenditures of funds to support these innovations.

The services performed by a petroleum library for its clientele appear to have changed little in the past 25 years. According to a survey conducted by Johnson in 1950, petroleum libraries prepared abstract bulletins, maintained patent files, conducted literature searches, and maintained search card files in their company's fields of interest (*14*). Almost 25 years later, similar activities are found to take place in a very specialized petroleum library which provides occupational health information to the affiliates of its multinational petroleum corporation. As with all libraries today, the problem of retrieving information from an overwhelming mass of paper is an impediment to efficiency, and this particular medical–industrial library was at that time contemplating machine-processing techniques for its proprietary service, and to that end was proposing the compilation of a thesaurus. The eventual in-depth indexing and storage of data will lend itself to machine retrieval, resulting in rapid access and manipulation of data possibilities (*15*).

Company libraries and information centers often are responsible for the corporate records and files. They serve as repositories of classified and proprietary documents as well as patents and reports developed in the research laboratories. They also must provide retrieval of this unique and valuable information resource for their company's management, research personnel, and technical staff members. For some libraries, retrieval of information for patent generation and support is the prime service they render the parent organization.

Generally a company library is not "large" in terms of numbers of books and periodical volumes as compared with the holdings of a college library or a public library. Petroleum library collections vary in size from a few hundred books to several thousand. There is a similar variation in holdings of bound periodicals, documents, maps, technical reports, patents, microforms, tapes, and vertical files of selected materials (*8*). Since the industry library exists to supply the information needs of its company, its collection and services are carefully patterned to fit that requirement, with an in-depth emphasis on specific needs.

Examples of such petroleum industry libraries would be petrochemical libraries emphasizing information on the manufacture and use of chemicals derived from

petroleum. Others have strength in secondary or enhanced recovery methods, offshore exploration and drilling, medical and public health research relating to the petroleum industry, or the economic and legal aspects entailed in the research and development of the activities of their companies. It follows that many of the petroleum libraries are strengthening their informational data on the related subjects of paramount national interest and international involvement, and in conservation of the country's rapidly diminishing energy resources. In addition to this conservation effort by the oil companies, there is the research being done on alternate sources of energy, as noted earlier. Petroleum industry libraries exist to support the efforts of their companies in all areas determined by company interests. The parent organizations consider their libraries and information centers a corporate asset as well as an investment.

EDUCATIONAL PETROLEUM LIBRARIES

In the world of scholarship, science and technology are becoming increasingly interdisciplinary in their relationships. Effective academic libraries reflect this interdependence in their collections and organization. "Petroleum libraries" in colleges and universities are generally subject collections or departmental collections in the colleges and universities which educate the petroleum engineers of the nation. They may be subject collections in a centralized or divisional university library; they may be departmental collections in engineering libraries; or they may be special collections in centralized or departmentalized libraries of schools of engineering and technology. In any case, their objectives are similar—to support the educational programs of their respective institutions.

Since 1967 the Engineering Manpower Commission of the Engineers Joint Council, in cooperation with the American Society for Engineering Education and other interested groups, has been gathering statistics concerning the engineering and technology degrees granted by institutions in the United States. Prior to 1967 these data were furnished from the U.S. Office of Education. Table 1 summarizes the total number and types of degrees given in petroleum engineering over the past

TABLE 1

Petroleum Engineering Degrees by Degree Level for All U.S. Engineering Schools, 1970–1974[a]

Year	Bachelor's	Master's	Engineer	Doctor's	Total
1970	268	103[b]	0	14	385
1971	277	96	2	19	394
1972	307	86	1	21	415
1973	328	93	2	17	440
1974	299	56	4	19	378

[a] Source: *Engineering Education*, 61, 431–446 (1971); 62, 799–808 (1972); 63, 520–522 (1973); 64, 263–269 (1974); 65, 421–424 (1975).

[b] Includes Engineer Degree.

5 years. The total for the year 1974 is sharply delineated by its implications. As Alden remarked: "It is ironic to note that smaller numbers of petroleum engineers were graduated in a year when energy crises began to generate an unusually high level of demand for specialists in these fields" (*16*).

There were almost a score of universities offering degrees in Petroleum Engineering according to the Lovejoy *Guide* current at this writing, and approximately half of them gave degrees through the doctoral level (*17*). Most of the institutions which had a petroleum engineering program were large state universities where opportunities for research present themselves, and where a larger proportion of research funding is usually available to the graduate student. Only one single-purpose engineering school offers Petroleum Engineering and Chemical and Petroleum-Refining degrees from the bachelor's through the doctorate—the Colorado School of Mines. It is a small state university with a singular commitment to the disciplines relating to the mineral industries. Its centralized library contains a well-rounded, integrated petroleum collection. Another special petroleum collection in an academic library is the superior collection on oil and gas law, a distinctive part of the Law Library of Southern Methodist University.

There are a number of educational research centers whose activities are directed largely toward new developments and research in petroleum and related technologies. Many are an integral unit of a college or university, often supported in whole or in part by industry. The current edition of *Research Centers Directory* indicates that there are 19 centers which are oriented toward petroleum and its related subjects in the United States and Canada (*18*). One of the centers, the University of Tulsa, Information Services Department, generates and publishes *Petroleum Abstracts*, the data base and information retrieval system for the world's petroleum exploration and production literature. It also conducts computerized searches for specific technical petroleum information. Its library of approximately 100,000 volumes serves both the university and the Information Services Department.

Another research center which has a unique purpose is the Petroleum History Research Center of the University of Wyoming. Its principal objective is the collection, preservation, and organization of the petroleum history of the United States, with primary emphasis on the Rocky Mountain region. The collections of its library include manuscripts, diaries, correspondence, corporate records, and other petroleum historical documents.

Something should be said for the service which colleges and universities in general perform for petroleum industry libraries. The strong research libraries of universities provide access to their bibliographic wealth through interlibrary loan, photocopy services, and reference information, by telephone, mail, or in person. There is a mutual benefit, however, to be gained. Many petroleum libraries loan material to university libraries from their highly specialized collections. In addition, as Nicholson points out, it is from the technical libraries of industry that have come many bibliographic tools, materials in the Translation Center of the John Crerar Library, and leadership in furthering research, experimentation, and action on data processing methods of coping with the scientific literature problem (*19*).

The petroleum industry also contributes large grants to educational institutions, and supports scholarships and research of faculty and graduate students.

PETROLEUM COLLECTIONS IN PUBLIC LIBRARIES

A few public libraries have been serving industry for decades through the establishment of scientific and technical departments. Especially is this true of the public libraries located in the large industrial centers. *Subject Collections*, 1967, noted 15 public libraries which reported significant collections in the geology, engineering, business, and commercial aspects of the petroleum industry (*20*). The *Directory of Special Libraries*, 1974, contains only three such public libraries. They are included with all other types of "petroleum libraries" (*8*). This variance is attributed, at least in part, to an interpretive reaction of the libraries to the questionnaires from the publishers. However, whether or not they consider their subject collections to be "special" libraries, there is often a large public library with a significant science–technology department, or engineering and business department, located in the major industrial centers. Public libraries in regions of intense oil industry activity usually reflect this information need in their working collections. The Tulsa City–County Library System would fall into this category. Its Business and Technology Department has strength in its holdings in earth and petroleum sciences and peripheral fields (*21*).

Some public libraries have unique specialized petroleum collections which are valuable in a historical perspective, such as the History of the California Petroleum Industry collection of the Long Beach Public Library, as noted in the *Directory* (*22*). Noteworthy also is the Houston Public Library's collection of 500,000 well records of oil and gas wells drilled in Texas between 1920 and 1965 (*23*).

Public libraries and industrial libraries have shared each other's resources and services for years, just as cooperation among all kinds of libraries is increasing as the flood of published literature threatens to inundate those who are attempting to organize and document it. However, public libraries, in only a limited way, supplement the depth and breadth of the informational needs required by industry to support its research, development, and production activities. As Pfoutz and Cohen point out in their study:

> Only a handful of public libraries in this country are providing materials and services which even begin to meet the needs of industry. When one adds up the public library science–technology resources of the world's richest and most industrialized country, the result is disheartening (*24*).

Nevertheless, the strong technical collection of the large public library, with long files of retrospective serials, document depository files and patents, and adequate indexing and bibliographic tools, is of incalculable value to the petroleum industry. This type of material and the broad diversity of information resources would hardly be expected to exist in the company library collection, but its availability in a pub-

lic library through interlibrary loan, copying, and direct personal use lends strength and support to the research and operational activities of industry.

PETROLEUM LIBRARIES IN GOVERNMENTAL AGENCIES

Petroleum libraries, as such, are not abundant in governmental agencies. Young et al. record only one "petroleum library" supported by the federal government, the United States Bureau of Mines San Francisco Petroleum Research Office (*25*). They do list, however, four energy research center libraries that the federal government maintains through the Bureau of Mines, which include petroleum, oil shale, secondary recovery, and such interrelated subjects in their fields of research. Actually, a comparison of these data with the "Directory of Special Libraries Serving the Federal Government, Fiscal Year 1965" indicates that two of the latter four energy research center libraries were called "petroleum research centers" at that time, one in Bartlesville, Oklahoma, and the other in Laramie, Wyoming (*26*). Indeed, so swiftly is the energy pattern changing that a check at this writing of the most recent edition of the *U.S. Government Manual* indicates that all of the former Petroleum Research Offices are now "Energy Research Centers," including the office in San Francisco. They and their libraries are now Energy Research and Development Administration (ERDA) research facilities (*27*).

Needless to say, the federal government, the petroleum industry, and citizens, in varying aspects at this time, are vitally interested in energy and what it represents to the economy now and in the future. A great deal of research in these areas is sponsored at the national level. Much of the research conducted by colleges and universities is supported in whole or in part by the federal government. Many state agencies also receive financial assistance from this source.

There are two large branches of the U.S. Department of the Interior, the Bureau of Mines and the Geological Survey, which have a vital research interest in supplementing the petroleum resources of the country. The Energy Reorganization Act of 1974 brought some of the department's research programs under ERDA. However, it retains at this time "basic responsibilities for research in resource assessment, mining, and environmental factors . . ." (*28*). As noted above, the petroleum research offices of the Bureau of Mines have all become energy research centers, and, of course, their libraries have changed their names accordingly. Although their purpose and activities remain essentially the same, their thrust is intensified in the support of energy research. The bureau's publications attest to the scope of its interests. Its bulletins, circulars, and reports emphasize basic research in developmental technology for the extraction, processing, and recycling of the nation's mineral resources, which includes a concern and reasonable respect for the environment. Its publications also are authoritative in the compilation and analysis of statistical and economic data pertaining to mineral resources.

The U.S. Geological Survey, with its excellent central library in the National Geological Center in Reston, Virginia, and three regional libraries, supports research

of the survey involving topography, geology, and mineral and water resources of the United States. The survey enforces departmental regulations pertaining to oil, gas, and mineral leases, and licenses and developmental contracts. Its publications are chiefly the results of the research performed by its geologists, geochemists, and geophysicists. Its Office of Oil and Gas Research maintains a computerized file of resource data on petroleum and natural gas.

Only two state governments indicate that they foster libraries with a petroleum emphasis, Alabama and West Virginia, both through their State Geological Surveys (*29*).

Undoubtedly there are many more states which sponsor petroleum research as an adjunct interest, especially through their geological surveys, mineral resources, or energy resources and conservation offices.

Canada has a National Energy Board Library which in its collection emphasizes, in addition to the petroleum industry, crude oil and natural gas pipelines, and liquified natural gas. The *Directory of Special Libraries* also includes two provincial petroleum libraries. One is the Alberta Research Council Library, which has a notable collection of information on oil sands and contains a special bibliographic tool, the *Athabasca Oil Sands Index*. The other is the British Columbia Department of Mines and Petroleum Resources Library, established in 1896 (*30*).

PETROLEUM LIBRARIES OF ASSOCIATIONS

There are a number of petroleum libraries which are maintained by independent organizations, nonprofit agencies, and scientific and technical societies. Probably foremost among these is the library of the American Petroleum Institute (API). The institute is supported by industry, being the first national trade organization in the United States to encompass all phases of the petroleum industry. It administers an extensive fundamental research program through its various divisions and committees, on the origin, composition, and properties of petroleum. In recent years its research has expanded into investigations on air and water conservation, antipollution studies, and environmental and occupational health. The API is an extensive publisher of books and reports covering results of its research, statistical data pertaining to all phases of the industry, and other useful information.

One of the chief contributions made by the API to the petroleum industry and the world of research is the publication of the well-documented data banks of the API Central Abstracting and Indexing Service. Two of the major titles include the *API Abstracts of Refining Literature* and the *API Patent Alert Abstracts*. These publications accomplish for the petroleum refining literature what the University of Tulsa's Department of Information Services does for the literature of the exploration and production of petroleum, as mentioned previously.

The institute's library serves as a general source of information about the oil and gas industry for users within the industry as well as the public in general. Its major emphases are environmental affairs, economics and statistics, legislative development, and history of the petroleum industry (*31*).

Another type of an association petroleum library is that of the organization which publishes scholarly journals. A typical example is the library of the American Association of Petroleum Geologists (AAPG), which maintains a working collection of publications of AAPG-affiliated societies in petroleum geology (*32*).

The American Institute of Mining, Metallurgical and Petroleum Engineers (AIME), a major publisher in its fields, is an affiliate of the Engineering Societies Library in New York City. The Societies Library serves a dozen professional engineering societies as a centralized library. Cooperative agreements and mergers were arranged by the respective engineering societies to establish it. However, only a small percentage of its collection would be expected to be petroleum oriented.

A unique cooperative petroleum organization is the Interstate Oil Compact Commission. Its voluntary membership is composed of 36 states which produce gas and oil. The member states are "working together in a program of waste prevention. Its sole purpose is to promote and encourage the conservation of oil and gas through established state agencies" (*33*). The commission's library contains thousands of vertical file materials and card files chiefly concerned with the conservation of oil and gas (*34*).

There are other notable association libraries, of course. The above few are typical examples representative of this type of petroleum library.

Petroleum Libraries and Energy

A major aspect of any discussion of petroleum libraries automatically involves one of the most critical subjects facing the United States and the world today—the energy crisis. Because petroleum is the world's current major source of energy on the one hand, and because that source has a finite and precarious existence in the Western world, on the other, an examination of libraries as they relate to energy is essential to the total petroleum library scene.

Late in 1973 the Arab oil embargo against the United States and other countries, following the Arab–Israeli war, brought into sharp focus the nation's dependence upon foreign oil. New discoveries of domestic crude oil and natural gas were not keeping pace with the expanding needs, and costs were escalating. For example, the total number of wells drilled in 1973 decreased 0.8% as compared with 1972, and the total footage increased 0.8% . The average cost per foot in 1973 was $22.54, an increase of 8.5% over 1973. Estimated expenditures for exploration amounted to $5.9 billion in 1973, an increase of 60% over 1972 (*35*).

Whatever the cause for the low record of new discoveries, whether geologic, economic, or bureaucratic, if the United States is to become self-sufficient in its energy needs by 1985, not only must exploration for new oil and gas discoveries be encouraged, but also alternate sources of energy must be developed. Conservation and efficient use of what is available now must also become daily practice.

Except for some few prophetic voices crying in the wilderness, very little attention was given seriously to the petroleum shortage until long lines of automobiles

began forming at service stations, and the price of gasoline soared. There are still an imaginative few who doubt that the oil shortage is real, who think it is merely a method contrived by the powerful oil corporations to gain concessions and increase their assets. The cars lined up at the gasoline pumps merely served to show, in their minds, to what extent the giant petroleum industry would go.

Investigation, however, proved the seriousness of the predicament of the United States, which had for too long depended too heavily on unstable foreign oil. The government marshaled all of its forces in 1974. The Federal Energy Administration (FEA) was established by the Federal Energy Administration Act of 1974 (88 Stat. 96), effective June 28, 1974. This action abolished the Federal Energy Office. The FEA's chief purpose is to develop policies to ensure that the United States supply of energy is sufficient to meet its total energy demand. The FEA produced a focus for the nation in what was called Project Independence (*36*). When the president delivered his State of the Union message to the Congress on January 15, 1975, it was apparent that the outgrowth of the effort that went into Project Independence was culminated in the country's comprehensive energy program. Almost immediately the Energy Research and Development Administration (ERDA) was created by the Energy Reorganization Act of 1974 (88 Stat. 1233; 3 U.S.C. 301), to consolidate federal activities relating to research and development of the new energy technology.

The nation's energy problems present a challenge that must be met and resolved with the cooperation of government, industry, private institutions, and the general public. The avenues through which this monumental task are to be accomplished will require the cooperative commitment of all elements of American society.

If the United States' dependence on foreign oil, and excessive oil prices dictated by the Organization for Petroleum Exporting Countries (OPEC), are to be minimized, a rigorous program of conservation of existing resources, increased exploration and new discoveries, and development of alternate sources of energy must be pursued judiciously. Consideration for the environmental risks and costs must, at the same time, not be obscured.

Conservation measures in the production, distribution, and use of oil and gas were instituted. The oil industry was familiar with conservation policies. Conservation became a legal problem in earlier years of the industry when competition among producers created wasteful drilling and production practices. Many scholarly studies have been written pertaining to the lack of conservation, the competitive exploitation of oil and natural gas fields, and the eventual development of controls, often through the courts. Zimmerman gives a definitive account of this phase of the industry's development (*37*). Conservation today, however, has a different connotation. The intent of the 55-miles-per-hour speed limit nationwide and car-pooling for day-to-day travel to work are concrete efforts to reduce the consumption of petroleum products. The reduction of automobile emission pollution is an added bonus. Efficiency in industrial use of energy, transportation economics, domestic heating and cooling conservation steps by insulation, direct utilization of clean coal by utilities and industry, and improved efficiency in electric power transmission are other immediate energy conservation goals.

The petroleum industry is in the forefront of energy research at the present time. Many of the research laboratories of the major oil and gas companies are presently engaged in research on various energy projects, as may be verified in the latest edition of *Industrial Research Centers* (*38*).

Petroleum engineers are aware that billions of barrels of oil are left in the ground after conventional primary and secondary methods have been applied. Today, they are experimenting with "enhanced recovery" techniques to extract a few more billions of barrels from the known reservoirs. There is a limit to this source of oil, but its recovery will help to reduce the dependency on foreign oil for the immediate future.

The National Petroleum Council (NPC), an advisory body to the secretary of the interior, on November 4, 1975, appointed a Committee on Enhanced Recovery at the request of the U.S. Department of the Interior. In the letter requesting that the study be made, Jack W. Carlson, assistant secretary of the interior, stated:

> While the U.S. could expect to recover an average of about one-third of the oil and four-fifths of the gas from reservoirs in the past, new conditions will undoubtedly improve the recovery rates in the future. We need to obtain the best estimates of likely new recovery rates because of the changes experienced in the past few years (*39*).

Increased exploration in order to make new discoveries of oil and natural gas is another pressing measure to augment the nation's energy self-sufficiency by expansion of its energy production. Oil companies are extending their exploratory drilling offshore, to the outer Continental Shelf (OCS). The oil and gas discovered at Prudhoe Bay on the North Slope of Alaska is a prime discovery. Figure 3 illustrates a large offshore drilling platform operating in the waters off Nova Scotia. Each new discovery will be expensive both in the exploratory phase and in the actual production. All efforts to find and produce every barrel of oil that can be economically developed will give the country that much more time to develop alternate sources of energy.

Two of the most prominent alternate sources are also fossil fuels, oil shale and coal. A great deal of research has been devoted to converting oil shale economically to oil and gas. There are significant oil shale deposits in the Green River Formation of Colorado, Utah, and Wyoming, and in other areas in the United States.

Whole mountains are composed of oil shale beds, as shown in Figure 4, taken near Rifle, in northwestern Colorado. There are numerous processes developed for extracting hydrocarbon fuels by retorting; as yet none are commercially operating. Some thermal extraction is done above ground and some in situ, or in place, which eliminates extensive mining and transportation of raw shale. Many oil companies are currently doing research and development in the Green River Formation. Research methods for protecting the environment also are necessary because of the nature of the techniques used to mine the shale. Figure 5 illustrates a revegetation experiment in which grasses are grown successfully on the oil shale waste. In the background is the mountain of shale. The federal government through

FIGURE 3. *A SEDCO-H offshore drilling platform in operation off Nova Scotia (courtesy of Mobil Oil Corporation).*

ERDA's Laramie Energy Research Center, formerly "Petroleum" Research Center, as noted earlier, is conducting an intensified research program on oil shale technology.

The chief oil shale problem is economics. It costs more to produce a barrel of crude made from oil shale than it does to purchase imported oil at present prices. Another problem is the cost to protect the environment, such as antipollution measures for clean air, water, and earth; population density; and protection of wildlife habitat—in essence the cost to shift the socioeconomic structure from an agricultural to an industrial basis (*40*).

Many oil companies are active in research seeking methods to develop clean energy from coal. Liquefaction and gasification of coal, so that it can be transported through pipelines, is an alternate source for the cleanest of fossil fuels, natural gas. The Office of Coal Research (OCR), of the U.S. Department of the Interior, is concentrating its research program on the development of environmentally acceptable technologies relating to the production of low-sulfur synthetic fuels and gases:

FIGURE 4. *Oil shale beds showing typical stratified formation of oil shale, in northwestern Colorado (courtesy of Colorado School of Mines Research Institute).*

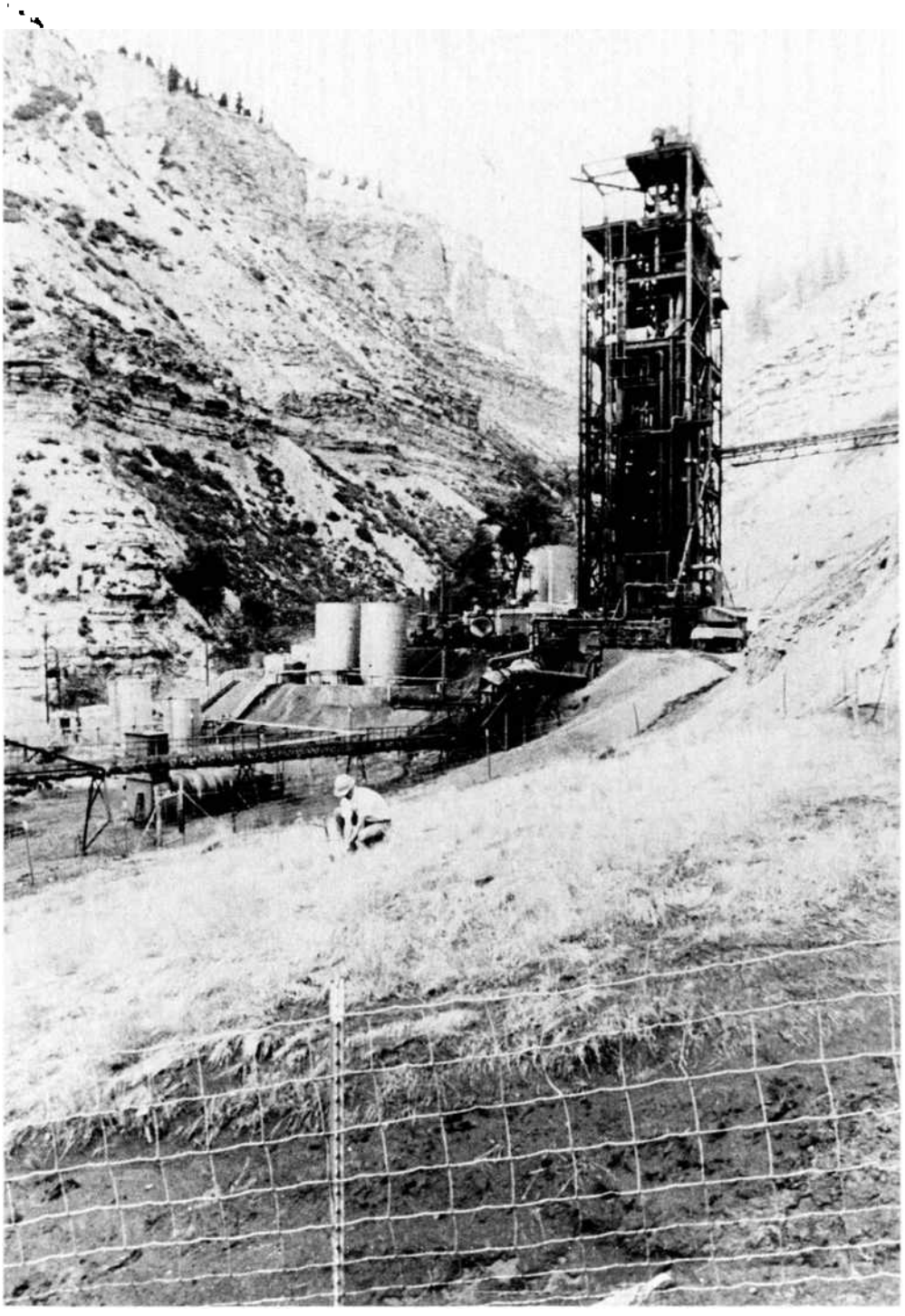

FIGURE 5. *Oil shale revegetation experiment is an attempt to protect the environment from the effects of mining and processing of the shale. Fescue grass has been the most successful to date. The experimental pilot retort plant, right center, is located near Rifle, Colorado (courtesy of Colorado School of Mines).*

> Even with maximum exploration and development of our oil and gas resources (including those in Alaska) and utilization of oil shale, coal is the only energy form whose resources are sufficient to supply our total energy demand (*41*).

The OCR administers research and coordinates supporting research projects with educational institutions, oil companies, and other industrial firms. Numerous technical reports have been issued on various phases of its efforts, and many environmental impact statements have been prepared.

Although nuclear energy research is not necessarily an interest of the petroleum industry, it must be considered a major and important alternate source of energy for oil and gas. At present there are nuclear electrical generating plants in operation and others on the drawing boards. Looking into the energy future a few decades, perhaps from nuclear fission, which is dependent on the availability of uranium or thorium ores, will come the advanced liquid metal fast breeder reactor (LMFBR):

> This latter achievement would reduce the problem of nuclear raw materials to insignificance for a long time to come, since it enhances raw material use by a factor of 50 or more compared with nonbreeder systems. If—looking still further ahead—we assume that nuclear fusion can be controlled to produce power economically, the availability of the required resources (deuterium and lithium) appears to be still more staggering (*42*).

Another important potential alternate source of energy, geothermal, comes from "harnessing the fires below. The energy potential of geothermal power is just now boiling to the surface" (*43*). The largest known source of such power in the world is the dry-steam geothermal field called the Geysers, located about 90 miles northeast of San Francisco in Sonoma County, California. At the present time about 500 megawatts of electricity are being produced from thermal wells for Metropolitan San Francisco. Wells are drilled to a depth of more than a mile and a half to tap the steam created when surface water seeps down through the layers of soil, sandstone, and clay to the molten rock below. The resulting steam is channeled through steam pipes to turbine generators, as shown in Figure 6, one of the generating plants of the Pacific Gas and Electric Company.

There are many obstacles to the development of geothermal energy. The greatest uncertainty appears to be the lack of knowledge of the location and the extent of reservoirs, their temperature and longevity, and the technological problems associated with efficiently operative systems (*44*).

Other more "natural" alternate sources of energy include solar energy, which originates as radiation from the sun, the largest energy resource. Wind energy conversion systems (WECS), hydropower, and biomass (the conversion of plant, agricultural, and forest residues into useful clean fuels) are other possible sources of energy for the future.

There are other potential sources of energy production, many with various limitations. Additional sources are magnetohydrodynamics (MHD), tides, waste heat and water (fusion and hydrogen). The limitations are, primarily, the lack of technologies to convert the potential energy to use.

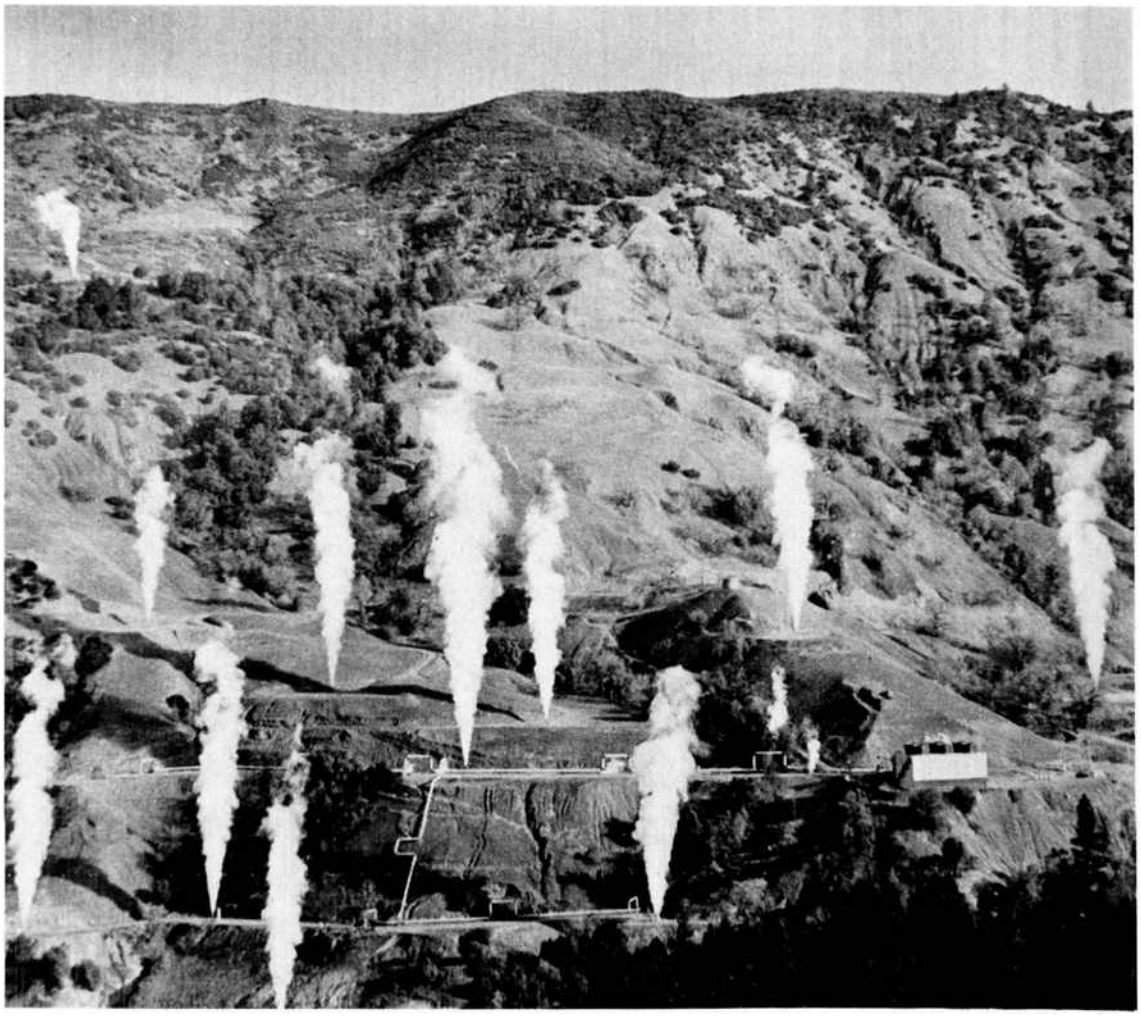

FIGURE 6. *Geothermal energy, the Geysers Field, Sonoma County, California. Steam gathering lines with expansion loops are shown venting steam to the atmosphere for testing purposes (courtesy of Pacific Gas and Electric Company, via Professor L. T. Grose, Colorado School of Mines).*

The national plan prepared by ERDA for energy research and development was conceived to achieve solutions to energy supply needs for the immediate or short term (the early 1980s), the middle term (early 1980s to 2000), and the long term (beyond 2000). The plan is based largely on the cooperation of governmental agencies with industry and the research community to work out an effective solution to the serious and continuing energy problem existing in the United States, not only for the present but into the future. There is a great deal of technological perfection, innovation, and development to be realized before even the major potential energy resources can be utilized. More lead time is required than is commonly realized. Even if the new "technologies should prove successful in satisfying the technical, economic, institutional and environmental requirements for implementation, their major energy supply contributions will occur in the twenty-first century" (*45*).

Some scientists, with expertise in diverse disciplines, believe that the economic factors may be as influential as the technical, if not more so, in achieving the energy flow necessary to meet the demands of a society built on an expanding economy, requiring an ever-increasing consumption of energy. It is the "net" energy, or what is left after total production and transportation of the energy to the consumer is subtracted, that is of ultimate significance. "It takes energy to produce new energy. . . . The time may come when it simply isn't worth all the energy costs to do the work our society demands" (*46*).

Industry, of necessity, calculates the cost-effectiveness of potential new developments. Its research programs, conducted in the laboratories, researched in the libraries and information centers, may take years before even one becomes a productive reality.

The petroleum industry is in the forefront of the research effort to develop alternate sources of the diminishing energy it has supplied the Western world for over a century. Its libraries and information centers have become "energy" libraries and information centers in practice, if not actually in name, as noted earlier.

Petroleum Literature

The survey of petroleum literature is presented chiefly in the form of a bibliography, at the end of this article. It is intended to be representative only, of the extensive body of recorded knowledge dealing with the interrelated subjects of petroleum and energy. Included are references on the primary aspects of these complex subjects. Materials pertaining to their history, growth, and development are included. Petroleum and energy references are separated, sometimes arbitrarily, because of the current and future importance of new sources of energy to the United States and the world.

Alternate sources of energy, one of the primary problems arising from the effect of diminishing petroleum resources, have had little research and scant treatment in the literature in the past. However, as a result of the energy crisis worldwide, the proliferation of information in this field has been explosive. Many new journals of varying quality, but timely, are appearing on the scene. Included in this category are condensed news publications such as *Weekly Energy Report* (Llewellyn King, Washington, D.C.), *Energy: the Weekly Journal for Energy Consumers* (ENERGY, Washington, D.C.), and *Energy Users Report* (Bureau of National Affairs, Washington, D.C.). These news briefs are designed to keep the reader informed of the latest developments in a rapidly changing field.

The scientific and technical journals are publishing heavily in the fields of energy in one form or another. Chemical Abstracts (CA), one of the world's largest abstracting and indexing services, documenting some 400,000 items annually, has been abstracting many of these scholarly publications since 1907. Beginning in July 1974, CA brought together the abstracts on energy-related topics under three significant sections: Electrochemical, Radiational, and Thermal Energy Technology;

Fossil Fuels, Derivatives, and Related Products; and Nuclear Technology. Portions of the data base made in the production of CA are available for computer searching as far back as July 1968, through CA Condensates (*47*).

The two major abstracting and indexing services for the petroleum industry, to which reference was made previously in a different context, are publications of the American Petroleum Institute (API) Central Abstracting and Indexing Service, and of the University of Tulsa's Information Services Department.

The *API Abstracts of Refining Literature* publishes abstracts, since 1954, from almost 200 technical journals in the fields of chemistry, petroleum, engineering, and physics. This service appears in four separate titles: *Petroleum Refining and Petrochemicals Literature Abstracts; Abstracts of Air and Water Conservation Literature, 1969; Abstracts of Transportation and Storage Literature, 1968;* and *Abstracts of Petroleum Substitutes Literature, 1969*. The latter title covers overall energy problems. *Indexes to API Abstracts of Refining Literature* provides hard-copy indexes as well as magnetic tape records for computerized searching of the data base from a library or information center terminal.

The *API Patent Alert Abstracts* since 1961 gives extensive coverage of patents of interest to the petroleum refining and petrochemical industries. This service records approximately 500 U.S. and foreign patents on a weekly service basis. *API Patents Index* is a key for locating specific information in patents. This service provides both printed copy and machine-readable tapes.

The API Central Abstracting and Indexing Service issued a new monthly publication in 1975, *Petroleum/Energy Business News Index*. Its purpose is to develop a ready access to the multitude of energy news, statistics, trends, supply–demand information, and environmental matters. It takes its data from five widely used oil news sources: *Platt's Oilgram News Service, Oil Daily, Petroleum Intelligence Weekly, Petroleum Economist,* and *Middle East Economic Survey*.

The API publishes, in addition, many other services, statistical studies, and reports of research, much of which it sponsors. Recently announced is a new publication of the API, *Basic Petroleum Data Book*; the first issue is dated October 1975. The *Data Book* replaces *Petroleum Facts and Figures*, the last issue of which was in 1971. The new publication is designed to provide a continuing source of current information on most aspects of the petroleum industry. Beginning in 1976, the new quarterly incorporates information previously published in the *API Annual Statistical Review* (*48*).

To balance the information needs of petroleum interests, the Information Services Department of the University of Tulsa has issued *Petroleum Abstracts* since 1961. This publication covers the exploration, development, and production of oil and gas in relation to such areas as exploration geology and geophysics, geochemistry, petroleum geology, well drilling and logging, reservoir engineering, transportation and storage, pollution, and alternate fuels and energy resources. *Petroleum Abstracts* is a comprehensive service abstracting approximately 10,000 items per year from the world literature. The information stored in its data base is retrievable by computer techniques.

There are other abstracting and indexing services that are of value to the petroleum industry. The few noted are some of the most useful. One other, *Nuclear Science Asbtracts*, is of particular value as an information base for one of the major alternate sources of energy. It was published since July 1948, by the U.S. Atomic Energy Commission; ERDA assumed sponsorship of the publication in 1975.

The federal government publishes innumerable reports and studies on petroleum and energy problems. A small number have been included in the bibliography, and a number noted in the previous pages.

Most of the larger oil companies publish house organs, or publications for the general public. The API's *Petroleum Today*, 1959–; *Exxon U.S.A.* (formerly *Humble Way*), 1945–, and *The Lamp*, 1918– (both published by Exxon Corporation); *Marathon World*, 1969–; *Shell News*, 1932–; and *Texaco Star*, 1913– are excellent examples of informative publications for the general public.

The selected bibliography contains monographs, serials, and articles on both petroleum and energy. Selections were made principally to give a representative example of all phases of the petroleum industry and the serious current problem of alternate sources of energy for the world's decreasing supply of oil and gas.

No attempt to classify the items has been made other than their format. Items that appear in the "References" are seldom repeated in the bibliography. No annotations are given, because in most instances titles and entries give sufficient information to make a determination of the usefulness of the citations. Many of the references contain excellent bibliographies.

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VIRGINIA WILCOX HEROLD

PHARMACEUTICAL LIBRARIES AND LITERATURE

General Information

Essentially there are two distinct types of pharmaceutical libraries, those that serve industrial organizations that do research and manufacture drugs, and academic libraries that serve schools or colleges of pharmacy. There are many similarities in their collections and operations, although there is, of course, a difference in emphasis.

Most large pharmaceutical companies support fine scientific collections that assist research personnel, and frequently the collections also include business and management materials, materials on laws and regulations, patents, and perhaps archival documents. These materials may be integrated at one location, or they may be housed separately with separate staffs. There is an emphasis on acquiring publications and maintaining files and indexes that relate to the products the company produces or is interested in developing.

The staff of the company library will usually do more literature searching and make more personalized services available to its clientele than the academic library can afford for its users. Many services are promoted in the industrial library to assist the user in rapid access to information needed. Of recent time there has been considerable use made of computers and machine-readable data bases. These libraries have long been known for their progressive, innovative, and cooperative activities.

Libraries that serve pharmacy schools do not always exist as separate entities. Occasionally the pharmacy materials are integrated with the general university library collection or with the medical school library, or are part of a science or

health science collection. The latter is probably a trend. However, a great many schools of pharmacy are served by a separate library, usually housed in the same building as the school. It is hoped that the service is equal no matter what the housing or administrative arrangement. However, accrediting standards seem to favor a separate collection (*1*).

Academic libraries, particularly those of large universities, hold long runs of back volumes of periodicals, but industrial libraries emphasize current materials and rely on interlibrary loans from schools to supply the older sources. It is necessary to have access to extensive periodical holdings to support the research activities of this field.

The research done in schools that offer advanced degrees resembles to some extent that done in industry. Rather large amounts in research grants are made to the various departments of some schools both from industry and from governmental agencies. Because of this there is considerable similarity in the library collections in all pharmaceutical libraries. It is of note that of recent years pharmacy schools have collected a good deal of material in the area of clinical medicine because of the increased emphasis on clinical pharmacy and its involvement with disseminating drug information (particularly that on adverse reactions) (*2*) to the medical community. Obviously, industrial organizations have an increased interest in this area of the literature also, and companies frequently have "in-house" drug information facilities set up to give information on their own products at least.

Organizations such as the American Pharmaceutical Association, the British Pharmaceutical Association, and the International Pharmaceutical Federation in Brussels also maintain libraries which support the work of their associations.

History of Pharmacy Collections

The organization most involved with the history of pharmacy in the United States is the American Institute of the History of Pharmacy (AIHP). It was founded in 1941 at the University of Wisconsin School of Pharmacy in Madison. The institute is a nonprofit organization devoted to advancing knowledge and understanding of the place of pharmacy in history. It regularly publishes a periodical, *Pharmacy in History*, and occasionally publishes monographs and pamphlets. Further aims of the organization are to foster humanistic teaching in pharmaceutical education, to confer awards for outstanding achievement in its field, to sponsor historical meetings and exhibits, to collect and preserve materials, and to serve as a center for research and information.

The University of Wisconsin School of Pharmacy is the oldest and most prestigious center for pharmaceutical history because it houses the AIHP and, further, has a superb collection of archival materials as well as impressive holdings in other literature. Such materials as the following are included in the holdings: the Kremers Collection of pamphlets and clippings of historical interest, a collection of commercial pharmaceutical catalogs, a list of catalogs published from 1872 to 1890,

and many books published before 1800. There are other pharmacy schools, particularly the older ones, that also have respectable holdings, and many medical school libraries have fine materials dealing with the history of pharmacy (*3*).

The development of the collection at Wisconsin is interesting. It began with the gift in 1927 of the personal library of the first head of the School of Pharmacy, Frederick Belden Power. Power's successor, Edward Kremers, was an outstanding collector and pharmacy historian, and due to his leadership more historical materials were added. Also, well-known later professors such as George Urdang (now deceased) and Glenn Sonnedecker have given direction in purchases of additional valuable materials for the collection.

In the early 1970s the American Institute of the History of Pharmacy entered into an agreement with the State Historical Society of Wisconsin whereby the society would serve as a repository for the AIHP's collection of unpublished records. The AIHP continues to collect all types of historical sources in the field, and those not appropriate to the new archive (such as printed and pictorial material) are maintained by the University of Wisconsin School of Pharmacy (*4*).

The reading room of the Division of Archives and Manuscripts of the Wisconsin Historical Society is open to all who wish to utilize the institute's historical collections.

At the time the archive arrangement was announced, the director of the AIHP, Glenn Sonnedecker, asked that all persons who knew the whereabouts of significant personal papers, institutional records, or organized files relating to pharmacy register their location, character, and extent with the AIHP's offices at Madison in the Pharmacy Building. The efforts of the group at Madison have done a great deal to preserve the documentary evidence of pharmacy's past in the United States.

Another source of historical information about American pharmacy is the archives collection at the American Pharmaceutical Association Foundation Library in Washington, D.C. (*5*). The schematic structure of the archive, with indication of the content, has been published (*6*).

A foreign organization of note is the Société d'Histoire de la Pharmacie, which is located at 4, Avenue de l'Observatoire, 75270 Paris. This organization was founded in 1913, and since 1930 it has published the periodical *Revue d'histoire de la pharmacie.*

The Lloyd Library of Cincinnati, Ohio, is an important privately endowed institution housing a large collection of reference works of particular value to research workers interested in discovering new medicinal agents in plants and to those interested in old rare publications in the fields of botany and pharmacy. Although the library has never had tax support, it has always served the public free of charge (*7*). Borrowed materials must be used in the library's reading room, but interlibrary loans are made to established libraries.

The library, which was founded in 1864, has occupied several locations in Cincinnati. The latest is a modern building, occupied in 1971, at 917 Plum Street (*8*).

The collection contains many rare, obscure, and foreign reference materials.

Among its outstanding holdings are: (*a*) a collection of world pharmacopoeias, dispensatories, and allied materials from the 15th to the 20th centuries (*9*); (*b*) a rare collection of incunabula, postincunabula, and vellum-bound books on pharmacy, botany, and the natural sciences; (*c*) a large collection of books on florae of the world; (*d*) the largest collection of eclectic medical publications in the world; (*e*) a large and unique collection of books on mycology; (*f*) a fine collection of rare drug price lists from the early 19th century to date; (*g*) an unusual collection of seed catalogs; (*h*) a collection of agricultural and biological experiment station publications; (*i*) many foreign and domestic abstracting serials; (*j*) a sizable collection of books on plant chemistry, medical botany, and pharmacognosy; (*k*) complete sets and long runs of outstanding periodicals dating back to 1787; and (*l*) a large pamphlet collection on pharmacy, botany, mycology, entomology, and allied sciences (*7*).

The collection size was reported in 1972 to be over 170,000 books, 120,000 pamphlets, and about 4,000 current periodicals (*8*). The holdings are listed in several union catalogs and lists.

The library publishes the journal *Lloydia, the Journal of Natural Products,* in conjunction with the American Society of Pharmacognosy.

Source materials of significance in the history of pharmacy are scattered and difficult to obtain (only a few pharmacy schools have a professorship in the field) (*3*). However, a few bibliographies and lists of holdings exist which can serve as guides to what is available, particularly in the Lloyd Library and the University of Wisconsin collections (see Refs. *3* and *7–14*).

The Development of Pharmacy Libraries

INDUSTRIAL LIBRARIES

Ideally an industrial library is planned as an integral part of an organization at the same time plans are made for the units the library is to serve. While this sometimes happens, a study of the development of company libraries (and pharmacy school libraries, too) shows that most often they have grown haphazardly in offices and laboratories. As such collections grow and organized library services are needed, the realization comes that collections should be brought together and a competent staff put in charge.

Company libraries have been in a number of places on organization charts. The best arrangement is that it is a distinctive unit in the organization on the same administrative level as other departments with comparable responsibilities. The head librarian then reports to someone high enough in the administrative echelon to make for easy communication with those who determine policies. In research areas this is usually the director of research. The library may be a department of a laboratory, and the librarian have department head status.

The name given to a company library doesn't always reflect accurately all the

activities encompassed. For instance, the library may include such activities as a Report and Technical Writing Group and a Reports Indexing Group. Frequently the terms "information center" or "information service" are used instead of "library." Before these terms came into use, "documentation" was the term sometimes used to designate the area of activity (*15*).

The information units are placed in a number of different ways in industrial organizations. There are about four main categories: (*a*) one library service for the whole corporation, (*b*) several libraries operating independently at various plant locations, (*c*) one central library with branches, and (*d*) various combinations of the first three. Strauss et al. say that no one arrangement can be recommended as universally effective (*15*). Progressive industries evidently modify organizational structure to suit changing conditions.

The development of the scientific library of Eli Lilly and Company in Indianapolis is interesting and also typical of the development of other company libraries. Lilly was one of the first firms in the United States to establish a special library (*16, 17*). The firm was established on a small scale in 1876, and by 1891 a botanist was put in charge of a small collection of pharmaceutical and medical books. A centralized library was established in 1911, and it functioned as one of the five subdivisions of the Scientific Department. Since the establishment of the library, five moves to larger quarters have been necessary, and, of course, the collection, staff, and services have grown and increased greatly, with automated services having been brought into use along with other innovations.

In addition to the Lilly Scientific Library there are several other information units including a Business Library, an Agricultural Library, a Legal Divisions Law Library, and an Archives Collection (*15*).

A look at articles written by pharmaceutical company librarians during the past 10 or 15 years reveals what matters have concerned them most. There has been attention given to computer utilization (*18, 19*), particularly in indexing systems. Also, simpler systems have been tried (*20*). Effective ways to search the literature have been explored (*21–23*). Interlibrary loaning and borrowing and other cooperative ventures have been important (*24–26*). The company library's role, and particularly its contribution to product development and marketing have been discussed (*27*). Handling of little-used material and the storage of it have been studied (*28*).

ACADEMIC LIBRARIES

The development of pharmacy school libraries has, to a great extent, been similar to that of industrial libraries. They also had their beginnings as small office collections that later were brought together in one place under the supervision of a librarian.

There were few pharmacy school libraries discernable before 1900. However, exceptions were the library of the Philadelphia College of Pharmacy and that of the Massachusetts College of Pharmacy (*29*). The interest in developing libraries

in schools did not gain much attention until 1933 when the Committee on Libraries of the American Association of Colleges of Pharmacy was established. This committee has flourished under several names and a different makeup over the years. The first chairman was Dr. Charles O. Lee, a professor of pharmacy at Purdue University. He was a most fortunate choice, serving for 19 years and making many contributions toward raising the standards of librarianship in the pharmacy schools. A history of this committee's work is available (*30*). Besides working toward the establishment of standards, the committee made notable contributions in the preparation of lists of textbooks, a survey of school publications, and in the promotion of exchange of books and periodicals. There was emphasis on getting trained and qualified librarians rather than making use of the services of students, clerks, or stenographers.

In 1952 the American Association of Colleges of Pharmacy (AACP) made an organizational change in its Committee on Libraries, and the Joint Committee on Pharmacy College Libraries was formed. A six-membered committee was set up. Two members were to be professors from the AACP, one serving as chairman. Two pharmacy college librarians were to be chosen by the Medical Library Association from their membership, and two were to be nominated by the Special Libraries Association from among pharmaceutical librarians in industry. The Joint Committee, like the earlier committee, made many contributions such as sponsoring publications, encouraging cooperation, and developing standards. The Joint Committee continued to be active as such until 1970, when the pharmacy school librarians petitioned for and received section status in the Conference of Teachers of the AACP and the committee was disbanded. However, both the Medical Library Association and the Special Libraries Association continue to appoint member pharmacy librarians as special representatives to the American Association of Colleges of Pharmacy group. Prior to becoming a recognized section of the AACP, the librarians of pharmacy schools had been meeting with the annual AACP's Teachers' Seminars. The meetings began in 1966 and from the start evoked a good deal of interest.

Like industrial libraries, pharmacy school libraries vary in organizational form. Opposing points of view have often been argued as to whether a centralized library or branches serving schools is best. In general those who use publications in a limited subject area such as pharmacy want materials close to their laboratory or office, while most library administrators prefer the alleged economies of a central service (*15*). As Strauss et al. say, "Scientists measure one way, libraries another." There can be no real conclusion about what is best for an institution in regard to either service or economy. However, the statement made in the *Accreditation Manual* (see below) of the American Council on Pharmaceutical Education, the accrediting body for this field, seems to favor separate libraries, or at least reading rooms in close proximity to the schools. This variability of organization has been recognized by the council in its accrediting standards for schools. Libraries are not accredited separately, but schools are considered for accreditation with library service as part of the total package.

In regard to administrative arrangements, these vary also. Sometimes the pharmacy school librarian will report directly to the dean of the school served, sometimes to the director of libraries of the university, and sometimes to the medical school or health science librarian. Occasionally some other line of authority may be set up. Again, no definite statement can be made about which arrangement is preferable.

It is felt that the efforts of the pharmacy school librarians to develop standards for their institutions have been quite successful. The American Council on Pharmaceutical Education states in the 1975 edition of its *Accreditation Manual* (*1*):

> Library: The library should be under the control of a competent professional librarian whose relation to the faculty should be that he is a member of the faculty and attends faculty meetings or otherwise enjoys effective communication with the faculty. The responsibilities of the librarian include: (1) the development of adequate holdings in suitable current reference books and periodicals and a working procedure for making additions to the collection as suggested by the faculty; (2) the provision of a reading room or study library of a size adequate for the student body within or adjacent to the college of pharmacy; (3) a program to acquaint students with the library and development of evidence of use of the library by students and staff; (4) facilities for the reproduction of study materials; (5) use of advanced information storage and retrieval and instruction techniques as their effectiveness becomes apparent and as they become available for general use; (6) effective strategies to teach students the proper use of the professional literature in the kinds of practice in which they are likely to engage.

The above statements are in contrast to those made in the previous edition of the *Manual* (1960), which stated (*31*):

> a. The library should be adequate to provide for the needs of the program of the college. This applies to the holdings in reference books and periodicals, to reading room facilities, and to annual appropriation. It should be in charge of trained library personnel.
> b. Of equal or greater importance is the use made of the library by staff and students. Evidence of this will be sought by examination of: programs designed to familiarize students with the library and its use; the records of staff and student loans; the extent to which library assignments are made and the nature of these assignments; and practices designed to inform potential users promptly of new acquisitions.

In 1970 the newly formed Librarians Section of the American Association of Colleges of Pharmacy made plans for the preparation of an "evaluative instrument" to be used for pharmacy library evaluation. In 1974 the section's Committee on Standards, with the assistance of Martha Jane K. Zachert, presented a preliminary edition of *Standards and Planning Guide for Pharmacy College Libraries* (*32*), which promises to be of great value, particularly for library self-evaluation. In 1975 the document was accepted by the Administrative Board of the AACP, who will publish and distribute copies of it with the title changed to *Standards and Planning Guide for Pharmacy Library Service*.

Some pharmacy colleges are primarily undergraduate schools, but many also have extensive graduate programs with work leading to the Doctor of Pharmacy, and master's and Ph.D. degrees. For that reason material may be collected on all levels. Generally speaking the fields covered include pharmacology and toxicology, medicinal (or pharmaceutical) chemistry, pharmacognosy, pharmacy administration, clinical pharmacy, and industrial or manufacturing pharmacy. Some schools also offer a curriculum in other related scientific areas such as nuclear science and environmental sciences.

There are still a few pharmacy schools that are independent; that is, they are not connected to a large parent university. In the main these schools are located in the eastern part of the United States, are old and well established, and support good libraries that have historical materials and that collect in a wider range of subject areas than do schools located on large campuses where there is a general library, medical library, or other collections to rely upon.

Pharmacy school libraries serve the programs of the institutions supporting them in many ways (*33–38*). For instance, they serve the research programs by collecting materials necessary for support, such as scholarly books, journals which publish original research, and index and abstract publications. The librarians give direction to graduate students and other users in literature searching and the mechanics of thesis and report writing (*39*). Duplicate copies of theses are usually cataloged and kept in the school libraries for use by researchers following up on work previously done. The Ph.D. theses of most schools are listed in *Dissertation Abstracts International.*

The basic educational programs of the schools are supported by providing reference and bibliographic service, loan of materials, and space for study (usually including individual study carrels). The librarians present lectures to classes or teach courses on library use and materials (*40*), and prepare acquisition lists and newsletters which are distributed to local users and other schools and interested individuals as well. The librarian assists the drug abuse information program and continuing education programs (*41*) by working with students and staff involved in selecting and acquiring supporting materials.

The library also assists with the drug information services of the schools by acquiring, organizing, and instructing in the use of the specialized drug information materials. In addition, the schools' archival and historical materials are collected and organized in the libraries of most academic institutions.

Most school libraries also serve a number of individuals in their communities who have no formal connection with them. This group may include local pharmacists, graduates of the school, physicians, nurses, employees of local industries, and high school students. In most communities there is no other source that can provide the comprehensive information service on drugs that is available from a school's pharmacy library.

The articles written by pharmacy school librarians during the past decade or so reveal what matters have been of concern to them. These differ somewhat from the problem areas of the industrial pharmaceutical librarians. There has been a

good deal of concern about instructing users, students particularly, in the use of the library and the literature (*36, 40*). Also, service to the user, particularly the faculty, has been discussed (*33–35, 37–39*). Collection building and selection of materials have been of concern (*42*). Statistics on various aspects of library service have been collected and analyzed (*43*). Problems associated with the storage of little-used materials have been studied (*44*). Interlibrary loan and other cooperative ventures have been given attention (*25, 26*). The library's role in continuing education programs has been a concern. A large number of articles have been written dealing with drug information services with emphasis on the materials needed to support such programs in schools of pharmacy (*2;* see also the list of bibliographies in the following section).

The Nature of the Literature

The literature collected in pharmacy libraries, particularly where graduate programs are supported and in industrial libraries, covers a rather wide range and depth, and selection of materials is a challenge. Materials in all these fields are collected: the pharmaceutical sciences; business administration; marketing; advertising; hospital administration; management; basic medicine; clinical medicine; biological sciences; physiology; pharmacology and toxicology; many areas of chemistry, particularly analytical, organic, biochemical, physical, and medicinal (or pharmaceutical); sociology of medicine; public health; drug abuse; nuclear sciences; pharmacognosy; botany; plant chemistry; natural products; cosmetics; perfumes; flavors; chemical engineering; chemical processes; laws and regulations; and medical terminology.

The literature is specialized, technical, and advanced for the average librarian, and few have a good background for it when entering the field. For that reason bibliographies, lists, and discussions of the literature are important. Most of the bibliographies available have been compiled by librarians although a few have been the work of pharmacists and/or pharmacy school professors.

The following list of bibliographies and lists of materials with annotations should prove helpful.

BIBLIOGRAPHIES AND PUBLICATIONS CONTAINING LISTS OF IMPORTANT MATERIALS

Andrews, T., "Indexing and Abstracting of Pharmaceutical Information," *Amer. J. Pharmaceutical Educ.*, **33**, 833–842 (1969).

Discusses some general characteristics of science literature and the indexing and abstracting publications and systems available. Includes a list of those of value to pharmacy library users.

Andrews, T., "World List of Pharmacy Periodicals," *Amer. J. Hospital Pharmacy*, **20**, 41–83 (1963).

This is a list of over 900 periodicals directly concerned with drugs and pharmacy, 650 of

which were being published at the time the list was prepared. A significant publication because it provided a means of checking the total periodical literature available in 1963.

Andrews, T., and J. Cassell, "Bibliography of Publications on Drug Interactions, Adverse Reactions, and Side Effects," *Drug Intelligence Clin. Pharmacy*, **8**, 487 (1974).

Lists monographs, indexes, abstract journals, and bibliographies (without annotations). Intention is to make the reader aware of what material is available on the subject.

Andrews, T., and M. J. Young, "The Literature of Pharmacognosy and Medicinal Chemistry," *Amer. J. Pharmaceutical Educ.*, **36**, 758–764 (1972).

A bibliography which serves as a guideline for a working collection in the fields mentioned. It is a representative list of titles which have been found by librarians to be useful and/or unique.

Andrews, T., and J. Oslet, "World List of Pharmacy Periodicals—Revised and Enlarged Edition, 1975," *Amer. J. Hospital Pharmacy*, **32**, 84–122 (1975).

A recent revision of the 1963 compilation by Andrews. About twice the number of titles are listed. Growth of literature is shown, as are some trends in publishing such as an increase in Japanese publication, a decrease in house organs, an increase in newsletters, and an increase in drug abuse and alcoholism titles.

Bett, W. R., "Pharmaceutical Literature: Short Guide," *Bull. Med. Lib. Assoc.*, **49**, 63–67 (1961).

Discusses literature published and issued by drug manufacturers. Some publications are significant. Includes discussion of house organs, pamphlets, leaflets, bibliographies, historical studies, books, and miscellaneous publications. (There has been a decline in company publications of recent years.)

Bibliography of Theses and Dissertations Relevant to Pharmacy Administration, Sections 1–10, American Association of Colleges of Pharmacy, Conference of Teachers, Section of Pharmacy Administration, Bethesda, Md., 1964–1975.

An annotated list of master's and Ph.D. theses, mostly from schools that are members of the AACP. A few others of interest from other institutions have been included also, however.

Blake, J. B., and C. Roose, eds., *Medical Reference Works, 1679–1966: a Selected Bibliography*, Medical Library Assoc., Chicago, 1967; Supplement 1, 1970; Supplement 2, 1973.

Section of most interest is "Pharmacy and Pharmacology" (pp. 221–232) which includes some unusual materials and many foreign-language titles. However, the most-used materials are not included.

Bloomfield, J. C., "Documentation in the Pharmacy and Its Classification," *Pharmaceutical J.*, **206**, 20–22 (1971).

This paper presents guidelines on how the practicing pharmacist can keep up to date. British materials in large part are mentioned. A good source of basic British materials for the practicing pharmacist.

Bloomfield, J. C., "Drug Information Sources: a Bibliography," *J. mondial pharmacie*, **13**, 330–356 (1970).

Arrangement is by broad topic, then by country. The scope is international, but the coverage is quite limited for U.S. titles.

Bonnett, H. T., "The Literature of Pharmaceutical and Medicinal Chemistry," in *The Literature of Chemical Technology*, Advances in Chemistry Series No. 78, American Chemical Society, Washington, D.C., 1968, pp. 152–190.

A long bibliography is included. The text material is mostly about computer utilization.

Brunn, A. L., *How to Find Out in Pharmacy: a Guide to Sources of Pharmaceutical Information*, Pergamon Press, London, 1969.

Intended for pharmacy students and librarians. Only English-language material has been included, with some emphasis on British. Scope is limited strictly to pharmacy. There are good discussions as well as bibliographies included.

Drug Information Services: Two Operational Models: Model I: *A Complete Drug Information Service in a Hospital,* by C. M. King, Jr., and B. A. Hellums; Model II: *A Regional Drug Information Network,* by V. F. Thudium and R. E. Pearson, developed for Pharmacy-Related Programs Branch, National Center for Health Services Research and Development, Health Services and Mental Health Administration, Public Health Services, Government Printing Office, Washington, D.C., 1972 (DHEW Publication No. (HSM) 72–3030).

Includes some lists of useful publications relating to drug information and presents information about them.

Drug Intelligence and Clinical Pharmacy, Drug Intelligence and Clinical Pharmacy, Washington, D.C., 1967–.

A periodical which has a section "Literature" which presents reviews of books in the fields of clinical pharmacy and drug information.

Eckel, F. M., "Utilization of the Pharmaceutical Literature," *Illinois Pharmacist,* **31,** 75–83 (1967).

Does not cover all pharmaceutical materials, just that on drug information which is useful for the clinical or practicing pharmacist. Includes discussion and a very good list of publications.

Hellums, B. A., "A Manual to the Literature of Pharmacy," M.L.S. thesis, Univ. of Mississippi, University, Miss., 1968.

A bibliography intended for students, but librarians find it useful. Reference sources are listed with annotations. The field is rather completely covered.

Jackson, E. C., "Books for Pharmacy Colleges, 1962–1968," Part 1, *Amer. J. Pharmaceutical Educ.,* **33,** 246–267 (1969); Part 2, ibid., **33,** 411–458 (1969).

Supplements the 1963 list by Zachert and Thomasson. Prepared under the auspices of the Joint Committee on Pharmacy College Libraries of the American Association of Colleges of Pharmacy. No annotations are included.

A Key to Pharmaceutical and Medicinal Chemistry Literature, Advances in Chemistry Series No. 16, American Chemical Society, Washington, D.C., 1956.

The volume is made up of 25 papers covering a variety of special areas in the field. Some of the material is still useful, particularly that covering unusual topics (e.g., embalming) and older literature.

McCann, A., "Pharmaceutical Codices and Related Useful Reference Tools," *Bull. Med. Lib. Assoc.,* **43,** 40–51 (1975).

Article discusses a few basic reference works widely used in pharmaceutical libraries. Some of these have been superseded by other titles and new editions, but the list still has value.

Pasztor, M., and J. Hopkins, *Bibliography of Pharmaceutical Reference Literature,* Pharmaceutical Press, London, 1968.

The aim of this British publication is to provide a selective annotated list of works used in all facets of the field. Covers material published approximately from 1960 to 1968 with a few earlier included. Arranged according to type of material and subdivided by subject area. A good compilation.

Reilly, M. J., *Drug Information: Literature Review of Needs, Resources, and Services,* for Pharmacy-Related Programs Branch, National Center for Health Services Research and Development, Health Services and Mental Health Administration, Public Health Service, Government Printing Office, Washington, D.C., 1972 (DHEW Publication No. (HEW) 72–3013).

Pamphlet contains a good deal of information about what is needed to support a drug information center. There are several appendices of lists of publications.

Rosenberg, J. M., and P. Sangkachand, "Selected Sources of Information Concerning Foreign Drug Products," *Hospital Pharmacy*, **10**, 16–26 (1975).

Article provides descriptions of 24 reference sources that the authors, who are pharmacists, have used often for retrieving information about foreign drugs. A good list although there are many other sources besides the ones listed.

Sonnedecker, G., in collaboration with A. Berman, *Some Bibliographic Aids for Historical Writers in Pharmacy*, American Institute of the History of Pharmacy, Madison, Wisconsin, 1958.

A 15-page annotated bibliography. The annotations are brief except for those of the American Pharmaceutical Association publications which hold a key position in the history of the field.

Southern, W. A., and P. J. Wilson, "Current Sources of National and International Pharmaceutical Market and Economic Information," *J. Chem. Doc.*, **4**, 237–244 (1964).

Discusses the literature that can best be utilized. Includes a good, long selected bibliography also.

Special Libraries Association, Sci.-Tech. Division, Pharmaceutical Section, "Drug Information Sources," *Amer. J. Pharmacy*, **136**, 52–70 (1964); **136**, 152–164 (1964); **136**, 257–267 (1964); **137**, 35–43 (1965); **137**, 69–81 (1965).

A list of the best compendia of each country, not including pharmacopoeias, which identify the drugs used in that country and report on drug composition, variant names, actions, uses, dosage, manufacturers, and price, etc. Includes such publications as drug encyclopedias, price lists, and therapeutic guides.

Strauss, L. J., I. M. Shreve, and A. L. Brown, *Scientific and Technical Libraries: Their Organization and Administration*, 2nd ed., Becker and Hayes, New York, 1972.

The bibliography on pages 420–424, "Pharmacy and Pharmacology," is of note.

Strieby, I. M., and M. C. Spencer, "National and International Pharmacopoeias: a Checklist," *Bull. Med. Lib. Assoc.*, **45**, 410–420 (1957).

Provides a list of the national pharmacopoeias throughout the world. Brief notes are included.

U.S. Congress, 88th Congress, 1st Session, Committee Print, *Drug Literature*, Report prepared for the Study of "Interagency Coordination in Drug Research and Regulation" by the Subcommittee on Reorganization and International Organizations of the Senate Committee on Government Operations: A Factual Survey on "The Nature and Magnitude of Drug Literature," National Library of Medicine, Bethesda, Md., 1963.

This report, prepared by W. Sewell, provided a good view of the kinds and magnitude of the literature. The problems of dealing with it were pointed out. Several lists of publications appear as appendices.

Zachert, M. J. K., and C. L. Thomasson, "Bibliography of Books and Reference Works Relating to the Professional Courses in the Pharmaceutical Curriculum," Part 1, *Amer. J. Pharmaceutical Educ.*, **27**, 266–290 (1963); Part 2, ibid., **27**, 361–421 (1963).

A list of professional and reference books for pharmacy college libraries selected by faculty members in response to a questionnaire. Arranged by subject area. No annotations included.

Organizations for Pharmacy Librarians and Their Roles and Contributions

SPECIAL LIBRARIES ASSOCIATION

There is a Pharmaceutical Division of the Special Libraries Association which is one of 24 divisions of the organization. These divisions represent broad subject

fields. The Pharmaceutical Division, which was formed first as a section of the Science and Technology Division in 1947, now has about 200 members, making it the largest group of organized pharmaceutical librarians. It has always been an active group of an active organization, sponsoring many publications and activities. One of its first cooperative projects was the preparation in 1952 of a union list of periodicals held in the libraries of the members. Over the years the division has sponsored a number of valuable publications including *Unlisted Drugs* and lists of *Drug Information Sources*. The former is a listing of pharmaceuticals not easy to identify elsewhere; the latter is described in the bibliography in the preceding section.

The division has had a number of distinguished members, several having served as president of the association.

MEDICAL LIBRARY ASSOCIATION

There is a pharmacy group in the Medical Library Association also. It is one of 14 special interest groups recognized by the association. Since the structure of the organization is rather loose it is difficult to determine how many members there are in the group and just when it was organized. However, it is considerably smaller than the counterpart division in the Special Libraries Association, and since the 1950s the interest has waned. Many of those active in this organization belong to the Special Libraries Association also. There has been no publishing program although such activities of the Special Libraries Association Pharmaceutical Division have been supported. In the 1950s there was a tendency for industrial pharmaceutical librarians to be active in the Special Libraries Association and for pharmacy college librarians to be active in the Medical Library Association. Of recent years this distinction has not been so evident.

The Medical Library Association has presented continuing education courses of special interest to pharmacy librarians from time to time, along with their other courses which are sponsored each year in conjunction with the annual conference.

Another activity of note is an exchange program which the association sponsors whereby member libraries may obtain needed materials from among the discards of other libraries.

The Medical Library Association certifies medical librarians, but has attempted nothing like this for the librarians of allied medical fields. Some of these librarians do hold medical librarian certification, however.

AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

As was indicated previously, the librarians of pharmacy colleges began meeting informally in conjunction with the American Association of Colleges of Pharmacy's annual Conference of Teachers meetings in 1966. Sectional status was granted to the librarians in 1970 putting their group on the same level as others of the Conference of Teachers. Membership in the section is open to all librarians responsible for pharmacy collections whether affiliated with a pharmacy school per se, with an

industrial pharmacy library, or with a pharmacy collection within a medical or general library. Although the number of librarians active in this group is not large, the organization has several attractions. In particular it allows the librarians to participate in joint sessions with administrators and teachers of pharmacy and to interact more closely with them. This interaction is an important and distinctive feature of pharmacy library work.

As has already been noted above, this group's efforts in raising the standards of pharmacy school libraries has been most noteworthy.

THE DRUG INFORMATION ASSOCIATION

Membership in this organization is open to those who are concerned in any way with drug information. The membership includes a great many librarians. Also making up the membership are practicing pharmacists, basic medical scientists, pharmacy professors, computer specialists, and information scientists. The organization was established in 1965, and since 1966 it has published a periodical, the *Drug Information Bulletin*, later called the *Drug Information Journal.*

The objectives of the association are "to foster cooperative efforts among educational, research, industrial and governmental personnel engaged in drug information activities and to encourage and develop improved methods of collecting, selecting, abstracting, indexing, storing, receiving, tabulating, correlating, computing, analyzing, evaluating, and presenting research data generated from chemical, pharmacological and clinical drug studies." The association has a membership of almost 1,000 individuals.

Notable Librarians and Their Contributions

It is appropriate to mention a few of the librarians who have made notable contributions in this area of librarianship. Few would doubt that Mrs. Irene Strieby Shreve heads the list as the foremost active leader. Mrs. Shreve was head librarian at the Eli Lilly and Company Research Laboratories from 1934 to 1956, then served as archivist for the company from 1956 until her retirement in 1959. During her years as an active pharmaceutical librarian she made contributions in almost every area and served in many capacities.

Mrs. Shreve held numerous committee appointments and undertook many assignments in the Special Libraries Association, holding the office of president in 1947–48. She was also active in the Medical Library Association, the U.S. Book Exchange, and several state organizations in Indiana including the Indiana Association of the History of Medicine and the Indiana State Historical Society. In addition, in 1957 she served as a summer school faculty member at Columbia University where she presented the first course in pharmaceutical librarianship ever offered by such an institution.

In the 1950s Mrs. Shreve received such honors as the Special Libraries Association Hall of Fame Award and its Award for Significant Professional Achievement,

and the Indianapolis Chamber of Commerce Award. She has contributed much to professional journals and is joint author of the book *Scientific and Technical Libraries*, now in its second edition *(15)*.

Another librarian who has contributed greatly to pharmaceutical librarianship is Winifred Sewell. She began her career in this field in 1942 as assistant librarian at the Wellcome Research Laboratories in Tuckahoe, New York. In 1946 she was employed as senior librarian at the Squibb Institute for Medical Research in Brooklyn, New York, and New Brunswick, New Jersey, remaining with this firm until 1961. Since 1961 she has been on the staff of the National Library of Medicine, first as a subject-heading specialist, then as deputy chief of the Bibliographic Service Division, and since 1965 as head of the Drug Literature Program.

Miss Sewell's activities have included membership since 1964 on the National Academy of Science/National Research Council Committee on Modern Methods of Handling Chemical Information, the Commission on Pharmaceutical Abstracts of the International Federation of Pharmacy (1958–1960), and an Ad Hoc Committee to Revise the Steroid Code for the U.S. Patent Office in 1959. She has served as president of the Special Libraries Association (1960–61), and has also been active in the Medical Library Association, the American Society of Information Science, American Chemical Society Chemical Literature Division, and the Drug Information Association.

She has received such honors as winning the Publications Award of the Science and Technology Division of the Special Libraries Association in 1966. She has contributed to many professional journals. In addition she initiated and edited *Unlisted Drugs* from 1949 to 1964, edited *Medical Subject Headings* for the National Library of Medicine in 1963 and 1964, and prepared the document *Drug Literature*, Committee Print, Senate Committee on Government Operations (see Bibliography in "The Nature of the Literature" section). All three of these publications are significant.

Miss Sewell has contributed to education for librarianship by instructing on Pharmaceutical libraries and librarianship at Columbia University in 1959, and has been an adjunct lecturer at the University of Maryland since 1969.

The last person of whom special mention is made is Dr. Martha Jane K. Zachert. Her first position in the field of pharmacy librarianship was as librarian and professor of the history of pharmacy at the Southern College of Pharmacy, Mercer University, Atlanta, Georgia, where she remained from 1953 until 1962. Since 1963 she has been on the faculty of Florida State University at Tallahassee, where her courses in special librarianship are of note.

Dr. Zachert has been active in many professional organizations and has contributed much to the professional literature. Particularly of note is the aforementioned document *Standards and Planning Guide for Pharmacy College Libraries (32)*.

In addition to the individuals specifically named above, most of the librarian-authors of the publications listed in the bibliography and references of this article have contributed a great deal to this special library field.

Recent Trends and Developments in Pharmaceutical Libraries

LITERATURE SEARCHING

Much of the literature of this field has been concerned with how and where to find information and with literature searching. Emphasis has been placed on methods, techniques, and the best publications to use from among the available indexes and abstracts (*20–22*, *45*, *46*). Also, attention has been given in pharmacy school libraries to teaching students how to search the literature and how to use the library effectively (*36*, *39*, *40*).

More recently attention has turned to the use of the computer for literature searching (*18*, *19*, *47*) and for doing a more efficient job in the library. Since the development of extensive data bases and the on-line retrieval of bibliographic citations by use of communications terminals in libraries (such as MEDLINE), machine searching has become more effective still. It is presumed that more bases will become available and more back file searching be made possible in the future.

NETWORK DEVELOPMENT AND COOPERATION

Since the cost of library materials and access to data bases is a serious concern, cooperative arrangements and networks are being developed through national, regional, state, and local plans. Federal funding through the National Library of Medicine has given impetus to the development of nationwide regional biomedical communications networks such as the Region 7 Midwest Health Science Library Network based in Chicago at the John Crerar Library. Statewide systems are also evolving, usually under the leadership or guidance of the state libraries, sometimes with federal funds assisting. Pharmaceutical company libraries and pharmacy school libraries have been actively involved with network development, and some have further been involved on a more local level through the formation of consortia.

There are a number of money-saving benefits that networks can bring to participants. Among these is less expensive access to data bases through shared use, the facilitation of interlibrary lending and borrowing, shared acquisition and cataloging information, and perhaps reference service. As early as 1959 (*25*), Sewell outlined the advantages of cooperative control of library resources. Limited budgets are a powerful influence in the development of such ventures, and it seems reasonable to predict that they will be with us for a while.

As yet no great strides have been made in international cooperation in this area of librarianship. However, some bibliographic projects have been carried to completion with the assistance of foreign librarians after their aid was sought by American librarians (*48*, *49*).

ROLE OF THE NATIONAL LIBRARY OF MEDICINE

The resource grants made to pharmacy libraries in the 1960s by the National Library of Medicine made it possible for collections to be developed to an extent

not possible before or since. Building and project grants also have been awarded on a limited basis to schools. However, probably the greatest service of NLM to pharmacy library users has been the access to the data bases such as MEDLINE and TOXLINE. The searches have been great time savers.

LEARNING RESOURCES CENTERS, AUDIOVISUAL COLLECTIONS, AND COMPUTER-ASSISTED INSTRUCTION

Most pharmacy school libraries are at least somewhat involved with audiovisuals and learning resource materials other than the book. It is an area of growing importance and involvement for academic libraries. In some institutions, however, there may be a separate staff assigned to assist with this kind of activity.

CONTINUING EDUCATION PROGRAMS

Continuing education programs have been expanding in most fields of recent years. This is particularly true of the profession of pharmacy as many states have new laws that require practitioners to continue their training in order to be licensed. To meet this educational demand, pharmacy schools now offer courses for practicing pharmacists. Frequently, use has been made of innovations such as closed-circuit television and films to present these courses and lectures. Pharmacy school libraries play an important part in serving those involved with such programs.

EXTENSION SERVICES

An important aspect of the work of colleges of pharmacy, particularly those connected with state universities, is service given to those not directly connected with the institution, such as alumni, health science practitioners in the local community, and those connected with industry. This service is important to the schools in terms of public relations value and important to the recipient of it because such service is rarely available elsewhere. Probably the largest amount of information disseminated by a school comes from the library staff or through use of the library. One of the most frequently sought services is assistance in identification of foreign drug products (*50*).

DRUG INFORMATION SERVICES AND THE ROLE OF THE LIBRARY

Of recent years there has been a greater need for library support to schools of pharmacy because of new educational programs in the area of clinical pharmacy and/or drug information services. These needs themselves have arisen from needs of the medical community. In order to understand the library's role it is first necessary to understand the needs of the school it supports and the underlying needs of the health science professional and patients from which these stem.

The number of drugs available for use today, their complexity, numerous side effects, changing legal requirements for use, and the public's concern about them

have made it difficult for physicians to prescribe with the degree of safety and assurance of therapeutic efficacy which is necessary.

In answer to the need for information concerning medications, drug information centers have been springing up about the country, most of them in hospitals, and staffed by pharmacists. Their literature needs have been taken care of either by the center collecting limited materials itself, by the use of a pharmacy or medical library's collection, or a combination of these. At the present time, concepts, programs, and systems are continuing to evolve to meet the requirements of the physician and the health science community.

In answer to the demand for pharmacists trained to staff drug information centers and to be advisors on the use of drugs, new programs have been initiated in schools of pharmacy. Consequently, pharmacy librarians have felt it necessary to increase holdings in the area of clinical medicine, as many reports of adverse reactions to drugs appear in journals of this field rather than in the traditional pharmacy periodicals. In addition to acquiring these materials, the library further assists with the drug information service by organizing and instructing in the use of literature.

RESEARCH

Pharmaceutical libraries have long been known for the effective way they have served the research interests of the institutions or organizations they serve. For many years there was continual growth in the research program of both schools and industry, but at this writing the growth seems to have leveled off.

In addition to supporting the research programs of the parent bodies, pharmacy libraries have recently become involved in higher quality library research projects of their own. The trend in this direction has been made possible by the use of computers and improved education along these lines.

CHANGES IN EMPHASES IN SUBJECT MATTER

The changes in subject matter emphasis in research materials published and collected are influenced to a large extent by the areas of research the federal government finances. However, the subject specialty of the individual researcher of the organization obviously is a consideration. In general it appears that future research will emphasize the rational design of new drugs based upon the increasing knowledge of the biochemical and physiological processes of life rather than empirical (trial and error) development of chemicals with drug potential. The result of this trend for libraries is that more basic scientific materials will be collected. In addition, of late, pharmacy schools have become interested in such areas as clinical medicine, public health, medical sociology, environmental toxicity, and drug abuse.

OTHER TRENDS AND DEVELOPMENTS

Standards for pharmacy school libraries continue to be of interest, as was discussed previously. The teaching role of the librarian is another continuing concern and it also has been referred to earlier.

It is of note that while research activities in this field are not growing at the present time, undergraduate enrollments in schools of pharmacy are at an all-time high. It is reasonable to predict that handling large numbers of students at a time when there is great competition for funds will present many challenges to librarians in academic libraries.

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THEODORA ANDREWS

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PHILOSOPHICAL LITERATURE

Philosophers are using both traditional and more up-to-date means to meet their information needs. Among these are bibliographies and indexes, information retrieval systems, selective dissemination of information systems, directories, journals, and encyclopedias and dictionaries.

Bibliographies and Indexes

The Philosopher's Index, which was founded in 1967, is an up-to-date quarterly index of articles from more than 270 philosophy and interdisciplinary journals. Professional philosophers index articles using subject headings from a controlled, but open-ended thesaurus. All articles are listed alphabetically by subject headings and by author. Abstracts of the articles are published in the "Author Index" and are generally written by the authors of the articles. Abstracts average approximately 100 words in length. The "Book Review Index" contains an alphabetical listing by author of recently published philosophy books that have been reviewed in the journals indexed. In addition to the four quarterly issues, a cumulative edition of the *Index* is published annually in the spring. It contains in merged form alphabetized listings by subject and author of all of the data published in the preceding four

quarterly issues. Both the quarterly and the cumulative editions are computer generated and typeset using computer-driven photocomposition equipment. The publisher is the Philosophy Documentation Center, Bowling Green State University, Bowling Green, Ohio.

Although *The Philosopher's Index* is probably the most commonly used index in the United States and in the Western world, there are a number of other important resources that are useful to philosophers.

The *Bibliographie Philosophie*, which was also founded in 1967, is a quarterly index of philosophy journal articles and books. Approximately one-half of each issue is devoted to Marxist literature, while the other half is devoted to non-Marxist literature. Each of the two major sections is divided into 10 major subdivisions so that the user can find articles and books dealing with a general field of philosophy. In addition, each issue has a complete subject and author index in the back. The *Bibliographie* is computer generated and is produced by photographing the output of a high-speed computer printer. It is published in Berlin by the Zentralstelle für die Philosophische Information und Dokumentation im Institut für Gesellschaftswissenschaften beim ZK der SED.

The *Bulletin signalétique: sciences humaines, philosophie* lists only articles and lists them within a broad classification scheme. In addition, a short abstract of each article is provided in French. Although the coverage of the *Bulletin* is broad, the lack of a detailed subject index hampers easy access to the information contained in it. The *Bulletin signalétique* and its predecessor, the *Bulletin analytique: philosophie*, provide coverage from 1944 to the present. The *Bulletin* is published in Paris by the Centre de Documentation du C.N.R.S.

The *Répertoire bibliographique de la philosophie* is a quarterly listing of books and articles in philosophy. Entries are listed under a broad classification scheme which divides the history of philosophy into nine divisions and philosophy in general into sixteen divisions. The fourth quarterly issue of each volume contains an author index to the preceding three issues as well as a listing of reviews published in the journals indexed during that year. It includes neither abstracts nor a detailed subject index. The *Répertoire* is published in Louvain by Editions de l'Institut Superieur de Philosophie. It has appeared in its present form since 1949 and is distributed in conjunction with the *Revue philosophique de Louvain.* The editor is Georges Van Riet.

Information on books in philosophy can be obtained from the many book reviews published regularly by philosophy journals and indexed in the forementioned publications. In addition, there are several important publications which deal exclusively with books.

The *Bibliographie de la philosophie* in its present form provides abstracts of most of the important books published in the Western world beginning with 1954. Entries are listed under one of ten major fields. The abstracts are provided by national centers and are usually written in the language of the book. The last quarterly issue of each year has an author index and an analytic subject index. The *Bibliographie* is published in Paris by J. Vrin, with the aid of UNESCO and CNRS (Centre Na-

tional Français de la Recherche Scientifique). It is sponsored by the Institut International de Philosophie and is edited by Lucien Jerphagnon.

Philosophical Books is published three times a year and provides substantial reviews of selected books. The books selected for review are generally in English and are those which the editor, M. A. Stewart, believes would be of the greatest interest to his subscribers. The books reviewed in each issue are listed alphabetically by author. From 10 to 20 books are reviewed in each issue. *Philosophical Books* is published by Leicester University Press and has served philosophers since 1960.

Philosophische Rundschau is a quarterly which has been published since 1967. This publication includes both articles and reviews of books. The articles usually are critical reviews of a series of related books. For example, a recent article deals with 10 different volumes concerning Wittgenstein. The fourth quarterly issue of each year includes an author index of the books considered during that year. The *Rundschau* is edited by Hans-Georg Gadamer and Helmut Kuhn; it is published by J. C. B. Mohr, Tübingen.

In addition to these general indexes and bibliographies, many specialized bibliographies are being published. These bibliographies usually center on a given country or area, a particular philosophical movement or field, or an important philosopher. Many of these bibliographies, especially if they are produced by conventional printing techniques, tend to be out of date before they are published. Hence, in philosophy there is a growing trend to maintain up-to-date bibliographies in machine-readable form. These bibliographies can be easily updated and a printout can be obtained at any given time. One example of such a bibliography is the Whitehead bibliography being compiled and maintained by the Center for Process Studies of Claremont, California.

Information Retrieval Systems

In the field of philosophy there are currently two information retrieval systems in operation.

The Philosopher's Information Retrieval System (PIRS) is a computerized retrieval system that stores data, searches tape files, and provides custom bibliographies with abstracts. The data base currently goes back to 1967 and includes information on philosophy articles only. Plans to provide information on articles published since 1940 have been made and hopefully will be completed no later than 1980. In submitting a request for a custom bibliography, the philosopher may specify any logical combination of key-word descriptors, a given period of time, a list of the languages which the user can read, a list of the particular journals that the user wishes searched, and/or a given author or authors. Currently, all searches are run in the batch mode on a monthly basis. This system is operated by the Philosophy Documentation Center of Bowling Green State University, Bowling Green, Ohio.

The Philosophy Institute of the University of Düsseldorf operates GOLEM, which is an on-line, interactive retrieval system developed by Siemens. This sys-

tem uses a series of descriptors with numerical links in order to describe the content of each article. Currently, a usable data base is being systematically developed. In addition to keeping up with current serials, the staff has indexed at least five major German philosophy journals from their inception to the present. The same information that is being input into their system is also being published in hardback under the title *Philosophische Dokumentation*, which is published by Verlag Anton Hain. The development of the center and of the retrieval system has taken place under the leadership of Alvin Diemer and Norbert Heinrichs.

SDI Systems

Although there are no operational selective dissemination of information systems in the field of philosophy, one is scheduled to begin operation in 1978. This system provides users with a quarterly listing of all philosophy journal articles which match the profiles that the individual philosophers have submitted. The listing is arranged alphabetically by the authors' names and includes abstracts of the articles. The system is being developed by the Philosophy Documentation Center of Bowling Green State University.

Directories

The *Directory of American Philosophers* originated in the early 1960s and has been published biennially ever since. The editor is Archie J. Bahm of the University of New Mexico. The 1976–77 edition appeared early in 1976 and was published by the Philosophy Documentation Center. It provides information on philosophy in the United States and Canada. The directory includes information on faculties of philosophy; the names, addresses, and specialties of philosophers; data on colleges and universities, philosophical societies, philosophical centers and institutes, philosophy journals, publishers of philosophical works; and data on fellowships and assistantships available in the United States and Canada. Complete indexes are included in the back of each edition.

The *International Directory of Philosophy and Philosophers* was first published under the auspices of the International Institute of Philosophy. The first edition was published in 1965 and was edited by Gilbert Varet and Paul Kurtz. Subsequent editions have been published by the Philosophy Documentation Center. The most recent volume is the third edition, which is dated 1974–75. The fourth edition will be published early in 1978. This handbook includes Europe, Central and South America, Asia, Africa, and Australia. The *Directory*, like its companion volume, provides names, addresses, and specialties of philosophers, as well as data on colleges, universities, philosophical societies, philosophical institutes, philosophy journals, and publishers of philosophical works. It also has complete indexes in the back of each edition.

Journals

Of the several hundred journals published in philosophy throughout the world, only one stands out as innovative in the way it seeks to communicate information. It is the *Philosophy Research Archives*, which is edited by William P. Alston and jointly sponsored by the Canadian Philosophical Association, the American Philosophical Association, and the Philosophy Documentation Center. The journal is unique in that it is published only on microfiche. This means that the *Archives* is free from many of the disadvantages and constraints of ordinary journal publications. For example, there is no limit to the number of articles that can be accepted or to the length of those articles. In addition, the speed with which microfiche can be reproduced eliminates the time lag between delivery of the manuscript to the printer and the publication date. Because of the lack of traditional constraints, the *Archives* is willing not only to consider journal articles, but also monographs, translations, and bibliographies for publication.

Cirpho is the new journal in philosophy that is devoted exclusively to computer applications in philosophy. As such, it probably has more articles on automated information techniques in philosophy than any other journal. However, at least two other serials regularly carry articles of interest to philosophers on automated techniques for information handling and dissemination. They are *Computers and the Humanities* and *Computer Studies in the Humanities and Verbal Behavior*.

Aware of both the increasing financial pressures of many philosophy journals and the lag between manuscript selection and publication, the Association of Philosophy Journal Editors received a government grant from the National Endowment for the Humanities to seek more efficient methods of publication. As a result of this study, more philosophy journals are likely to move to computer-driven photocomposition techniques. These techniques reduce costs and the time required for page composition. The president of the association and the chief investigator of the grant is Professor Robert N. Beck of Clark University.

Encyclopedias and Dictionaries

The Encyclopedia of Philosophy, which was edited by Paul Edwards and published in 1967, is probably the best single reference work in philosophy. Its eight volumes contain over 1,400 articles which were written by some 500 scholars from 24 nations. Detailed and annotated bibliographies are found at the conclusion of each article.

The most comprehensive dictionary that is currently available is James M. Baldwin's *Dictionary of Philosophy and Psychology*. Although this dictionary was originally published in the early 1900s, it has been reprinted by Peter Smith of Gloucester, Massachusetts, in 1960. This dictionary has entries covering both philosophical terms and philosophers. The volumes include an index of Greek, Latin, French, German, and Italian terms along with their English equivalents and a sec-

tion devoted to bibliographies. Contributors included such famous philosophers as John Dewey, William James, G. E. Moore, Charles Peirce, and Josiah Royce. Although these volumes are still valuable for historical purposes, information on philosophy in the 20th century must be obtained from more up-to-date sources such as *The Encyclopedia of Philosophy*.

RICHARD H. LINEBACK

PHILOSOPHY OF SCIENCE

Introduction

The philosophy of science is of fairly recent vintage as far as philosophical specializations go. Rom Harré (*1*) calls our attention to this fact by noting that the idea that the systematic sciences presuppose styles of inquiry different from those of the ordinary commerce of the mind did not really take root until the early 19th century. Before this time, what we have by way of a literature are the records of the methodological deliberations of scientists and the technical developments of epistemologists (philosophers of knowledge). It seems quite natural that at some point efforts would have been made to marry these two, in many ways different, literatures.

The courtship preceding the marriage *began* in the 19th century but the wedding has not been an easy one to arrange. Representatives of the two families involved, that is, philosophy and science, have sometimes traded harsh words. It is not difficult to find scientists who resent the "intrusion" of philosophers who never have had to face the demands of empirical research. Philosophers can be found, moreover, who retort that scientists can be likened to clumsy bears wandering about in a woods with no concept of, or even a desire for a concept of, the geography of the forest. Ackermann (*2*) illustrates this familial rivalry by calling attention to the awkwardness of the situation in which a philosopher is placed when queried by a scientist (particularly a physicist): tell me something you've learned recently about science. The situation can be balanced by the philosopher reversing the initiative and questioning: tell me something you've learned recently about philosophy. Socially, however, scientists seem to win the day, because, on the whole, it is philosophers who have declared an interest in science and not scientists in philosophy.

Such rebuffs and retorts may seem to be so much dirt in the laundry of the philosophy of science. In fact, however, they are diagnostic of a most stubborn impasse in the foundation of a philosophy of science. This impasse, as phrased by Arthur Danto (*3*), is the attitudinal predisposition of philosophers and scientists alike that competent works in the philosophy of science are philosophic, for the former, or scientific, for the latter. It is the case, nevertheless, that since the 19th century we can find not only individuals who are known for their philosophy but produced scientific works, such as René Descartes, or who are known for their

science but produced philosophic works, such as Francis Bacon, but also individuals who refer to their works as the philosophy of science.

Some of these individuals, moreover, have produced "introductory" treatments and, consequently, have provided a resource from which we can derive a general appreciation for the scope of philosophies of science:

1. Hanson—exploration of the internal structure of scientific thinking (*4*).
2. Churchman and Ackoff—explication of the systemic presuppositions of inquiry (*5*).
3. Ackermann—explication of general, problem-independent principles of scientific practice (*2*).
4. Frank—systematic approach to the understanding of the tactics and strategies of science (*6*).
5. Harré—exposition of the principles operative in science which enable the acquisition of knowledge about the world and the things in it (*1*).
6. Lambert and Brittan—analysis of conceptual and methodological issues in science and exploration of how science, as an experience, relates to human activity in general (*7*).

An attempt to synthesize these six statements (among others) concerning the scope of philosophies of science results in a statement to the effect that a philosophy of science constitutes a critical understanding of science. The word "critical" in this statement is important in that it implies that the ways in which science is understood are themselves subjects for examination and understanding. Consequently, although a scientist may understand a science to the extent that he or she *does* science, a second level of understanding, that of understanding his or her understanding, may be absent. The degree to which this second level (and an infinite number of other levels defined similarly) is missing in the thinking of science (or a science) is the degree to which science's (or that science's philosophy) is undeveloped.

In discussing the critical understanding of science attempted by the philosophy of science it is important for us to keep in mind that its understanding is just one such of a number possible. Others have come recently to be subsumed under the umbrella descriptor of "sciences of science." The closest of these to the philosophy of science is probably that of the history of science. Whereas, however, history of science inquiries usually result in descriptive expositions (as is characteristic of history), those of the philosophy of science result in prescriptive developments (as is characteristic of philosophy). These sciences of science will occupy our attention again in the final section of this article.

Organization

Our objectives for this article are two: (*a*) we want to conduct a survey of some of the thinking which has been done in the name of the philosophy of science, and (*b*) we want to open discussion of how this thinking can be said to apply to the work of library and information scientists. The "applications" aspect of this article

is included more for crystallizing the material around familiar seeds than for any other reason. It is hoped that each reader will be able to think through her or his own applications, given the material of the survey.

It is evident that a survey can take any of a number of forms. Some surveys are organized around people, others around eras, and still others around issues. The organization of the present survey is that of "-isms." Other authors who have employed this style are Churchman and Ackoff (*5*), Churchman (*8*), Pepper (*9*), and Turner (*10*). (What we understand by "-ism," others have called "school.") It is possible to overwork the notion of an "-ism." Consequently, before we identify those we will cover, we do well to take steps to clarify our intentions. (Our development in this area is related to Ackermann's discussion of scientific theories.)

When discussing the genetic constitution of an organism it is convenient to make a distinction between "genotypical" and "phenotypical" characteristics. Genotypical characteristics are those said to be encoded in the organism's genetic makeup, while phenotypical characteristics are the result of the interaction between this makeup and a specific environment. Insofar as an organism is always in an environment, we can observe only phenotypical characteristics and, by examination of a number of "similar" organisms, infer genotypical characteristics. Since genotypical characteristics are inferred, they stand as idealizations and, as a result, no one expects to be able to observe them directly.

As we discuss the characteristics of philosophy of science "-isms" in the following, we will be dealing with the genotypical. This is to say that when we outline an "-ism" in terms of the way in which an "-ist" views the world, the "-ist" does not actually exist. Nevertheless, we will name historical personages and label them as an "-ist" of one type or another. It should be understood from here forward, however, that when we do this we mean to say that the person involved is more of this type of "-ist" (has more of the characteristics of this "-ism") than he or she is of any other.

With these cautionary comments in mind we can turn to identifying the "-isms" of our survey. This identification has been accomplished by grouping orientations assumed by philosophers of science as they have considered the following two questions:

> How should scientists conduct their inquiry?
>
> What should be our attitude toward the products of scientific inquiry?

These questions are not the only ones asked by philosophers of science. Nevertheless, they can be said to account for much of that which philosophers of science have debated among themselves. In the following we shall refer to the first of these questions as the "how" question and the second as the "what" question.

Given these two questions of interest, we note that it is possible to find philosophers of science who agree in their orientations toward one and disagree on the other. Consequently, we have at our disposal a two-dimensional classification of philosophy of science thought. This classification is represented by the matrix

	What question	
How question	Conventionalism	Realism
Rationalism (Speculativism)		
Empiricism (Positivism)		
Criticism (Pragmatism)		

FIGURE 1. *Two-dimensional classification of philosophy of science thought.*

shown in Figure 1. Therein the "-isms" associated with orientations toward the how questions are displayed as rows while those associated with orientations toward the what question are given as columns. Some "-isms," moreover, are presented in parentheses. These are "-isms" which we will develop as "modern" variants of traditional approaches.

The matrix in Figure 1 expresses exactly the way in which we will organize our survey. Our first concern will be that of orientations toward the how question. This discussion will be followed by one centering around orientations toward the what question. As mentioned at the start of this section, the material of these survey sections will be focused through a perusal of what the philosophy of science might be said to have to do with the work of library and information scientists. After that, the article will conclude with an articulation of some of the present and future issues in the philosophy of science.

Orientations Toward the How Question

All vital questions raised by philosophers seem to attract a great deal of attention directed at stating them precisely and clearly. Authors can be observed to begin discussions so directed with the query: what is it that we are *really* asking? Answers

to such second-order questions usually lead directly to answers for the original question.

The two questions which we have chosen are philosophically vital in the above sense. For this reason we can say that it is according to the way in which an author formulates the how or the what question that we will class him or her as an "-ist" of one type or another. Authors can be said to subscribe to the same "-ism" by virtue of the similarity of their statement of questions.

Applying this reasoning to the how question leads to three main "-isms": rationalism, empiricism, and criticism. Each of these had reached a high degree of sophistication prior to the 19th century. Consequently, each has had an opportunity to undergo growth sufficient to allow identification of "modern" variants. These contemporary counterparts are known as speculativism, positivism, and pragmatism, respectively.

In this section our primary concerns will be those of the traditional "-isms." This is the case for two reasons: (*a*) due to their place in history, the traditional "-isms" appear more "stable" than their modern versions, and (*b*) we have provided for a section dealing with "current and future issues" in this article and can focus upon the modern there rather than here. Consequently, our immediate plan is one of laying out the traditional and discussing the modern only insofar as they can be said to carry on certain lines of thought.

We can convey a quick notion of who the people involved were, how they formulated the question under discussion, and what answers they provided. Some of the principal proponents of each "-ism" were:

> Rationalism—Leibniz (1646–1716) (*11*), Descartes (1596–1650) (*12*), and Spinoza (1632–1677) (*13*)
>
> Empiricism—Locke (1632–1704) (*14*), Berkeley (1685–1753) (*15*), and Hume (1711–1776) (*16*)
>
> Criticism—Kant (1724–1804) (*17, 18*)

These people can be said to have formulated our how question as follows:

> Rationalism—What are the simplest ideas which (*a*) can be had by a scientist, and (*b*) are sufficiently "powerful" as to make their correctness unquestionable?
>
> Empiricism—What are the simplest sensations which (*a*) can be had by the scientist, and (*b*) are sufficiently "clear" as to make their existence unquestionable?
>
> Criticism—What capabilities must a scientist have prior to an inquiry in order to make judgments about the experience represented by that inquiry?

These formulations, in turn, lead to the following answers:

> Rationalism—Scientists should conduct their inquiry so that it is guided by theory.
>
> Empiricism—Scientists should conduct their inquiry so that it is guided by data.
>
> Criticism—Scientists should conduct their inquiry so that it is guided by both theory and data.

Rationalism and empiricism were, and are, diametrically opposed positions which became synthesized with the advent of criticism. Such a synthesis was required because both rationalism and empiricism, taken separately or together, were, in one degree or another, inadequate for the explanation of certain notions judged basic to science. The explication of the areas of adequacy and inadequacy of both rationalism and empiricism will be our first concern.

For both rationalists and empiricists, the component of science requiring the most explanation is the ability of its practitioners to make any "sense" out of the flows of perceptions which arise from interactions between the human sensorium and the energies of the universe. Characteristically, a rationalist looks to the world of sensory experience and finds no permanence, no order, no intelligence; in short, he or she finds a world of appearance. Rationalistic reasoning led to the conclusion that the fact that there is any stability in human perception is due to the existence of certain simple concepts. These concepts were said to be used by the scientific *mind* to recognize the things contained in the chaos of sensation. Scientists come to make sense of the world, rationalists proposed, when they come to see instances of concepts.

Let us illustrate the rationalist program to the extent that we have presented it. In the world of everyday experience there are familiar objects which we call "chairs." None of us would claim that we have seen or will see all chairs. We know that chairs are manufactured according to different designs and are fabricated from different materials. Yet none of us feel particularly stressed when applying the term "chair" to an object we have never seen, manufactured by a design we have never seen, and fabricated from materials we have never seen. Rationalists concluded that this state of affairs is possible only because there exists a concept of "chair" which is common to all human reasoning and which can be employed by each of us to recognize without hesitation that each of a number of sensually dissimilar things is in fact an instance of this concept.

Rationalism received its justification from the "force" of the double-edged proposition that God exists and is good. From this basis, rationalists proceeded to conclude that a good God would not construct an unintelligible universe. Consequently, as we have said in the above, it was asserted that the flux of reality was deceptive. The problems of science were proposed to be (*a*) the discovery of the simplest of ideas, and (*b*) the combination of these ideas to develop other ideas. The methods appropriate to science were claimed to be intuition, for discovery, and deduction, for combination. The correctness of the products of intuition was debated according to the "principle of contradiction," which required that for an idea to be judged correct it must be impossible for the universe to be otherwise. The products of deduction, moreover, had their correctness assessed according to the demands of logic wherein the principle of contradiction also played a role in that a combination of ideas would be judged to be incorrect if it could be shown that it asserted the opposite of other ideas which were already accepted as correct.

The 20th-century mind, in general, has not been sympathetic to the rationalist program. It somehow seems incredible that philosophers and scientists would have

proposed that intuition was the primary method of discovery appropriate to science. Although we will soon have much more to say on this, it seems important to itemize at this point some of the contributions to science made by scientists who ascribed to rationalism. First of all, Leibniz was a rationalist, and he, with Newton, added integral calculus to the armamentum of science. Descartes, to whom we owe gratitude for the Cartesian coordinate system, was also a rationalist. Finally, almost all of mathematics in particular, and logic in general can be said to be motivated by rationalistic considerations.

It is much, therefore, that science can be said to have gained as a result of the efforts of individuals who believed deeply in a rationalistic philosophy. The fact remains, however, that the rationalist program was, in a sense, lopsided. Rationalism could always talk with more confidence and precision about deduction than it could intuition. The question of discovery of simple ideas and the associated validity of the entire rationalistic program loomed large. This was particularly the case because empiricism submitted that the notion of "simple ideas" was confused altogether.

It is difficult to imagine how two systems of belief could be more fundamentally opposed than those of rationalism and empiricism. Whereas, as we have discussed, rationalists viewed the products of sensation as intelligible only when based in thought, empiricists viewed the products of thought as intelligible only when based in sensation. Empiricists located the responsibility for the flux and chaos of experience in the mind. The world as we see it, the empiricists submitted, is simple and clear. It is the influence of undisciplined operations of the mind that introduces confusion. Whereas the existence and goodness of God is a matter of mere opinion, the clear and distinct sense impressions of a crisp, juicy, sweet, and red apple are undeniable facts. It was the proposition of the empiricists that scientists come to make sense of the world when they begin to notice the similarity of certain simple sensations among a number of objects.

Empiricists have always been quick to call attention to the superfluity of rationalistic beliefs when compared to theirs. As an example of this, consider the experience of pain. For an empiricist, pain is understood to be simply and distinctly forceful in its influence of the mind of man. There is no need to assume, with the rationalists, that a concept of pain is needed for the experience of pain. As children, each painful experience we encounter is unique. With time we come to associate the similarity of all painful experiences and to develop a general notion of pain together with a system of types (such as dull, sharp, shooting, and the like). It is the sensation of pain which enables the recognition of a concept of pain. If it was otherwise, then children would have to be assumed to partake of the same experience as adults. For an empiricist, this implication of rationalism was decidingly absurd.

The justification of the empiricistic attitude was one of common sense (almost taken literally). Empiricists challenged scientists to admit that colors and shapes of things are trustworthy, while their naming of things was error-prone. From this framework the problems of science which empiricists recommended were observation and induction. The products of observation, that is, the simplest sensations,

were verified by the agreement (consensus) of scientists performing the observation (either together or separately over time). The ideas admitted by induction, moreover, were said to be judged according to the "sufficiency of evidence" invoked in the induction.

Previously we commented that the 20th-century mind has not been, in general, sympathetic to rationalistic science. This is in part demonstrated by the fact that for most of us our basic image of science is one of controlled observation of the world through experimentation, an image of empiricistic origin. All "good" scientific investigations must be replicable. All "good" scientific theories must fit the "facts." It is easy to recognize the empiricistic program as it enters our daily lives through social values and customs. Logical thinking is also a scientific value and we still turn to rationalists to give us assistance in this area. Yet we refer to them as "logicians" instead of "scientists."

Rationalism was challenged by empiricists to explicate the origins of simple ideas. Such an explication, the argument was made, was the whole point of science. The program of empiricism proposed an explication, as we have discussed, involving a notion of simple sensations and induction in contrast to the simple ideas and deduction of rationalism. It is important to note, however, that the observations of simple sensations are "guaranteed," so to speak, by the trustworthiness of consensual agreement. The execution of induction, furthermore, is guaranteed by a belief in the principle of sufficiency of evidence. Rationalists challenged empiricists to explicate exactly how the principle of sufficiency of evidence could *itself* be verified. Using this approach, rationalists argued that empiricism was at fault due to circularity of reasoning.

As might be expected, adherents to rationalistic and empiricistic orientations toward our how question did not find much ground for thoughtful communication. There was one rationalist, however, who late in his life heeded the arguments of an empiricist and proceeded to define a new orientation. The rationalist was Immanuel Kant. The empiricist was David Hume. The emergent philosophy of science "-ism" was criticism.

The message which Hume (*16*) sent from England to Germany (which, incidentally, was the direction of most empiricistic critiques of rationalism) was contained in a revolutionary account of the scientific use of the notion of "causality." Hume had believed in the empiricistic proposition that we come to awareness of the cause of something, say B, by observing that it is always preceded by another thing, say A. It is said that while playing billiards one evening, Hume, by observing the interaction of the balls on the table, recognized that all one could correctly say is that "B succeeds A." He concluded that the notion of causality made no sense or was at least superfluous when viewed strictly from an empiricistic vantage point. The situation was no better, he discovered, in the rationalistic camp. In order for a rationalist to state that "A causes B" it would have to be assumed that the concepts of A and B "provided" for their causal relationship. Otherwise, the concept of A causing B could not be deduced from their individual concepts. But this would require our concepts of everything to include provisions for their relationship to

everything else. This, Hume concluded, would result in our concepts being "unworkably" broad. Hume thus argued that the notion of causality was not scientific and that it should be abandoned.

Kant (*17*) accepted Hume's devastating thesis, announced that the notion of causality had to be "saved," and set about the task. Evidently, the only way that this salvation could have been accomplished was by formulating a new orientation. This is what Kant attempted and his approach was one of synthesis of rationalism and empiricism. As mentioned in the above, the synthesis he devised came to be known as "criticism."

The fundamental premise of the criticistic orientation was that the products of scientific inquiry originate neither *exclusively* in the world nor the mind. Rather, these products are the result of a process of cooperation between thinking and sensing. For a criticist, simple sensations or simple ideas simply do not exist. Instead, there are actions of judgment which are made possible when the mind structures reality as presented through the senses. A criticist would regard our how question as directed to the problem of a scientist deciding exactly how to conduct her or his observation. When asked how a scientist should conduct inquiry, criticists think of the structure of the world which must be assumed in order for observation to be possible.

The criticistic program called for the senses to provide the contents of our scientific judgments while the mind provided their form. As examples of what criticists meant by "form" we cite space, time, and a number of "categories of the understanding." One of these categories Kant defined "as to Relation" and it included, among substance and community, cause. Herein Kant's proposed solution of the Humean problem can be found. Whereas the senses inform us as to what needs to be related, the mind performs the relation. One such category of performance results in the judgment that A causes B. We find causality neither in the world nor in our concepts, suggested Kant, not because there is no causality but because it is contained in the *operation* of the mind.

Over time, the details of Kant's philosophy have been shown to be in error by developments in science itself. For instance, Kant accepted the Newtonian treatments of space and time as basic to the operation of the mind. Einstein and his followers have taught us that it is logically possible to think otherwise and that it is empirically mandated in certain situations to do so. Nevertheless, the criticistic orientation toward our how question deserves a place alongside of its parents, rationalism and empiricism. Rationalistically oriented scientists have given us logic, empiricistically oriented scientists have given us experimentation, and criticistically oriented scientists have given us motivation to temper our logics with experiments and our experiments with logics.

With the articulation of criticism the divisions between orientations toward our how question have become progressively less distinguishable. It would be admitted now by almost all scientists and philosophers of science that scientific theories do not occur in the minds of people without some provocation, brought to bear by data from experimentation, as to what it is that needs to be theorized. Observation in the

name of science, moreover, is generally accepted to require some theoretical deliberation if only to define the extremes which can be measured by the instruments to be used. The issues of debate among interested parties in the 20th century seem to have become those of "degree" (the degree to which intuition is important and the degree to which observation is important), with speculativism emphasizing intuition and positivism, observation.

As we have mentioned in one way or another a number of times in this section, it is speculativism, the modern version of rationalism, which is on the defensive in contemporary discourse. The speculativist program claims that certain sciences, particularly those dealing with life and society, are intrinsically intuitionally based. This is to say that important components of the conceptual frameworks associated with these sciences will never be able to be expressed in terms which enable observation. Consequently, speculativists reason, there will always be a central place in science for intuition. Realizing this, a number of speculativists, Husserl (*19*), for example, have devoted attention to the development of well-circumscribed intuitional methods.

Positivists, on the other hand, have responded to speculativistic arguments by acknowledging that unobservable concepts may be required by science, but the extent to which they are required is the extent to which the body of knowledge involved is prescientific. The demand of positivists is that scientific knowledge be "positive" in the sense that it make assertions about things which are observable. The meaning of *scientific* terms, argue the positivists, is nothing more and nothing less than the operations required to observe the terms' referents. Terms for which such operations cannot be specified are said to be nonscientific. The fact that there are other types of meanings than those scientific should not influence the scientist. As well, positivists regard the analysis of the language(s) of science as one of the most important tasks to be performed by philosophers of science.

Two individuals who have done the most with the positivistic orientation as we have discussed it are Carnap (*20*, *21*) and Bridgman (*22*). Other individuals involved in the speculativism–positivism debates are:

> Speculativism—Whitehead (1861–1948) (*23*) and Bergson (1859–1941) (*24*)
>
> Positivism—Mach (1838–1916) (*25*), Wittgenstein (1889–1951) (*26*), and Ayer (1910–) (*27*)

It seems important to note that the positions of both speculativism and positivism can be said to be reasonable. Scientific knowledge, as we have come to understand it, must be based on publicly available information. Positivists have concluded that this requires that scientific knowledge be based on observation even though at some point some of the components of that knowledge may have been little more than very private, and very tentative, intuitions of some scientists. Speculativists complain that the labeling of the products of intuition as nonscientific or prescientific is an arbitrary and dangerous limitation of the scope of science. To them, it seems warranted that whatever influences the development of scientific knowledge be considered to be part of science.

Speculativism and positivism can be said to have arrived at the same sort of communication impasse as their forebears, rationalism and empiricism. Criticism, we have seen, attempted to break this barrier by demonstrating how the scientific mind could be both rationalistic and empiricistic at the same time. Although criticistic arguments seem to have succeeded in this demonstration, the resurgence of rationalism and empiricism can be interpreted as an indication that the criticistic thrust did not cut deep enough. Pragmatism can be viewed as the modern version of criticism in that it attempts to demonstrate how a philosophy of science can harmonize speculativism and positivisim.

The basic component of the pragmatic orientation as we shall discuss it is that a *science* can be both speculativistic and positivistic at the same time. Pragmatists bring to the surface of contemporary debates the fact that at any given time a science involves a number of different individuals at different stages of understanding of different (types of) problems (phenomena). Some of these individuals may be speculativistic in their outlooks while others may be positivistic. Pragmatists regard as unnecessary the classification of concepts as nonscientific simply because they are speculativistically based. The classification of fields of inquiry as nonscientific simply because their practitioners are predominantly speculativistic is similarly viewed.

For pragmatists, science as an activity is not as separable from other forms of human activity as other philosophers of science seem to view it. The relations among sciences, that is, physics, biology, etc., moreover, are not as cut-and-dried as many would have it. The question of what psychology has to say to physics, or what art has to say to physics for that matter, is meaningless to a pragmatist unless a problem has been defined. Once a problem has been specified, the importance of a solution to the problem assessed, and an inventory of available knowledge accomplished, a pragmatist will accept anything as scientific that contributes to the attainment of a state of knowledge which is appropriate to the importance of the problem.

Pragmatism, then, attempts its synthesis of speculativism, positivism, and the other orientations we have covered in this section by focusing upon the inquiry of science rather than of individual scientists. Some of the people who have enunciated a pragmatic philosophy of science are James (1842–1910) (*28*), Dewey (1859–1952) (*29*), and Singer (1873–1954) (*30*). It should be noted, as we complete this discussion of pragmatism, that pragmatic thinking has not received the same recognition from speculativism and positivism as did criticism from rationalism and empiricism. Some additional remarks will be made on this point when we turn to the current and future issues in a later section.

It has been our goal in this section to expose some of the main currents in the thoughts which philosophers of science have given to the question of how scientists should conduct inquiry. This we have done by discussing the tenets of orientations to the question which we obtained by grouping the efforts of individuals who can be said to have formulated the question similarly. Although this survey has focused on the "–isms" so defined, it is important to recognize the issues involved to be

basically those of the relative contributions to be made to science by intuition versus observation and deduction versus induction.

Orientation Toward the What Question

The second question which we selected for the survey of this and the preceding section was: What should be our attitude toward the products of scientific inquiry? In comparison to our first question, the meaning of this second query is less obvious. Its history, moreover, is considerably less extensive in that it has only been an active area for debate since the middle of the 19th century. Nevertheless, deliberations in its name have become increasingly commonplace in recent times.

Before proceeding much further we had best be clear about our understanding of the question. First of all, we acknowledge that the products of scientific inquiry are manyfold. The specific class of products which we are addressing with the question, however, is that of "theories." Generally, we want to avoid the question of what the structure of a theory might be said to be [see Campbell (*31*) or Braithwaite (*32*) for expositions of widely accepted views]. The question which we do want to raise is that of the *function* of scientific theories. The debate which we want to survey has been concerned with the correctness of supposing that we can do certain things with theories.

To illustrate the form of this debate we appeal for the moment to what is probably the most prevalent opinion on the subject. For many of us, scientific knowledge in the form of theories constitutes the "safest" and most "useful" knowledge that we humans can achieve. It is "safe" in the sense that it is dependably error-free. It is "useful" in the sense that it is tailored to provide solutions to problems of survival. No matter how strongly we might argue that the cost of scientific knowledge is excessive or that the methods by which it is obtained are inhumane, scientific theories have the advantage that they "work." They have provided direction for handsome material development, they have enabled us to reach for the stars, and they have justified utopian visions of disease-free societies. In sum, scientific theories enable us to predict, explain, and control the events of our world with precision.

The view of scientific knowledge which we have just articulated can be analyzed to expose an orientation toward our what question. For instance, we note that the viewpoint assumes: (*a*) that a world of physical objects and processes exists independent of the scientific mind, (*b*) that the nature of these objects and processes are (in principle) knowable, and (*c*) that scientific theories are the most precise form of such knowledge attainable. Debates on the merits of the third part of this characterization usually occur between scientists and nonscientists, and even though they are fascinating, we have omitted any record of them from this article. There has been debate in philosophers' circles, moreover, on the appropriateness of the assumption that a world exists independent of the mind but we will also leave that discussion to another place and another time. What we will take up for discussion in

the following are the thoughts of those scientists and philosophers of science who have found themselves more in agreement than not when comparing attitudes toward questions about the existence of a physical world and the precision of scientific knowledge relative to other forms of human knowledge but, all the same, disagree radically on the issue of the knowability of the physical world.

The orientation which holds that scientific knowledge does constitute an understanding of the nature of things in the physical world has come to be called "realism." Two of the individuals who have thought through realistic positions are Moore (*33*) and Ryle (*34*, *35*). Most of the rationalists and empiricists whom we cited in the previous section can be said to have been realists to one degree or another. In addition, a number of psychologists have attempted to develop theories of sense perception which are overtly realistic ["Gestalt" theorists, such as Köhler (*36*), for instance, postulate that the contents of reality and those of the mind are "isomorphic," i.e., are in a one-to-one correspondence]. Turner (*37*) can be cited as a contemporary, philosophically minded psychologist who openly discusses his commitment to realism.

Realists are opposed by a number of points of view which agree to the extent that they all emphasize the strongly *conventional* rather than *real* character of scientific knowledge. Individuals of this orientation frequently refer to certain events in the history of science in order to convey an appreciation for why they have brought the realistic thesis under examination. Inventories of these events always include the "revolutions" of Copernicus and Einstein whereby complete systems of scientific knowledge, those of Ptolemy and Newton, respectively, were summarily replaced (*38–40*). Mention is also made of developments in modern physics (in the form of quantum mechanics) which have led to the conclusion that there are limits to the ability of the human mind to know in real terms (*41*). Even the world of mathematics, the contents of which lie beyond the perceptive powers of most of us, has been the scene of similar developments (*42–44*). It is noted, moreover, that astrologers and alchemists once laid an unchallenged claim to being scientists; and ether, phlogiston, and humors once laid a similar claim to being scientific, realistic concepts. In no small way, the history of science can be said to be littered with the decaying parts of discarded theories and concepts.

It is not the case that realists ignore the dramatic events itemized in the previous paragraph. Rather, they don't accept the conclusions which "conventionalists," as we will call them, can be said to draw from the study of the history of science. Realists claim that it is to be expected that science's movement toward *real* theories should exhibit progress whereby concepts and theories are refined. Events such as the replacement of Ptolemy by Copernicus and Newton by Einstein should be viewed as nothing more than "growing pains." The assertion that scientific theories are realistic *in principle* cannot be rejected simply because we haven't yet achieved perfect science.

Conventionalistic response to realistic arguments can be said to have appeared in two major forms. First of all, there are those who have held that science doesn't

need to assume a realistic attitude. This tactic has been most forcefully adopted by psychologists of a behavioristic bent (*45,46*) and has come to be known popularly as the "stimulus-response," "black-box," or "input-output" view of things. It has also influenced philosophic treatments of cybernetics [that of Craik (*105*), for example]. Essentially, this strain of conventionalism, which has also been called "instrumentalism," holds that science need only record the correlations of actions performed by scientists and results observed. Introduction of any additional material into scientific theories is said to be unnecessary.

A second conventionalistically motivated response to realism can be found in the writings of Mach (*25*), Poincaré (*47*), and Duhem (*48*). The suggestion of these authors, among others, is that the realistic attitude is inappropriate. It is their assertion that the reality of a theory cannot be assessed on *scientific* grounds. How could such an assessment be performed, they ask, without a comparison of the contents of the theory with those of reality itself. Obviously, such a comparison is impossible because it presupposes knowledge of that which is unknown. These conventionalists acknowledge that one theory can be said to be unrealistic in comparison to another in the sense that it doesn't account for observations as adequately. But, they are quick to remind us, science has experienced in its history the "unfortunate" co-occurrence of theories which account for the same observations to the same degree of accuracy. To say that one such theory became ascendant because it was more *real*, they conclude, is to postulate an impossible decision-making capability.

In the place of a realistic orientation, conventionalists of the form we are discussing would substitute an orientation which views scientific theories as "languages" by which scientists can communicate results of observation unambiguously and economically. It is not to be denied that the contents of these languages are provoked by reality as observed, but it is to be contested that they tell us about that reality as it is unobserved. If Duhem's program is followed (*48*, pp. 19–30), it is held that the relationships among the contents of a theory, on the one hand, and the relationships among the contents of reality, on the other, move toward a coherence over time, but beyond this "natural classification" little more of the realistic attitude toward scientific theories can be interjected.

The survey of conventionalistic critiques of realism which we've conducted to this point hopefully engenders an appreciation for why the assumption of "in-principle knowability of reality" has come under examination. Without introducing considerable additional detail, it would be difficult to take the discussion much further. It has been our intention in going this far to demonstrate how quickly the deceptively simple question "What should be our attitude toward the products of scientific inquiry?" becomes complicated when investigated critically. As with the previous section, it is important to keep in mind the issues which have structured debate about the question. For our what question, these issues can be said to be those of the (in)appropriateness, (un)necessity, and (im)possibility of the attitude toward scientific theories as constituting real versus conventional knowledge of the world.

Application to Library and Information Sciences

At the start of this article the promise was made that our survey of philosophy of science thinking would be applied to the problems of the library and information sciences. To produce such an application in the full form possible would be to develop a philosophy of library and information sciences. This we cannot do within the scope of a single article but we hope to sketch out the components and promise of such a philosophy.

If we recall for a moment the definition of "philosophy of science" which we introduced for our discussion we will be able to develop precisely what function a philosophy of library and information science might have. This definition stated that a philosophy of science constitutes a critical understanding of science where the word "critical" implies that the means by which the science is understood are themselves subjects for examination and understanding. People who dedicate thought to the philosophy of science, or to the philosophy of a science, therefore function, through the results of their work, to enable scientists to be more selective, more conscious about what they do and the ways they do it than they might be otherwise. This is the case, that is, if there exist open lines of communication between the two groups of scholars (those concentrating on the science, on the one hand, and those concentrating on the philosophy, on the other).

Stated in familiar terms, those who work upon a philosophy of a science assist those who work in that science in conceptualizing design options and interpreting situations. The options available to an individual approaching a system or an experimental design task can be categorized, given sufficient work, along the lines we followed in discussing our how question in previous sections. This is to say that a design task essentially raises questions about how something should be done and, philosophers of science assert, answers to such questions, upon examination, can be said to contain rationalistic, empiricistic, and criticistic orientations. It follows that a scientist who is able to recognize and analyze the strengths and weaknesses of these orientations is better equipped to formulate and evaluate design alternatives than one who is not.

Library and information scientists, for instance, face daily the problem of representing the contents of documents. Whether the mode of representation is that of classifying, abstracting, or indexing, to cite three, the problem remains to be one of developing a "substitute (surrogate)" for a document which enables that document to be related to other documents for purposes of storage and retrieval. We solve this problem by using classification and indexing systems. The designs of these systems have evolved over time and can be viewed to demonstrate the philosophy of science orientations we have discussed. The approach to classification adopted by Dewey, for example, relied heavily upon a conceptualization of the universe of knowledge, while that of the Library of Congress is based more upon the actual contents of documents themselves. In this respect, the Dewey Decimal Classification, oriented toward the ideational, can be said to be predominantly rationalistic while the Library of Congress Classification can be said to be

predominantly empiricistic because it is oriented toward the observable. S. R. Ranganathan, moreover, with his Colon Classification, can be recognized to have assumed a criticistic orientation. This is by virtue of his use of the Process-Matter-Energy-Space-Time (PMEST) formula in the context that *every* document contains something about each of these facets (an ideational assertion), but what is contained has to be determined by continual surveillance of published literature (an observational assertion).

The point of discussing how library and information scientists have gone about designing systems for representing the contents of documents, however, is not to claim that the designers involved used philosophy of science thought to guide their work. Rather, this brief exposition stands as evidence for the proposition that philosophers of science do serve to help the practicing scientist understand more fully the ways things have been done in the past and the ways they could be done in the future. Faced with a problem of design and equipped with a comprehension of philosophy of science, scientists could explore at the outset of work on the problem the rationalistic, empiricistic, and criticistic viewpoints to the problem. Such an exploration would result in a preliminary inventory of subproblems, subtasks, associated with the theory which has to be invoked relevant to the problem (rationalistic), the data which has to be collected relevant to the problem (empiricistic), and the means by which the theory and the data can be matched to evaluate the effectiveness of the design (criticistic). This inventory, in turn, can function to clarify what the design could do and, after consideration of the practical, what it can do. It is in this latter category, that of what is practical for a design, that the inventory is again very useful because it enables an understanding of what the design is not doing. Thus, the task of explaining design failures, after a system is implemented or an experiment is conducted, becomes more systematic and less ad hoc than it is otherwise.

In some ways the above may be read as an articulation of the "systems approach" or the procedure of "systems analysis." This is not by accident. A number of contemporary philosophers of science have also contributed to the "systems" literature. A partial list of authors in this category includes Russell Ackoff (*49–50*), C. West Churchman (*5, 8, 53, 54*), Olaf Helmer (*55*), and Nicholas Rescher (*56, 57*). The work of Ian Mitroff (*58*) is particularly interesting in this respect, especially his effort with James Williams and Eugene Rathswohl (*59*), because it is frequently applied to information science topics.

Beyond the functioning of philosophy of science thought as an aid for the conceptualization of design issues and options, which is a function it has for all science, there are a number of possibilities for the direct application of philosophy of science developments to the problem spaces of library and information sciences. The concept of "user," for instance, is one which library and information scientists have discovered needs increasing precision. Library and information workers are frequently encouraged to actively consider and involve the "user" in the design of services first and in the delivery of services over time. Indeed, the attention which the concept of "user" has attracted in recent years can be said to account for the

metamorphosis of the library and information sciences into the behavioral and social realms. To date, however, the language which the library and information profession has developed for discussing this concept is predominantly anecdotal in tone and descriptive in approach.

The concept of "user" can probably be said to have begun its ascendance as people who work with information endeavored to make scientific sense of the associated concept of "relevance." On both intuitional and evidential grounds it is clear that the relevance of an item of information is a judgment made by a recipient of that item. The proposition is offered, then, that relevant items of information transform a passive recipient of information into an active user. A design objective which is consistent with this reasoning is that information delivery systems should strive for making *users* out of the *recipients* of their services. The manner in which these systems might do this, to come full circle, is to deliver highly relevant items of information.

In an article summarizing conclusions made from experimentation with relevance, Tefko Saracevic *(60)* notes that comparisons of relevance judgments have been made among users, nonusers, experts, and nonexperts. The remark we want to make at this point is that such comparisons are quite obviously based upon a typology of recipients of information. This is to say that considering the degree of subject specialization of a recipient or the conditions of reception, an individual is typed, for purposes of analysis, as a user, nonuser, expert, or nonexpert. Referring back to our previous comment about the language which library and information scientists have for discussing the concept of user, we can now see exactly what that language is.

The hint of an alternative language, that is, an alternative typology, for discussing recipients and users of information can be recognized to reside in the philosophy of science thought we have surveyed. Assuming that library and information work will be concerned with scientific and technical communication for years to come, which is certainly true in part, the ways in which philosophers of science have come to discuss orientations assumed by scientists toward their work could be explored as a base for similar discussions among library and information scientists. This is to say that we would come to state information requirements and judgmental criteria of groups of recipients of information in terms of the degrees to which they could be said to be rationalistic, empiricistic, and criticistic in their orientations. Although statements of this type are premature given current levels of development, we can suggest for purposes of illustration that the differential relevance of items of information could be systematically approached by assessing the rationalistic, empiricistic, and criticistic influence at work in the author and recipient.

Insofar as philosophies of science provide theories of science and of scientists, then, they allow two major areas of application to the library and information sciences to be pursued. Both of these have been discussed in the above. First of all, in summary, philosophies of science as theories of science help to make library and information scientists more aware of the constellation of approaches available for the execution of any given inquiry. Second, as theories of scientists, they contain

characterizations of recipients and users of information to the extent that the information involved is that of scientific and technical communication. It is not to be concluded, however, that the philosophy of science is completely ready to be applied in these ways. There remains much work to be done by both philosophers and scientists.

Some Present and Future Issues

That which one regards as an "issue" in a field is that which is regarded as the problematic. It is the case, moreover, that the perception of the problematic is something which varies greatly from individual to individual. Everything we have said in this article pays tribute to this fact: what a rationalist takes for granted an empiricist questions and vice versa. It has to be understood, therefore, that as we state some current and future issues in the following, these statements have to be interpreted, more than those of any other section of this article, in the light of their author's point of view. Obviously, this point of view is not that of a philosopher of science per se; rather, it is that of an information scientist who has found material in the literature of the philosophy of science which provokes thought about and adds perspective to his work. In addition, the point of view of the author tends to be criticistic, that is, he favors the examination of the interaction of concepts and observations over the examination of concepts or observations by themselves.

Within this framework it can be stated, preliminarily, that the major present and future issues of the philosophy of science are at the "fringes" of the field instead of at its core. In truth, it has to be acknowledged that this entire article has been on the fringes. Such "core issues" as laws versus empirical generalizations, the (a)symmetry of explanation and prediction, the structure of theories, and the explication of terms have occupied little space in the preceding. These core topics can be said to be focused on the *products* of science. Our focus can be said to have been that of the *processes* attendant with the science. This consideration of processes attendant with science, moreover, is still a fringe concern for philosophers of science.

It is not fringe, however, for a number of other groups of scholars which we reference through the descriptor of the "sciences of science." Such scholars have come to understand that a full treatment of the processes of science will require *at least* a politics, sociology, and psychology of science and scientists. Seminal works in this respect are those of Derek de Solla Price (*61*) and Abraham Maslow (*62*). Diana Crane (*63*) has recently published a related effort, as has Ian Mitroff (*64*). The monumental study by Elliot Freidson (*65*) is also of interest, as are those of Norwood Hanson (*4, 38*).

It is the case that many philosophers of science in modern times have systematically excluded the psychological from their sphere of inquiry. As he begins his milestone treatise on probability as inductive logic, Rudolf Carnap (*66*) remarks at length on how it is inappropriate for a logician to attempt to speak to the point of the ways in which scientists actually do or even should reason. Logic and, so it

seems, philosophy of science in this widespread conception should be neutral as to the actual practice of science. The core issues raised in this context are associated with the development of objective knowledge and the formulation of universal hypotheses and laws from time-bound experimentation. As is the situation with mathematics, the results of such research are presented as declarations of possibilities rather than imperatives for action.

In a certain sense this attempt to define the core of the philosophy of science is similar to what some authors have tried to do with the issue of relevance in library and information science. W. S. Cooper (*67*), referencing Patrick Wilson (*68*), for instance, states clearly that his concern is that of *logical* relevance (topic-relatedness) rather than utility. Donald King (*69*) has also seen value in separating the psychological aspects of relevance from other aspects which could be considered. The main group of philosophers of science have placed such logical matters at the center of their specialization, as many library and information scientists can be said to have done with relevance.

The formal or "logico-mathematico" vein of philosophy of science has spawned a richly substantial literature. Recently, moreover, it has developed along lines which bring it into proximity with the library and information sciences. Some of the work in this class has been done by Kemeny (*70*), Watanabe (*71*), Hintikka and Suppes (*72, 73*), and Suppes and Atkinson (*74*). The common ground involved here is bounded by inductive inference and information theory wherein information theory provides a "calculus" for certain measurement of language tasks associated with the procedures of inductive logic.

The neutrality of this style of philosophy of science can be said to be responsible for both its strength and its weakness. It has been strong because scholars devoted to it and working within it have been able to push forward without being constrained at every step by speaking to the actualities of science and scientists. Note that this state of affairs, wherein philosophers of science have excluded behavioral and social inquiry from their approach, is symptomatic of a rationalistic frame of mind. This is the case even when the philosophers involved have been extolling the virtues of empiricism. But it is important to recognize that philosophers of science *do* philosophy and not science and, consequently, it is not inconsistent for them to use rationalistic arguments in philosophy for empiricistic conclusions in science.

There are those who are not convinced by this reasoning and it is these that we have referred to as the fringe of the philosophy of science. We are at a point now from which we can understand clearly their position and the present author's conception of the future. The fringe of the philosophy of science is constituted by those individuals who have adopted empirical methods for developing their philosophies. Evidently they believe such philosophies are possible even though it can be expected that philosophy, psychology, and sociology may be radically transformed in the process. This is the area, the "empiricizing" of philosophy, in which interesting future issues will develop. It is the area in which interesting present issues have crystallized. The projected result is that the core of philosophy of science will itself transform to something which is more directly approachable and appro-

priate to scientists than that which is currently the case. Whether or not this transformation will also result in a philosophy which is too "vulgar" to attract the attention of competent philosophers is something which is difficult to decide.

Possibly the first and foremost group on this fringe of which we have made so much is that of the pragmatists. The reasons for this are not hard to guess. Philosophies can be characterized, as we have in the preceding to a limited extent, by their "unit of analysis." Rationalism, for instance, analyzes things in terms of ideas, while empiricism uses sensations. Criticism's interest is in the act of judgment and thus its emphasis is on the relation of idea and sense. The unit of analysis of pragmatism, which we have presented as the modern variant of criticism, is that of human action in general [see Mead (*75*), for instance] For pragmatists more than any other philosophers of science, therefore, the demand has been for an action-directed philosophy of science.

In addition to the push pragmatists have provided from the fringe, certain developments in the study of "objectivity" have set off some minor eruptions in the core itself. Primarily, it would seem, most of the problems are associated with the social sciences. Therein the appropriateness or even possibility of an objective comprehension of human and social behavior has been strongly questioned. Basically, the issue has come to be known as that of the "value-(non-) freedom" of the social sciences. Krimerman's anthology (*76*, pp. 689–759) contains an excellent sampling of opinions on this subject. The biases which a social scientist can introduce into an experiment have been the subject of study by Robert Rosenthal (*77–79*), among others. To make the situation complicated many times again, moreover, it has been determined that the objectivity of social science research is in question due to biases introduced by *subjects* themselves. The classic case in point in this regard is that of the "Hawthorne Program" [which provided the material for a book by Roethlisberger and Dickson (*80, 81*)] wherein it was concluded that an improvement in industrial worker productivity and satisfaction could be traced to the workers' participation in an announced experiment rather than to any alteration of the working environment.

No doubt to some, the problem of objectivity in the social sciences represents no less than a diagnosis of their inadequacy as sciences. Things, however, are not that simple. Astronomy, for instance, is certainly an "acceptable" science and yet astronomers have struggled for years (indeed, centuries) with the problem of consistency in observation. Such consistency would be, in principle, possible if objectivity of observation and reporting were operative. Physics, as viewed by Heisenberg (*41*), has evolved to a state of uncertainty in this respect as well. In an almost poetic chapter (*41*, pp. 167–186), Heisenberg outlines the dilemma of the physicist historically an expert in the realms of the obviously real (levers, inclined planes, pendula, etc.), approaching the atom and the awareness that with things atomic there is a world of " . . . potentialities or possibilities rather than one of things or facts." When the language of the physical sciences moves toward a potential or possible or probable calculus it begins to sound similar to the dispositional or expectational or probable one of the social sciences.

So we find that the concept of objectivity, at the center of logico-mathematico strains of philosophy of science, is in a position of change of outlook. Modern

physical science and modern social science have furnished evidence to the effect that objectivity is in the process of being replaced by intersubjectivity. Intersubjectivity, moreover, seems radically less a logical matter than one empirical insofar as the "inter–" of the concept requires attention be given to at least two things acting together rather than the solitary "ego" which can be found in so much of what we understand as logic. This is the major issue, though, which we have identified with the present and future of the philosophy of science. For purposes of summary, we again state that this issue, and all attendant issues, are those associated with the development of empirical techniques of philosophy in general and philosophy of science in particular.

Conclusion

The bibliographical sources for this article are extensive and thus it may be of use to cite some works for purposes of general reference. The author's personal favorites, which is to say the ones which he consults most often, are those of Hanson (*4, 38*), Turner (*10*), Churchman (*8*), Duhem (*48*), Kuhn (*39, 40*), and Pepper (*9*). These are listed according to some measure of increasing difficulty. In the area of collections, the author favors those of Krimerman (*76*) and Brody (*82*). It can be noted that all of those references are from the 20th century; it is the author's opinion that it is best to start with these rather than the original, classic sources from which they draw.

Individuals who have not received citation in the preceding discussion but who have played influential roles in the development of contemporary philosophy of science thought are: Broad (*83*), Crombie (*84*), Eddington (*85*), Feigl (*86*), Feyerabend (*87, 88*), Kaplan (*89*), Merleau-Ponty (*90*), Merton (*91*), Mill (*92*), Neurath (*93*), Pascal (*94*), Pearson (*95*), Popper (*96, 97*), Quine (*98*), Reichenbach (*99*), Russell (*100–102*), Schlick (*103*), and Scriven (*104*). This list, however, should not be regarded as being exhaustive, for it reflects the scope of study of its author. The references given throughout this article also need not in every case be the most representative of an author although the attempt has been consciously made to meet such a condition for the majority.

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PAUL EVAN PETERS

PHONORECORDINGS: COLLECTIONS AND USE

See *Nonprint Materials*

PHYSICS. AMERICAN INSTITUTE OF PHYSICS

The American Institute of Physics (AIP) was founded in 1931. It is chartered as a membership corporation with leading societies in the fields of physics and astronomy as members. The institute combines into one operating agency those functions which can best be done by the societies jointly. The member societies are:

The American Physical Society
Optical Society of America
Acoustical Society of America
Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society

The institute publishes scientific journals; provides abstracting and indexing services; serves the public by making available to the press and other channels of public information reliable communications on physics and astronomy and their progress; carries on extensive manpower activities; maintains projects directed toward providing information about physics and astronomy education to students, teachers, and academic departments; encourages and assists in the documentation and study of the history and philosophy of physics; cooperates with local, national, and international organizations devoted to physics and related sciences; and fosters the relations of physics to other sciences and to the arts and industries.

The physicists represented by the AIP number more than 50,000 members of its member societies. In addition, approximately 5,000 students in over 450 colleges and universities are members of the institute's Society of Physics Students, which includes the honor society component, Sigma Pi Sigma. Industry is represented through 85 corporations, institutions, and laboratories which, through Corporate Associate membership, aid the institute in carrying out its purpose, the advancement and diffusion of the knowledge of physics and its applications to human welfare.

Organization

The institute has a staff of 360; expenditures for its operations, including activities carried out for member societies, come to $14,000,000 per year. The AIP is divided into three operating branches—Fiscal, General Activities, and Publishing. The Fiscal Branch provides financial services for the institute and member societies, comprising such essentials as subscription fulfillment, dues billing and collection, data processing, accounting, and office services. General Activities includes public information, education, manpower studies, a placement service, and a center for

TABLE 1

Publication Statistics*

Number of members	56,963
Number of journals published	43
Number of conference proceedings published	4
Number of pages published	106,319
Number of pages published per member	1.9
Number of paid subscriptions	
Member	182,577
Nonmember	82,463
Number of items published	18,133
Number of items published per member	0.3

*1975 data.

the history and philosophy of physics. The Publishing Branch includes divisions for publications, advertising, and marketing, as well as for *Physics Today*, a monthly news magazine for physicists.

Publishing Branch

Publishing represents the institute's major effort on behalf of its member societies and the physics community. In 1975, AIP published over 106,000 pages in archival journals, member-society bulletins, translation journals, and conference proceedings. Table 1 gives some statistics on the scope of the program, which covers about 90% of the physics research published in the United States. The original English-language publications of the AIP and its member societies are:

American Journal of Physics
Applied Optics
Applied Physics Letters
The Astronomical Journal
The Journal of the Acoustical Society of America
Journal of Applied Physics
The Journal of Chemical Physics
Journal of Mathematical Physics
Journal of the Optical Society of America
Journal of Physical and Chemical Reference Data
(published jointly with the National Bureau of Standards and the American Chemical Society)
The Journal of Vacuum Science and Technology
Medical Physics
Physical Review A (General)
Physical Review B (Solid State)
Physical Review C (Nuclear)
Physical Review D (Particles and Fields)
Physical Review Letters

The Physics of Fluids
The Physics Teacher
Physics Today
Reviews of Modern Physics
The Review of Scientific Instruments

In May of 1973, the U.S.S.R. became a signatory to the Universal Copyright Convention; the Soviet Union had not previously been a party to any international copyright agreement. Members of the UCC are obligated to provide the same copyright protection to nationals of other countries as they give to their own authors. As a result of the U.S.S.R. joining the UCC, an agreement was reached between the AIP and the Soviet All-Union Copyright Agency which gives the institute the rights to 19 Soviet journals, continuing the translation program begun in 1956; in exchange, the Soviets received similar rights to translate and reproduce the journals published by the institute. The Russian physics journals which AIP publishes and distributes are:

JETP Letters
Optics and Spectroscopy
Soviet Astronomy
Soviet Astronomy Letters
Soviet Journal of Low Temperature Physics
Soviet Journal of Nuclear Physics
Soviet Journal of Optical Technology
Soviet Journal of Particles and Nuclei
Soviet Journal of Plasma Physics
Soviet Journal of Quantum Electronics
Soviet Physics—Acoustics
Soviet Physics—Crystallography
Soviet Physics—Doklady
Soviet Physics—JETP
Soviet Physics—Semiconductors
Soviet Physics—Solid State
Soviet Physics—Technical Physics
Soviet Physics—Uspekhi
Soviet Technical Physics Letters

Because of the scale of the publishing operation, the AIP was in a unique position to develop a system which could integrate primary journal publication with the production of secondary services. With support from the National Science Foundation, a system evolved in which items were keyboarded only once, producing a data base on magnetic tape which is used for many different purposes.

The great majority of papers published in AIP journals are composed by typewriter composition (*1*), with computer photocomposition accounting for about 15% of the pages. Items produced by computer photocomposition, produced from the tape, are the "heads" (titles, authors, authors' locations, abstracts, indexing information) for all journal articles, journal indexes, *Current Physics Index*, *Physical Review Abstracts*, and material for *Nuclear Science Abstracts*. Tapes of article heads,

including the abstracts, are distributed as SPIN tapes (*2*), and are also supplied to INIS (International Nuclear Information System) through the U.S. Energy Research and Development Agency (ERDA).

Heads are keyboarded from the author's manuscript, after the manuscript has been accepted for publication by the journal editor. Keyboarding is done in upper and lower case, using only those characters which appear on standard typewriter keyboards. Special characters and symbols (AIP uses about 1,500) are handled by means of an escape key and code. For example, ω is keyboarded as @gw; it appears on the SPIN tape as =(omega)= and is printed in hard copy as ω. The heads are proofread, corrected, and computer-photocomposed using a Videocomp photocomposition device. Camera-ready copy of the heads for the journal is usually available within three working days after receipt of the manuscript from the editorial office. Details of the computer software used to compose special characters, formulas, etc., have been described elsewhere (*3*, *4*).

The computerized data base, in addition to producing heads, is then reused to provide various secondary services:

SPIN—a monthly magnetic tape service designed for SDI and retrospective searches; records on the tape contain the complete article "heads" from all of the AIP journals and conference proceedings. A few non-AIP American journals are also included. The data base began in 1970, and contained almost 160,000 items by the end of 1975.

Current Physics Index—a new secondary publication begun in 1975, intended as a quarterly subject and author index, with abstracts, to the AIP publication program. There is an annual cumulative author and subject index.

Physical Review Abstracts—a semimonthly collection of abstracts scheduled for publication in the *Physical Review*; abstracts appear in advance of journal publication, with a tentative date of issue.

Journal indexes—author and subject indexes are produced for the completed volume of each journal.

Other related services include:

Current Physics Reprints—a document access service for all AIP and member society journals, as well as those of the Institute of Physics (London). Tearsheets or photocopies of journal articles are usually dispatched within 24 hours of receipt of a mail or telephone request.

Current Physics Microform—a monthly set of microfilm reels or cartridges with the full text of articles published in the preceding month. Reel and frame numbers are included on SPIN and in *Current Physics Index*.

Selected heads—sent semimonthly, on tape and as camera-ready hard copy, to ERDA for publication in *Nuclear Science Abstracts* and inclusion in the INIS tape service; these articles are indexed according to INIS specifications.

Figure 1 shows the flow of information from receipt of manuscripts accepted for publication to the appearance of the various primary and secondary services.

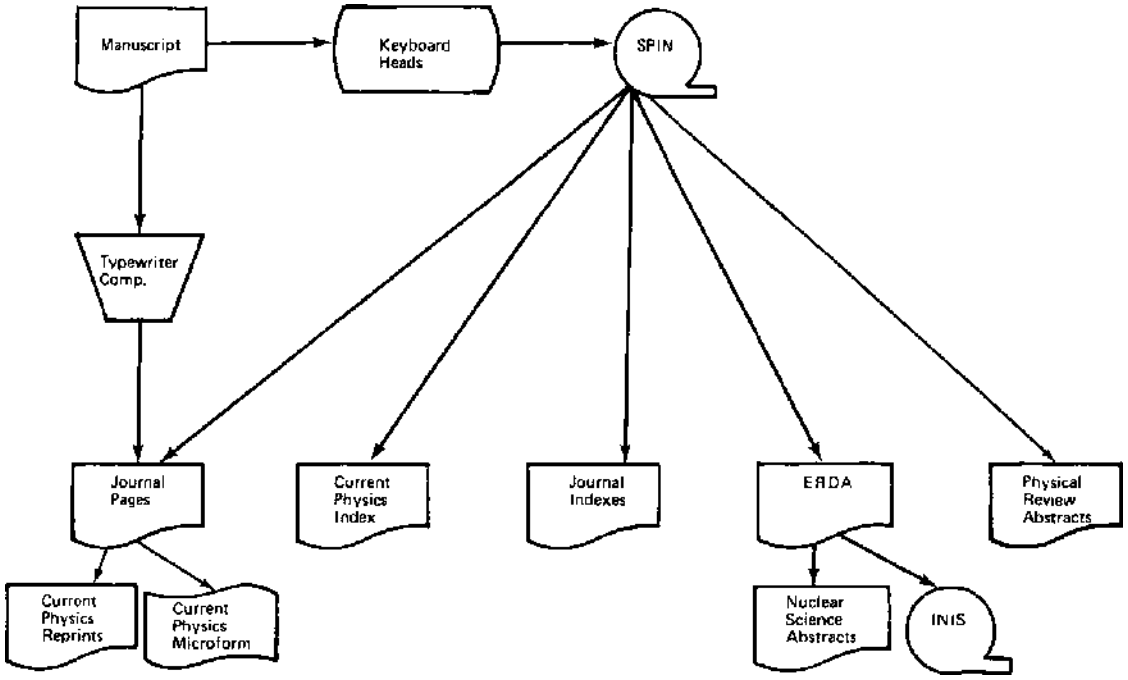

FIGURE 1. *Production of primary and secondary information services in physics.*

Indexing

All journal articles are indexed using the Physics and Astronomy Classification Scheme (PACS) (*5*), which was developed with NSF support. PACS is a hierarchical scheme, and is compatible with the common classification scheme which has been agreed upon by the Physics Working Group of the International Council of Scientific Unions/Abstracting Board. Authors are asked to assign up to four index codes to their papers, placing the most important index code first on the list, and indexing to the most specific level possible. Indexing is then checked at AIP. PACS is updated annually, in cooperation with the ICSU/AB Working Group in Physics.

General Activities Branch

Information about physics and astronomy is provided as a service to science writers and the general public. An annual summary of new developments, assembled with the cooperation of AIP member societies, is written in easy-to-understand language specifically for science writers. The "Monthly Science Summaries," a joint effort containing brief stories from the American Institute of Physics, the American Chemical Society, the American Association for the Advancement of Science, and the American Psychological Association, is distributed to 350 weekly newspapers throughout the nation. Other services to science writers include establishing press rooms at meetings, providing lay-language papers, organizing press conferences, and arranging interviews with physicists at the request of newsmen.

Several films have been produced for national television under a grant to AIP from the National Science Foundation ("Birth and Death of a Star" and "The Structure of Hemoglobin").

The Public Relations Division administers two annual science-writing awards in physics and astronomy, with support from the United States Steel Foundation, in an effort to encourage good science writing; one award each year goes to a journalist and the other to a scientist.

The work of the Center for History of Physics focuses on the location, preservation, and use of documentation covering the history of modern physics and astronomy at repositories throughout the United States. Information on the location and contents of these collections is listed in the center's *National Catalog of Sources for History of Physics and Astronomy* (*6*). Research materials in the center's Niels Bohr Library include some 10,000 published volumes, biographical-bibliographical files for major physicists, tapes and transcripts of oral history interviews conducted by the center and others, the Archives for History of Quantum Physics, a large collection of historical photographs and tape recordings, vertical file materials, and archives of personal papers and institutional records. The center conducts studies on the historical development of contemporary physics and astronomy and issues books, articles, catalogs, and other publications communicating results of its research and preservation activities.

The programs of the Education Division include a consulting service which provides information and advice on undergraduate education to individual faculty members and physics departments throughout the United States. A listing of speakers, tours, and films (*7*) has been compiled by the Society of Physics Students. The AIP Information Pool in Education has served as a source of documents related to physics education. The Tech Physics program aims to provide instructional materials for teaching physics to prospective technicians at community colleges and technical institutes; some of the equipment designed for this program was available in 1974, and publication of modular text units began in 1975.

Annual manpower surveys examine the flow of new physics degree recipients into the labor force, and make possible an analysis of physics subfields, types of employers, work activity, salaries, and other factors. Reports resulting from these studies include: Survey of Physics Enrollments and Degrees; Survey of Physics Bachelor's Degree Recipients; Graduate Student Survey; and an Employment Survey, which is a follow-up of physics degree recipients entering the job market for the first time. A *Directory of Physics and Astronomy Staff Members* (*8*) is issued annually, and a year-round employment referral service assists prospective employers and physicists seeking academic and industrial jobs.

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RITA G. LERNER

PHYSICS LIBRARIES AND LITERATURE

Introduction

This article will discuss the practices and problems inherent in the production, publication, organization, storage, and use of physics information. In order to understand how physics libraries and literature differ from libraries and literature in general, one must have a sensitivity to the philosophy and practices of physics in addition to an understanding of the position physics holds in the total spectrum of knowledge. Next, all levels of physics literature—primary information, secondary sources, and review literature—will be mentioned, placing particular emphasis on the problems of production and use. The final of the three major sections will focus on the storage and handling of the physics information in libraries.

The Nature of Physics

To the casual observer it may seem that the scope of the science of physics has been shrinking since the term was first used by the classical Greeks. Their word "physikos" was defined as "the study of nature." Nature, in this sense, included the organic as well as the inorganic. In fact, Locke was said to have insisted in the 18th century that the study of physics should include the study of the spirits and gods. It has been suggested (*1*) that the information explosion in the 16th-century scientific literature actually caused the development of sciences other than physics. Since the average physicist could not keep up with the literature in his field, he was forced to specialize!

Modern physics developed with the study of the solar system (*2*, *3*). With Newton the studies of astronomy and physics grew more distinct. In the early 1800s, with

the rise of modern medicine, the study of the organic separated from physics. By the mid-1800s, culminating in the work of Mendeleev, the field of chemistry became fully developed. At the turn of the 19th century we are left with what is still commonly thought of as the limits of physics. The *Oxford English Dictionary* provides the following definition:

> 2. in current usage restricted to the science or groups of sciences treating the properties of matter and energy or of the action of the different forms of energy on matter in general (*4*).

This rather dry definition seems far removed from that of early Greeks, but is it really?

In the most generic sense, nature consists of two qualities, matter and energy. In fact the great insight of Einstein showed that the two are related as $E = mc^2$. Further, considering that the rather intangible element called "the life force" is but one form of energy among many, then we are back to defining physics as the study of all nature, and indeed its scope has not shrunk at all. The scope of physics covers all possible areas of nature. Depth, however, is what does delimit the areas of physics investigation. Physics seeks to investigate only the very elementary, fundamental properties of matter and energy.

Physics does have one rather alluring quality about it, something that makes it slightly more grand than the other sciences. Physics has a single goal, a "mission" if you will. This goal is to eventually reduce all of nature to its fundamental laws (*5*). Such laws would be universally valid. Moreover, some physicists assume that these laws will be simple in their form, elegant in their statements about the physical world, and few in number—one preferably. From this one law and its axioms man could completely describe nature. It would be a valid assumption that the current work of physicists is still a long way from that final goal. As far along as physics may be, however, it is important to remember that this goal exists, and it is the motivating force behind contemporary physics.

Gravely misunderstood by most laymen are the physicist's concepts of truth or physical law. Laymen see a complex combination of physical phenomena with social implications and require the physicist to provide a clear-cut solution. "What is the best source of power?" or "How do we clean up the environment?" are typical of the questions that society wrongly demands physicists to answer quickly. Such answers are better given by social or political leaders. Physicists do not work that way! The process of physics is slow, painstaking, and divorced from any social or technological implications. This is not to say, however, that the initiative for physical research may not arise from social needs or that the results of physics research may not be utilized by other disciplines. It is simply that during the actual research, physicists observe only isolated physical phenomena.

It is generally correct to say that physics research seeks causal relationships. The physicist takes a particular phenomenon and simplifies his description of that realm of nature until he has an independent variable and a dependent variable (his phenomenon). He then measures the changes in the dependent variable caused by

a given change to the independent variable. The need to measure change is dictated by mathematics—the physicist's tool and language. Thus, the physicist's concept of truth or physical law is merely a statement of certainty that within mathematical limits a given change in a physical phenomenon will have a predictable result. If one increases the force on a given mass, the mass will always accelerate ($F = MA$).

A second step in the progress of physics involves the synthesis of previously observed results into a more complex and comprehensive description of nature. The discoveries of subnuclear particles and the description of each separate particle, variable by variable—with each variable being the result of a series of observational experiments—are gathered together and synthesized into a description of the nucleus: a description, however, that is only as good as the worst piece of observational data used. The physicist's description of the nucleus, his physical truth, is once again only a statement of mathematical certainty (or uncertainty). As the observations used in the synthesis are replicated with increasing precision or, as often happens, surprising and unexpected information is obtained during the course of other experiments, the mathematical certainty of what is considered law may change, either to reinforce the law or to require its review.

Because of the fundamental nature of physics, interactions with the other sciences and nonsciences are common. The relationship of physics and mathematics already alluded to is most crucial (*6*). The two have often been confused by laymen. Mathematics is an organized system of reasoning, which utilizes a unique language or formulism. It permits the demonstration of a relationship between one logical theorem and another. However, the science of mathematics is generalized beyond the real world. Its theorems make no inference about nature, and all that one needs to answer its questions is thought. Physics, with its faith that nature operates according to mathematical laws, applies the reasoning of mathematics to quantifiable physical phenomena. The physicist uses the reasoning of mathematics as a logical tool and the formalization of mathematics as a language; but at all times the physicist observes the real world. The answers to the questions of physics cannot be found by thought alone.

Just as physics applies the general rules of mathematics to the special case of natural phenomena, so engineering applies the discoveries of physics to the practical goals of society. For instance, society as we know it today would be far different without the common transistor. The development of the transistor was based upon discoveries in solid state physics (semiconducting effects) and crystallography (material preparation). Science typically operates in this mode of increasing specialization (mathematics→physics→engineering). There are, however, many cases of the reverse process being of extreme importance. The transistor developed by engineers enabled the physicists to utilize much more sophisticated electronic equipment. Not surprisingly, this helped the solid state physicist to investigate more thoroughly his laws of semiconductor physics, thus aiding the development of better transistors. On a higher order, there have been cases where the tools provided to the physicist by mathematicians were not sufficient for the task at hand. In rare but often important cases the physicist, in his need to describe nature, has made

great advances in mathematics. Newton is given much credit for the development of calculus. However, while conducting his work on planetary motion, he found that all existing mathematics were insufficient to describe the motion of a planet within the solar system. Thus it can be seen that Newton's work on the development of calculus was necessitated by the attempt to describe the observations of nature.

The other physical sciences—chemistry, geology, meteorology, and crystallography—are specialized branches of physics. They investigate particular forms of matter and/or energy in unique circumstances. The biological sciences apply the fundamental principles of matter and energy to living systems. Contemporary advances in biology have been possible not only because of advances in instrumentation made available through physics but also due to conceptual leaps suggested in physics. Even psychology has begun studying the physical principles involved in desires such as thirst, hunger, and fear in a discipline known as psychophysics. The entire group of social sciences has long emulated the philosophy, practice, and mathematical basis of physics.

Much has been written about the philosophical differences between the sciences and the humanities. However, such differences find few champions among physicists. More than any other scientific group, physicists view themselves as artists trying to paint a mathematical picture of nature. The creative and imaginative genius of the physicist at work is quite similar to that of the painter, sculptor, or author. The only real difference is how they are perceived by society (*7*). Are Maxwell's equations less elegant than a Bach fugue?

The wide range of physical phenomena has forced physics to develop several major divisions of investigation. *Mechanics* is the study of the motion of objects. *Classical* (or Newtonian) *mechanics* deals with objects much larger than the size of the atom, while *quantum* (or wave) *mechanics* treats objects near the size of the atom. *Heat* and *thermodynamics* investigate systems with regard to the somewhat qualitative concept of temperature. *Statistical mechanics*, a branch of thermodynamics, looks at the microstructure of thermal systems using the laws of statistics and probability. *Electricity* and *magnetism* study the interactions of particles having the property of electric charge. *Optics* deals with both the nature and propagation of light (*physical optics*), while *geometrical optics* is concerned with tracing light rays. *Atomic physics* investigates the structure of the atom, especially the interactions of electrons with the nucleus. *Solid state physics* looks at materials in their condensed state with respect to their electromagnetic, optical, mechanical, and thermal properties. *Nuclear physics* looks for structure within the atomic nucleus and also studies the unstable radioactive nuclei. Research in this area is done with large energetic nuclear accelerators (e.g., cyclotron, Van de Graff). *Particle physics* constitutes one of the frontiers of modern physics. Using larger and more energetic nuclear accelerators (particle physics is often, for this reason, called *high energy physics*), the fundamental constituents of matter are sought. Another frontier of modern physics, *relativity*, considers all physical phenomena in a generalized region of space and time, with particular attention to gravitational forces. These

divisions are rather forced and many examples can be found where the work of one particular person straddles two seemingly disparate divisions—quantum optics, for example. Libraries tend to force such a physics subdivision even further through various classification schemes.

Regardless of the particular phenomenon any one physicist may be investigating, his methodology is traditional. It is the scientific method. One of the primary requirements of research which follows the scientific method is that a description of the work and its results must be made available for others to scrutinize and, if necessary, replicate. In addition, physics, with its unique division emphasizing either theoretical or experimental research, has additional communication needs. Theoretical arguments are either refuted or accepted by the results of experimental investigations. Previously unrecorded phenomena observed during experimental work can be placed into the logical framework of physics by the theorists. Each group must be aware of work done by the other. The progress of the science of physics depends upon the existence of an active and thorough network of information transfer and information storage. The second section of this article discusses modes of information transfer while the third section focuses on the methods of information storage.

Physics Literature

INTRODUCTION

The process of physics assumes that nature is deterministic. It assumes that physical laws exist and are obeyed; these laws can be deduced through observation. The methodology of physics assumes that replicability is crucial to the acceptance of observational results. Furthermore, the progress of physics depends upon the synthesis of observational data into more complex descriptions of nature. Therefore, physics is forced to include tools and techniques of recording past activities for present and future comparison. Such permanently recorded and retrievable data are fundamental to the practice of physics in that they provide the archives needed for consensus by a basically conservative science. In addition, the results of observational and synthetic methods may provide stimulating ideas for those outside of the intended audience. Discussions concerning the philosophical necessity for scientific communication are many and elegant; see, for example, Ziman's *Public Knowledge* (*8*) and Russell's *The Scientific Outlook* (*9*).

Any discussion of communication, in physics as well as in other disciplines, can be organized in three ways: first, the direction of communication—who communicates with whom; second, the type of information communicated; third, the media of communication. To understand the reason for these choices, it is important to know that the literature of physics can be broken down into three levels.

First, and most elementary, is the "primary literature" which contains works reporting advances at the forefront of knowledge. Such information is then distilled in the second form, "review literature." Review literature summarizes advances

made in a given field over a given period of time. Finally, "secondary services" or the "where-to-find-it" literature facilitate the use of the other two levels.

Each of the preceding three types of information can, in varying degrees, be transmitted by the following media: journals, books, reports, computer-readable files, conference proceedings and lecture notes, indexing and abstracting publications, and perhaps most importantly, oral communications.

This brief discussion of the levels of physics literature serves as an introduction to the various types of information communicated and the various media used for this communication.

PRIMARY INFORMATION SOURCES

Within that group of literature resources known as the "primary sources" one finds the great mass of information that forms the archives of this science. Primary sources are the distributed results of physics research or other intellectual activities of physicists. In the primary sources one can find the important elements of an experiment, which include the description of the problem, the experimental hypothesis, the methodology, the resulting data, the analysis of the data, and the conclusion. Ideally, if the paper represents a theoretical investigation it will contain a discussion of the past theory and a comparison of theory and the real world, followed by a discussion on the limitations of the theory, proposal for advancement of the theory, a construction of a model of the physical phenomenon, a definition of terms and nomenclative lists of assumptions and approximations, a derivation of the new theoretical result, a test of the new theory by sample calculations or by comparison with experimental results, and finally a conclusion discussing strengths and weaknesses of the new theory along with any new insights gained. In both experimental and theoretical primary sources, all of the previously described elements are contained in the papers but it should be noted that they are neither highlighted nor otherwise made obvious. Each research paper includes them in a unique presentation.

The publication of research in primary sources benefits two distinct groups—an obvious statement yet deserving of comment. First to benefit is the author because he is forced to organize his thoughts into a publishable form. The critical nature of his problem must be established, it must show the particular insight of his approach, and it must defend the form and importance of his results. Last but not least, all of the aforementioned elements should appear in a clear and concise style. As a member of the second group, the reader often gains more than simply the information intended by the author. New experimental techniques or theoretical formalisms applicable to his own research interests can be found, or he can scan the literature for descriptions of problems that may prove interesting.

Since the beginning of the 20th century, the most important medium for the transmittal of primary information has been the scientific journal. The scientific journal format has been increasingly favored by authors because the information is published quickly, disseminated widely, and through compatible secondary

sources, documented thoroughly. Many studies have been done and many publications have been written on the scientific journal over the past 10 years, with perhaps the most complete analysis to date (1975) being that of *Physics in Perspective*, Vol. 2, Part B, Chap. 14, "Dissemination and Use of the Information of Physics" (*10*). This single source, which comprises over 200 pages, reviews every significant work published on the contemporary problems of physics information. Much of the work resulting in recent publications about journal literature in physics was spurred by the current extraordinary growth in the number and size of physics journals (see Figure 1). Indeed, this rate of growth in journal literature has, since the journal's beginning, been constantly accelerating.

Scientific journals first began publication in the middle of the 17th century. Prior to their appearance, the majority of communications among philosophers and scientists was by letter, printed essay, or treatise. The existence of such works was carried by word of mouth. The rise of the scientific societies provided, at a critical period, the impetus to publish the journal. Members of the society submitted their own works, either from their personal correspondence or items from their libraries, which were to be included in the journal. The subsequent issues were then circulated to all other members and subscribers. Kronick makes the following interesting comment:

> The early journals can hardly be said to contain scientific contributions in the form of original papers as we know them today. The characteristic form of the scientific paper did not appear until much later in the history of scientific journalism and derives much more influence from the prize essay and the academic dissertation and oration than from the early contributions to the scientific journal. The distinction between authorship and editorship of the early journal is not made very clearly, so that many of the early editors are described in the contemporary literature as authors of their journals (*11*, p. 72).

These early journals also contained many articles which were only translated from other sources.

Chronologically, there are several critical points in the development and growth of the physics journal (*12*). Although credit is usually given to the French publication *Journal des scavans* for being the first journal containing scientific articles (January 5, 1665), of more importance to the literature of physics is the appearance 2 months later (March 6, 1665) of the *Philosophical Transactions* of the Royal Society of London. By the 18th century, scientific journals were being published in most European countries and specialization had become evident.

Then, in July 1771 the monthly *Observations sur la physique, sur l'histoire naturelle et sur les arts* appeared. The first journal devoted primarily to physics, *Journal der Physik*, began in 1790. It then changed titles: *Neues Journal der Physik* (1795–1797), *Annalen der Physik* (1799–1824), finally settling on *Annalen der Physik (und Chemie)*, similar in form to what we know it as today. Also beginning at the end of the 18th century was the venerable *Philosophical Magazine* (1798). The 19th century saw the start of several other highly respected contemporary jour-

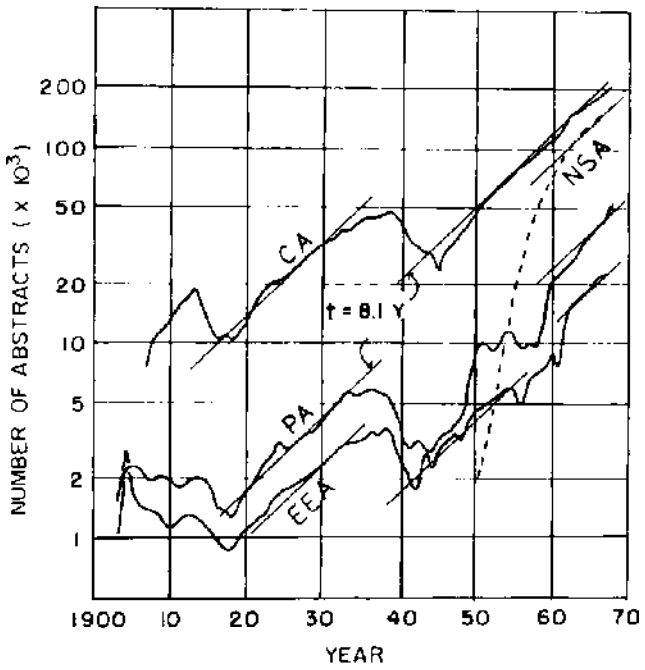

FIGURE 1. *The growth in the number of abstracts covered by* Chemical Abstracts, Physics Abstracts, *and* Electrical Engineering Abstracts *since early in this century along with report literature covered by* Nuclear Science Abstracts *showing the "normal" 8.1 year doubling time (From Ref. 19, p. 14).*

nals: *Monthly Notices* of the Royal Astronomical Society (1831), *Scientific American* (1845), *Zeitschrift für Mathematik und Physik* (1856), *Nature* (1869), *Proceedings* of the Physical Society, London (1874), and most importantly, the *Physical Review* (1893). The listing continues into the 20th century and the number of journals containing scientific literature is currently estimated at 35,000 ±10% (*13*).

Contemporary problems in journal literature seem to focus on two major issues—size and economics. The problem covered by the word "size" is more accurately one of quantity. Even in extremely specialized areas of study, the amount of published information is now beyond most researchers' ability to assimilate. The most probable solutions lie with improved secondary services. Estimates of the particular number of journals which contain information useful to the progress of physics are difficult due to the vague definition of "journal" as well as the fundamental (interdisciplinary) nature of physics. The number of journals scanned for *Physics Abstracts* (*Science Abstracts, Section A—Physics*) has increased from 200 in 1920 to over 800 in 1968 (*14*). However, in 1964, out of approximately 750 journals scanned for *Physics Abstracts*, only 420 titles contained pertinent articles and, in fact, in 1964, 90% of the abstracts were contained in 124 titles. It is well known that although the literature of a subject may be scattered throughout many titles, a large amount of it is clustered in a relatively small number of key journals. Within the core journals there is also another clustering phenomenon but this is due to prestige effects. For a listing of those key journals in physics see Chen (*15*). In addition to

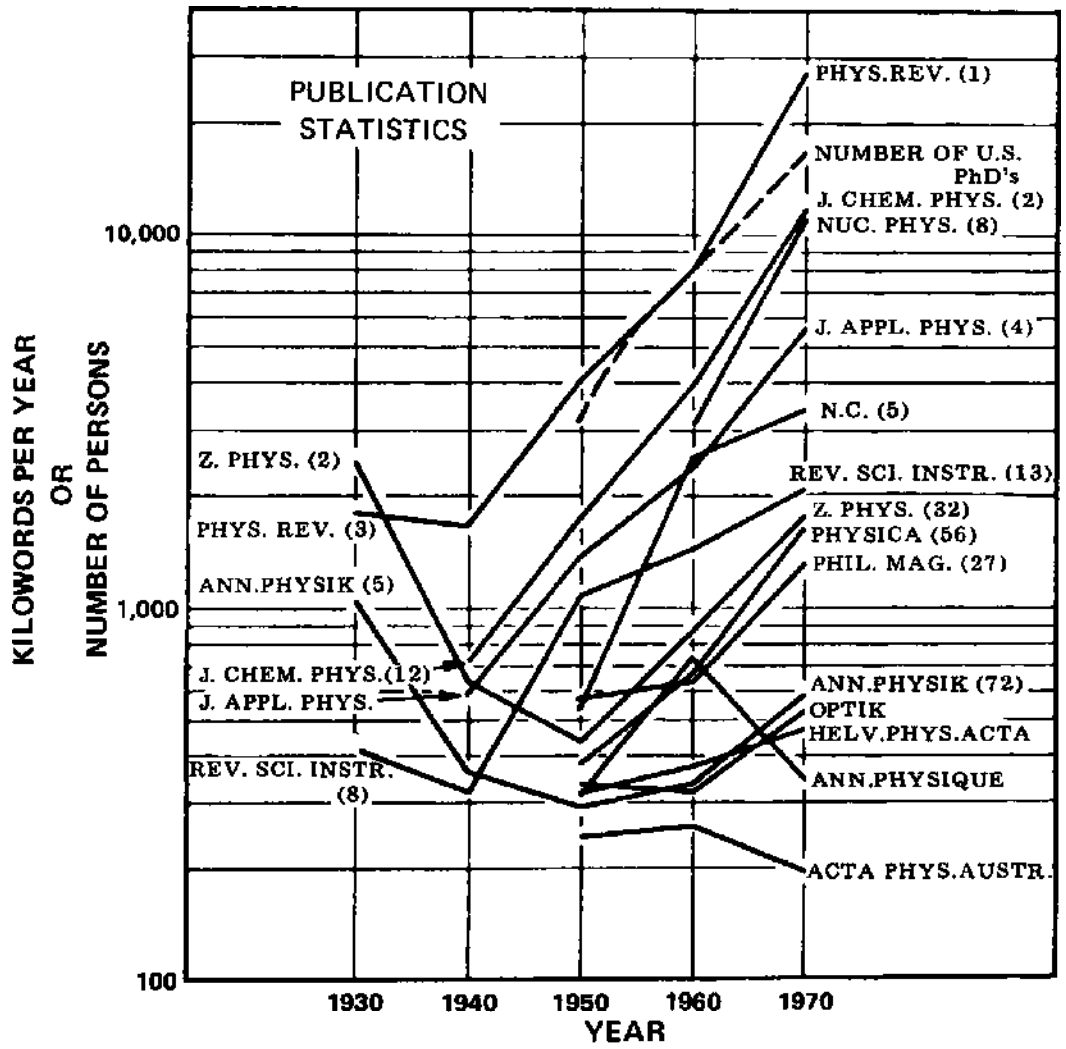

FIGURE 2. *Changes from decade to decade in the amounts of material published by various physics journals. The dashed curve gives the growth of the number of physics Ph.D.'s in the United States (From Ref. 10, p. 1337).*

the rankings of physics journals in her study, Chen also indicates for those same journals the rankings they received in earlier studies by Keenan (*16, 17*).

While the number of physics journals has been growing at an approximate rate of 3% a year, it is interesting to note that the total volume of physics journal publications (in words) has been growing at a rate of nearly 11% a year (*18*). The conclusion is obvious—physics journals are getting fatter. Figure 2 gives a glimpse of how some of the major journals have been increasing in size. The same figure also indicates the rate of growth of physics Ph.D.'s in the United States over the same period of time. The slopes of the manpower curve and the publication curve are similar. In fact, the output per physicist has been increasing at a slight rate (*10*). Even if the number of publishing physicists remains the same, and in an increasingly technocratic society most envision the probable increase of this number, physics journal literature should continue to grow in quantity.

As mentioned earlier, the second major problem in physics journal literature is the economics of publication. Given the enormous quantity of physics literature being written, how can society afford to publish and purchase it? The details of the problem are not greatly different in physics than they are in the rest of the publishing industry. Yet physics has led the way in working to solve this problem (*20*). The majority of physics publications are issued by societies, not commercial publishers. The American Institute of Physics directly publishes 25% of the world's total physics journal literature, translating and marketing an additional 10% (*19*). Publication costs are kept low by using the page-charge system. The page-charge system works as follows:

> The institution sponsoring a piece of research pays for its publication at a rate that now generally covers most or all of the "pre-run" costs. The charge is not compulsory and payment is not expected if it would constitute a hardship. The average subscription price covers the "run-off" costs and the costs of those papers that do not honor the page charge. Since 1960 the honoring of page charges has usually exceeded 80%. The page-charge system enables the societies to offer their publications to subscribers at a reasonable cost but it does nothing in itself to reduce or eliminate journal publication costs (*10*).

The costs involved in the publication of the journal literature can be divided into the aforementioned "pre-run" and "run-off" groups. Pre-run includes all steps from reception of the manuscript to the first copy produced by the printer. Typical stages of pre-run are technical editing—acceptability of contents; copy editing; layout, composition, and proofreading; and finally composition, which is production of the plates for printing. Run-off costs are those of producing any given number of copies. Typical run-off stages are printing—paper, presswork, and binding; mailing; and subscription file maintenance. In discussions of journal economics two points are important. First, pre-run costs are usually 60–80% of the total costs and they are not dependent upon the number of copies produced. They are a fixed cost per volume published. Run-off costs vary directly with increasing subscriptions but they are a small fraction of the total cost. It would therefore seem possible that by lowering their subscription prices, publishers would increase their sales, thereby returning more money to cover pre-run costs, and the circle could then be reversed.

It has been suggested that despite buyer resistance, enough libraries will purchase physics journals at quite high prices so that no journal with reasonable content is likely to fail from mere lack of subscribers (*10*). Recent advances in library cooperation such as the Center for Research Libraries Expanded Journals Project and the Institute for Scientific Information's Original Article Tear Sheet (OATS) Service may enable individual libraries to so cut back on marginal journal subscriptions that the above statement will no longer hold true and traditional information dissemination patterns may be destroyed.

Most of the efforts to reduce the costs of producing physics journals (with the exception of the page-charge system) have involved advanced technologies. The

use of photo-offset printing has enabled some small specialized journals with very short runs to be produced with more cost-effectiveness. In photo-offset the typewritten manuscript is photographed in its entirety and each manuscript page is printed—by offset process—as one journal page. As an example of a journal published in this manner see *Physical Review Abstracts.*

The most important advance in the last 5 years has been the use of photocomposition (*19*, Appendix D). In this process the text, letter by letter, is exposed to a photographic emulsion until the entire page is composed. This greatly reduces labor costs of composition (pre-run) and in some respects is better able to handle illustrations, charts, graphs, and even equations. The ultimate achievement in printing involves using a computer to set the composition of the entire article. It is hoped that the computer could set an entire page of copy into a cathode-ray tube display screen. While on the screen, the page could then be photocomposed onto the final printing surface, or a microform version could be produced. At the present time only authors, titles, and abstracts have been handled by computer because of their relationship with secondary services.

There exist several other points critical to such a discussion of physics journal literature. The popularity of this medium above all others is based primarily upon two factors. The author of an article needs only to discuss one idea, and the time between conception of the idea and publication of the journal is relatively short. The time-lag between submission of an article and its publication can be anywhere from one month to a year. "Letters" journals, those specializing in brief communications, can, using typewritten photocomposition, publish an article within one month. As an indication of how important speed of publication has become, one should note the rise in both the numbers of titles and pages published in the letters-type of physics journal. It is interesting to note that the same technology which aids in the production of more economical journals will also aid in reducing the publication lag-time. One of the main causes of this lag is the process of refereeing. Articles, when they are submitted for publication, are distributed to outside referees to obtain judgments on the suitability of the articles for publication. This process has been criticized for promoting conservatism and the status quo in physics, but studies have indicated that the process is fair (*21*).

The primary language of physics journal literature is English, accounting for 68% of the entries in *Physics Abstracts*. Using the same source, Russian is second with 17%, German and French each provide 5–7%, and all other languages account for less than 3% of the total. The figures are somewhat different when consulting other secondary sources, but the ranks are approximately the same (*22*).

Finally, a word should be said concerning the specialization of physics journals. From the 1930s to the present, specialization in physics journals has increased until the specialized journal is now predominant. Although the specialized journal suits the needs of some physicists very well, the entire field of physics cannot continue to be so easily and profitably subdivided. The definition of a subdivision or speciality is unique to each researcher. Also, as a journal specializes it loses subscriptions and is forced to raise prices. This has a spiraling effect and can easily

put a journal published by a profit-making organization on an unsteady economic footing. These interdisciplinary and economic effects will probably reverse this trend of specialization in journals during the next few years.

The second most important medium for the publication of primary information in physics is the book. From a historical point of view, the book once served as the major means through which primary information was disseminated. The cornerstones of classical physics were published in the form of books or treatises: Bacon's *Novum Organum,* Copernicus' *De Revolutionibus . . .,* Galileo's *Discorsi . . .* and *Siderius Nuncius,* Newton's *Principia,* and Maxwell's *Treatise on Electricity and Magnetism.*

Today, in terms of primary information sources, the most prominent use of this medium is the area of published conference proceedings. Entries in *Physics Abstracts* reporting papers published in books represent slightly more than 2% of the total number of entries. Per kiloword, the price for books is comparable to that for journals. Circulation is slightly higher, mainly because of sales to conference registrants as well as to libraries.

The time-lag in publication of conference proceedings in book form is longer than that for journals. One year is not considered long, and the publishers of conference proceedings are often the sponsors of the conference and are thus inexperienced, a problem which causes further delays.

English is the predominant language in books by an even greater margin than in journals. The quality of the contents is said to be lower in books due to the lack of refereeing; nevertheless, citation statistics are not unfavorable to papers published in books. Since the type of publication now most frequently found in books is more suited to the journal format, it is suggested that "proceedings, when publication is deemed necessary, be published in a journal of wide circulation rather than as a book" (*10*). Such a proposal could very well spell the end of the book as a medium for communicating primary physics information.

The "report" literature covers a broad spectrum of formal and informal publications, from theses to preprints. Their common point is their informal mode of publication. The most formal of this group are theses. Recently the accession of most American theses has been greatly eased by the University Microfilms Company of Ann Arbor, Michigan (a subsidiary of Xerox, Inc.). University Microfilms takes all theses from subscribing institutions, abstracts them, indexes them (in *Dissertations Abstracts*), and makes them available for purchase in either microfilm or microfilm–hard copy format. Those from other sources (e.g., European), although containing valuable information, suffer from a lack of bibliographic organization and are often overlooked.

Technical reports tend to be characterized by the following: they are often the product of a grant or an industrial effort; they are not usually indexed, abstracted, or otherwise under some form of bibliographic control; they are typically of an applied physics nature. The technical report is discussed in the *Panel Report on the Role of the Technical Report . . . (23).*

The most important form of informal physics publications is the preprint. An

operational definition of a preprint is a single article of primary information published by the author's supporting institution (usually by multilith-offset) and sent out on exchange according to individual mailing lists. Typically, most preprints are later published in formal journals (thus "pre"-prints). These publications are then called reprints. (The reprint must be mentioned because of its confusion with preprint. A reprint is an exact copy of the published article, produced by the publisher. Usually an author receives for his own use and distribution about 50 free reprints of any article he publishes.)

However, the preprint has become a topic of some controversy. On the positive side, the preprint provides inexpensive dissemination of current information to a selected critical group of readers. On the negative side, it completely lacks bibliographic control, thereby making it impossible to document and to cite. Because not all of them are eventually published, there soon develops an archival problem in sorting out from the total that which is unpublished and must be kept. Both sides are equal in argument. A complete discussion of the preprint problem can be found in Libbey and Zaltman (*24*). It is clear that, although under poor bibliographic control, semiformal communications contain valuable information, and according to recommendation C14 of SATCOM (*18*) they should be improved and continued.

One of the most difficult forms of primary information communication to document is oral-personal communication. Oral communication of technical information can be divided into two general areas: formal and informal. Lectures and seminars serve as examples of the former, with letters and conversation as examples of the latter area. Lectures, seminars, and meetings generate primary information in two basic ways. First, the speaker usually discusses new work and ideas which inform his audience. The audience in return, through discussion and comments, brings additional information to the speaker. Active researchers tend to rely on personal conversation when they need immediate discussion on a point critical to their work. The number and value of contacts they have available is usually in direct relationship to their activity in attending meetings. Quantitative studies are difficult, but it has been roughly estimated that in physics the value of all forms of oral communication is equal to the value of primary information from journals (*10*).

The preceding sources and media of primary physics information, to varying degrees, involve interpretations of data. Final sources of information that should be mentioned are the raw data collections of information analysis centers. Most often these centers are supported by a governmental agency and consist of a small group of experts with clerical staff. Their job is to collect from other sources all published data on a specific topic and to then reduce and organize it into a usable form. Table 1 lists some of the information analysis centers closely related to physics. A more complete description of information analysis centers can be found in *Critical Evaluation of Data in the Physical Sciences . . .* (*25*). The use of such centers is viewed with an eye to the future by the Weinberg Report:

> Ultimately we believe the specialized center will become the accepted retailer of information, switching, interpretation and otherwise processing information from the large wholesale depositories and archival journals to the individual user (*26*).

REVIEW LITERATURE

In order to facilitate the orderly progress of science it is necessary to gather periodically all of the recent primary information on a given topic, sift through it, consolidate it, and present it from a critical, unified point of view. The results of such syntheses are referred to as review literature. Because it selects only the best of the primary literature and also because it highlights the critical points in the state of the art, review literature is probably the most efficient form of information publication in the physics literature.

The need for these condensations of the literature becomes even greater as the volume of primary publications increases. Unfortunately the volume of review literature has not risen in step with the primary literature. There are two obvious reasons for this. Researchers, especially active prominent researchers, do not wish to take time away from their research efforts to spend on review writing. It is a sad fact that too much (in terms of funds, prestige, and perhaps in lean years, even jobs) rides on the outcome solely of research. Compounding this reluctance is the amazing growth of the primary literature in the past several decades which has produced such great quantities of literature as to make the writing of review articles almost impossible. As an example, on the topic of "direct nuclear reactions" (a moderate-sized subfield of nuclear physics) a review author working in 1974 would have found over 200 articles listed in the 1973 issues of *Physics Abstracts*. Assuming that review articles could not be published on every topic every year, one can begin to see the magnitude of the problem.

Review literature can actually be divided into three workable groups: review articles, treatises, and compilations. The compilation is the easiest to discuss, since it is a gathering of data from several sources, which is then reduced to common parameters and published in a single source. The compilation usually has only a small written body to describe the methods used to collect and organize the data. Compilations are few in number, but can be found in practically any form, from books, journals, and reports, to computer-readable files. Prime examples of compilations are, first, the journal *Atomic Data and Nuclear Data Tables* and, second, the set of books, *Numerical Data and Functional Relationships in Science and Technology*, commonly referred to by the authors' names: Landolt–Bornstein.

The treatise is the largest single source of all review literature and in itself covers a wide variety of material, from books for the layman, through graduate-level texts, and on up to research-level monographs. Very few of the treatises published attempt to cover comprehensively the literature of their topic. Their treatment is selective, usually following any biases of the author. The topics covered by the treatises also tend to be broader than those covered by review articles. Publication lag-time is often much longer for treatises than review articles, resulting in works that are more obsolete upon final publication. Despite this lag, the average lifetime for a treatise does not differ from the review article and both are significantly longer than the 5-year half-life of primary information. One explanation for this is that there are so few reviews that authors use and cite whatever is available. Judging

TABLE 1

Selected Federally Financed Information Analysis Centers Most Closely Related to Physics[a]

Name of center	Location[b]	Sponsor[b]	Scope (physics part)
Alloy Data Center	NBS	NBS	Structure-insensitive properties of metals and alloys
Applied Science Data Group	LBL	LBL	Neutron and photon cross-section data
Atomic and Molecular Processes Information Center	ORNL	NBS, AEC	Atomic collisions, atom-surface collisions
Atomic Energy Levels Data and Information Center	NBS	NBS	Atomic spectra
Atomic Transition Probabilities Data Center	NBS	NBS, ARPA	Atomic transition probabilities
Berkeley Particle Data Center	LBL	LBL, CERN	Properties of elementary particles and resonant states
Center for Diffusion in Gases	U. Md.	NASA	Gaseous transport data
Charged-Particle Cross-Section Information Center	ORNL	AEC	Charged-particle-induced reaction cross sections
Cryogenic Data Center	NBS, Boulder	NBS, NASA	Low-temperature properties of materials
Crystal Data Center	NBS	NBS, ACA	Crystal structure data
Diatomic Molecule Spectra and Energy Levels	NBS	NBS	Spectra of diatomic molecules
Diffusion in Metals and Alloys Data Center	NBS	NBS	Diffusion in metals and alloys
Electronic Properties Information Center	Hughes	USAF	Electronic, magnetic, and optical properties of solids
High Pressure Data Center	BYU	NBS	High-pressure properties of materials
Infrared Information and Analysis Center	U. Mich.	ONR	Infrared technology
Isotopes Information Center	ORNL	AEC	Production and use of radioisotopes

Soviet Institute for Laboratory Astrophysics Information Center	U. Colo.	NBS, ARPA	Collisions between electrons, photons, ions, atoms, and molecules
Light Scattering Data Center	Clarkson Coll.	NBS	Light scattering in gases and liquids
Low Temperature Specific Heats	NBS	NBS	Heat capacities 0–300°K
Microwave Spectra	NBS	NBS	Microwave absorption spectra of molecules
Nuclear Data Project	ORNL	AEC	Nuclear levels
Photonuclear Data Center	NBS	NBS	Photonuclear cross sections, etc.
Radiation Effects Information Center	Battelle	NASA, DASA	Effects of radiation on materials
Radiation Shielding Information Center	ORNL	AEC, DASA	Shielding of reactors, accelerators, radioisotopes
Research Materials Information Center	ORNL	AEC	Availability, preparation, and electronic properties of high-purity inorganic solids
Shock Wave Data Center	LBL	LBL	Hugonoit curves for chemically classifiable materials
Superconductive Materials Data Center	GE	NBS	Properties of superconducting materials
Thermophysical Properties Research Center	Purdue	NBS, USAF, NASA, NSF, ONR, and industry	Thermodynamic and thermal transport properties of materials and surfaces
X-Ray Attenuation Coefficient Information Center	NBS	NBS	X-Ray attenuation data useful in shielding

[a] Data from COSATI (*10*).

[b] Abbreviations: ACA, American Crystallographic Association; AEC, U.S. Atomic Energy Commission; ARPA, Advanced Research Projects Agency; Battelle, Battelle Memorial Institute; BYU, Brigham Young University; CERN, European Organization for Nuclear Research; DASA, Defense Atomic Support Agency; GE, General Electric Co.; Hughes, Hughes Aircraft Co.; LBL, Lawrence Berkeley Laboratory; NASA, National Aeronautics and Space Administration; NBS, National Bureau of Standards; ORNL, Oak Ridge National Laboratory; U. Colo., University of Colorado; U. Md., University of Maryland; U. Mich., University of Michigan; USAF, United States Air Force.

by surveys of primary literature citations, treatises account for a large proportion of the citations but do not dominate the citations as they do the figures on total review pages written. This may be because the treatises contributing to the latter are not oriented so completely toward the research worker as the review articles are and also because the treatises, taking longer to publish, are less up to date when they appear (*27*).

The third form of review literature, the review article, can be found in journals (review journals, primary journals, society proceedings, and multidisciplinary journals for the general reader) and also books (Annual Review of . . . , and Progress in . . . , conferences, summer schools, and multiauthored books and series). As opposed to the treatise, the review article tends to be much more comprehensive in reporting on the advances as published in the primary literature (treatise, 1.5 citations/kiloword vs review article, 4.0 citations/kiloword), but covers a much narrower topic. The size of review articles varies from several pages to several hundred pages, with the following averages: 25 pages for articles in *Reviews of Modern Physics*, 50 pages for articles in books, and 8–10 pages for articles in nonreview journals.

The publication lag-time is much less for review articles than treatises (usually 6 months) and it is typically 1 year behind the literature when published. The cost of publication of review articles is approximately the same for both books and review journals, but dissemination is greater for articles appearing in the Annual Review-type of series. In general, "the review articles that are the most used are ones that have reasonable thoroughness and are published in fairly obvious and accessible places" (*10*).

Finally, in discussing the review article and its publication, one must mention three important sources. *Handbuch der Physik*, a set of 54 volumes, is the most comprehensive and respected review publication in physics. Topics included are rather broad, and it makes little attempt to be "current." *Reviews of Modern Physics* and *Uspekhi fizicheskikh nauk* (translated into English as *Soviet Physics—Uspekhi*) are the two preeminent review journals in physics, each being more popular in its own country.

SECONDARY SERVICES

The group of abstracting journals, title listings, citation indexes, and subject indexes form the communication resources called the secondary services. They provide the vital organizational link between the seeker of physics information and the archives of published literature. It is helpful to keep in mind when discussing secondary services that the use of such services follows two distinct, but not exclusive, patterns dependent upon the user's needs. The user can be interested in constantly knowing of the most recent advances in his prescribed field. This is known as a *current awareness* service or perhaps as Selective Dissemination of Information (SDI). On the other hand, when the user is interested in knowing the previously published literature in a given area, a *retrospective service* is consulted.

As we shall see, a given publication can provide both current awareness and retrospective services. There have been approximately 70 secondary services identified as covering the entire field of physics, a distinct subfield, or a peripheral area. A listing of these services can be found in Cooper and Terry (*28*). A discussion of secondary services can be divided into what information these services transmit and how this information is (or should) be used by the physics community.

As mentioned, secondary services usually provide one or both of two information searching functions: current awareness or retrospective. The amount and type of information transmitted by the secondary services is a result of this function. Specialization as to current awareness or retrospective service is more emphasized today with computer-aided photocomposition than it has been in the past. Current awareness services are more or less valuable as a function of the time-lag between the publication of an article in, for example, a primary journal, and the announcement of that publication in the current awareness source. Because of this, it is important to include only the most necessary information that will enable the user of the secondary service to identify useful publications. As more information is included, the prepublication editorial work takes longer and increases the publication lag-time, reducing the efficiency of the service. A simple but efficient group of information to be included in a current awareness service is simply author, title, and citation. Concurrently, computer-aided photocomposition of primary journals is most efficiently utilized in the area of the author, title, and citation. The obvious result is that while the computer is "setting" the composition of the author-title-citation for the primary journal, it can simultaneously be creating a current awareness service, with practically no lag-time. The American Institute of Physics, the largest single publisher of physics primary journals, has begun publication of *Current Physics Titles* using this concept. Prime examples of current awareness services in physics are the following:

Current Papers in Physics, Institute of Electrical Engineers, London
Current Physics Titles, American Institute of Physics, New York
Current Contents—Physical and Chemical Sciences, Institute for Scientific Information, Philadelphia
Chemical Titles, American Chemical Society, Columbus, Ohio

Retrospective secondary services have traditionally included more information per listing than current awareness services. The most prominent addition is the abstract. A moment should be taken to mention that the information included in an abstract can differ greatly from one service to another and is dependent upon what type of abstract each service uses: critical, informative, or indicative. The critical abstract is usually written by an authority on the subject, discussing the content of the paper and making critical comments. This is the most expensive, time-consuming method. The informative abstract, written by an editorial abstractor, summarizes the content of the article and is still rather slow and expensive. The indicative abstract only suggests what topics are addressed in the article. It is usually (now almost totally) written by the author of the paper. It is the cheapest, quickest, and

therefore, the most common form. Some services (*Mathematical Reviews* and *Applied Mechanics Reviews*) still use critical reviews, and still others (*Referativnyi zhurnal* and *Physikalische Berichte*) have at least retained signed informative reviews. In general, the newer the secondary service, the more likely it is to use the author's own abstract. The question should arise as to the necessity of even including an abstract at all, especially after it has been stated that the author-title-citation group is a most efficient form of secondary information. The answer is that author-title-citation may be most efficient for current awareness but it is often not sufficient for a retrospective service.

Current awareness services tend to have a higher frequency of publication than retrospective publications. In addition, current awareness services are used as they are published, while a retrospective search is done only periodically. Because of this, a user of a current awareness service has fewer alerts (possible source of information) on which to make a follow-up decision at one time. He can, therefore, be more cavalier about not rejecting a possibility and, indeed, he can take the time to look over the actual publication. The retrospective search builds a great volume of alerts at one time. The user must then make accurate, conservative decisions to quickly and drastically reduce the initial number of alerts. Thus, the retrospective search requires more information from the service, usually in the form of an abstract. In such a highly speculative field as physics, it is crucial to aid the user in reducing to as few as possible the number of alerts he must follow up, or the sheer amount of time necessary for him to complete the literature survey will be overwhelming.

Some secondary services using the above descriptions, which would qualify as retrospective services, have attempted to also serve as current awareness services by two methods: organization and media. Most abstract journals have begun classifying (or having the author classify) each article into one (or several, if necessary) subject classifications. The objective, as stated by the AIP for their *Current Physics Index*, is to have the classifications so detailed that for one issue of 3,000–4,000 entries, each subject division has only about 10 entries and, further, that only about 30% of the entries need be cross-referenced (*19*). If this goal is met, a user has need only to identify his areas of interest to find the entries that may be of some use to him. The only disadvantage in this form of current awareness is the large publication lag-time due to the inclusion of the abstract.

The second method of increasing the current awareness utility of basically retrospective services is to transfer the information onto computer-readable files. Such files typically parallel the information contained in the paper-copy version of the same service. One notable exception is *Chemical Condensates*. This is the magnetic tape version of *Chemical Abstracts*, but, unlike *Chemical Abstracts*, *Chemical Condensates* does not include the body of the abstract. If it did, *Chemical Condensates* tapes for each week would be greater in file size than could be easily handled by most computers and computer programs servicing them—especially in relation to the slight increase in utility. Other bibliographic computer files of importance to physics, and their paper equivalents, are as follows: AIP–SPIN (Searchable Physics

Information Notices) tapes parallel the forthcoming *Current Physics Index;* INSPEC Physics Tapes parallel *Physics Abstracts;* AEC tapes parallel *Nuclear Science Abstracts;* NASA tapes parallel *Scientific and Technical Aerospace Reports* (STAR); and Science Citation Index, which parallels the paper *Science Citation Index*.

The general manner in which such computer-based services are used is by "profile" matching. A profile is a list of key words (words which uniquely describe the subject of interest) which are joined in a pattern by logical connectors (AND, OR, NOT, etc.). The list of words with their necessary and sufficient conditions are then matched character by character against the words (e.g., title–author–citation) appearing on the data base for each article entered. If the correct pattern of key words appears on the data base, the full information for that article is printed out for perusal by the user. Most bibliographic data bases can be categorized according to the type of vocabulary control they utilize, with two extremes being prevalent. Some data bases use a fixed vocabulary where all terms must be selected from an approval list (thesaurus) while most use no vocabulary control, since they rely upon the author's own free text selection of a title and abstract. The latter is much more common in the physical sciences data bases.

A relatively new form of secondary service not yet discussed is the citation service. At present the only published citation index is *Science Citation Index*, published by the Institute for Scientific Information. For those unfamiliar with the citation searching method, the principles, in brief, are as follows: The user locates one or several extremely critical papers in his highly specialized area. The paper could very well be the user's own paper. He then assumes that anyone else writing in his area would also cite that paper. He would then look up in the citation index the critical paper, and listed along with that paper he would find other papers that have cited it. By working backward from a recent paper and all of its references, one can build (by inverse pyramid) a complete bibliography of the subject. For detailed information on citation services see the article "Citation Indexes" in Volume 5 of this encyclopedia. As we briefly mentioned earlier, the *Science Citation Index* also has a computer-readable tape version.

Almost overlooked in discussing secondary services is the common index. Typically, the index covers all information in a relatively few number of journals. Perhaps the only major index of interest in physics is the Wilson publication, *Applied Science and Technology Index*. This index covers the more "popular" journals of science and technology (e.g., *Physics Today, Scientific American,* and *New Scientist*). Each article and news item within a covered journal is assigned one or several subject classifications and the citation to that item appears in the index following the appropriate index headings. It should be noted that *Applied Science and Technology Index* is practically the only secondary source published that refers to articles that can easily be read and understood by laypersons, college undergraduates, and others with marginal knowledge of the sciences.

In discussing the patterns of use of secondary services by physicists, it must be noted that the use of such services is at best minimal. Compilations of various sources published in *Physics in Perspective (10,* Vol. 2, Part B, pp. 1281–1284)

show that although physicists rate the merits of secondary services very high, in fact, in terms of information-gathering methods actually used, secondary services are least important. There are a number of commonly held opinions as to why physicists are reluctant to utilize secondary services. The most often voiced complaint is that the information sought is not taxonomic. The implication of this statement is that it is the nature of physics research, not the failure of a particular indexing or classification scheme, that makes it difficult for the physicist to predict the proper entry for a secondary service literature search. This is probably the greatest problem in the future of physics literature for it has no real solution. If classifications are too broad, they encompass too much material to be scanned. If they are too narrow, the user must choose several classifications to cover his particular information needs and, again, he receives too many alerts. When one finds a physicist who likes a particular secondary service, it is often because his area of interest just happens to be accurately defined by one of the classification terms of that service.

Another reason voiced for the physicist's lack of interest in secondary services is subjective in nature. There is a large minority of physicists who cry that the archives are being overwhelmed with poor or, at best, mediocre papers. A study done by the Physics Survey Committee contradicted the view that "most of the literature is rubbish" (*10*, Vol. 2, Part B, p. 1137). If the size of the primary literature continues to grow as rapidly as it has in the past 20 years, this unfounded notion will continue to grow. The result of such an evaluation of the primary literature is, of course, to assume that the secondary services provide alerts to basically inferior information. It should be pointed out that this feeling is markedly stronger among theoreticians than among experimentalists, experimental articles being more straightforward in content and thus more easily understood by the reader. Physicists who adopt this "inferiority of the literature" position are usually strong believers in the following two notions. The first notion, that of the Invisible College, which is a term coined by Robert Boyle to describe the communication among scientists before the founding of the Royal Society, assumes that personal communication among eminent workers in a given field is so good that each will keep the others informed of the developments in their field. This falsely assumes that researchers not included in their peer group, or work done not in exactly their field, will not be of interest. The second notion (also of an elitist nature) is that the researcher should be able to duplicate any steps along the way to his own research goal. It also assumes that he knows what problems remain to be solved in his speciality. One hears this particular type of researcher complain that literature searches promote "bibliographic research" and actually fill a person's mind with trivial results. Both of the preceding scenarios are simply the results of a large number of physicists frustrated at any attempts to keep abreast of all of the literature in even their own small speciality.

The use of a given secondary service increases as its comprehensiveness increases. Additionally, the use of secondary services in a given subject area increases

if there exists a single predominant source—a "one-stop service" as it were. The existence of *Chemical Abstracts* positively affects the degree to which chemists utilize organized chemical literature systems. Physics, however, is divided among the several previously mentioned secondary services. The publication of *Current Physics Index* by the AIP may exacerbate this problem by adding another secondary source to those existing sources. In addition, the appearance of *Current Physics Index* points out the further uneconomical duplication of effort. The AIP has proposed to sell the indexing and abstracting of its publications to the publishers of other secondary services in physics as it currently does to *Nuclear Science Abstracts*. Unfortunately, at the time of this writing, no agreements have been reached using this most sensible suggestion.

Two other factors affecting the use of secondary sources have already been briefly mentioned. One is the time-lag between the publication of the primary source and its appearance in a secondary service. Although this is often cited as a significant factor in the low rate of utilization of the secondary services, it has never been so great in physics as to have been a major problem. Nor have recent improvements in publishing times (due to the use of computers over the past several years) seemed to have brought any noticeable increase in the utilization of *Physics Abstracts*. An analogy can also be drawn from the review publications to say that users of secondary services are content with what is currently available to them.

Probably a more pertinent factor in low utilization is that of availability. Since increasing size leads to increasing costs, many comprehensive secondary services are now beyond not only the scope of personal subscriptions, but also beyond the range where most libraries can acquire more than one copy. It is a well-known problem from the question of departmental libraries that easy accessibility is a major determinant in the extent to which any information resource is used. Obviously, those secondary services which have a subscription rate within the means of the individual will become the most important secondary service to that user. The American Institute of Physics's primary goal in publishing *Current Physics Index* is to provide a cheap but comprehensive secondary source of its publications to individual researchers. Conversely, an excellent resource from which the user must travel to a single "central" location often remains greatly underutilized. (The extremely high subscription rate is a significant reason why *Science Citation Index* remains sadly neglected.)

Finally, one point should be made on physicists' use of secondary services. Physicists, like other groups, contain members who are highly organized, some who are very unstructured, and all varieties in between. Obviously, it is very easy to design information systems for those users who are more organized, because they also tend to compartmentalize and categorize their work. Builders of information systems should be wary of having user studies biased by inclusions of large numbers of such users. The pitfall is that they tend to have always been heavy users of traditional formal information services and are thus very visible to students and investigators in information science. A surprisingly large number of eminent physicists, because of

their free-wheeling nature, have not fit in well with any secondary information services. But it should not be assumed that they do not have need of information services.

Physics Libraries

INTRODUCTION

On a broad scale the problems and practices of physics libraries are indistinguishable from those of libraries in general. The only significant and unique quality of the "physics library" lies in the definition of its collection. By its very name, it houses the literature of physics and the literature of use to physicists. We have already gone over the place held by physics in the total spectrum of knowledge and research and it is probably correct to say that physics libraries have a similar relationship to all of the information sciences. In their philosophy, the physics libraries—regardless of their particular form—are classified as special libraries. Most commonly (see, for example, Refs. *30* and *31*), special libraries differ from traditional libraries in that special libraries focus on the particular current needs of their well-defined user group, whereas the traditional library builds a collection that could meet the needs of as many different users as possible.

Even within the definition of special libraries there are still two distinct groups of libraries—both groups being numerous. Those libraries which develop in support of a specific program are referred to as "mission-oriented" libraries. The best example of a mission-oriented physics library would be the libraries of the Los Alamos Laboratories. They developed during the early 1940s in response to the single task of building an atomic weapon. The mission-oriented library acquires material in any topic or form as long as the material relates to the organization's specific program.

In opposition to the style of the mission-oriented collection is the "subject-oriented" library. This type of library attempts to maintain a comprehensive collection but in a single, well-defined subject area. Typically, because of the interdisciplinary nature of physics, a strict "suboriented" library is the exception among physics libraries. The Niels Bohr Library of the AIP is, however, a good example of a physics subject-oriented library. It is an archival collection strictly in the area of physics.

This discussion of physics libraries is divided into two sections. The first, library operations, will discuss the management of special libraries, emphasizing particular problems for the physics library. The second section will look at the various forms of physics libraries and will discuss various problems incurred because of their form. However, before physics libraries are broken down into their constituent parts, some brief history of this type of library should be given.

Studies of physics and astronomy began in the ancient civilizations of China, Egypt, and Mesopotamia; and the centers of such learning were usually around a person or group of people who produced, owned, and collected the "literature" of the period. The school of a famous thinker (Aristotle, Plato, Pythagoras) was

synonymous with his collection and, unfortunately for us, the fall of his school often was accompanied by the destruction of that library.

The personal library system was improved upon by the religious orders of the Christian era, whose monasteries and later schools were the centers of literary collections. For the progress of the sciences, the bibliographic works of these religious groups were often repressive and thus many writings from the ancients were lost.

The first truly great development in the history of scientific (physics) libraries was the beginning of the scientific societies. The Royal Society of London assumed that the libraries of each of its members were to be considered among the resources of the whole society and in 1660, 5 years before the first publication of the *Philosophical Transactions*, the Royal Society began to purchase books for a common library. With the rapid growth of colleges and universities, the development of libraries was assured and the great rise of scientific libraries had begun, due essentially to the technological needs created by the industrial revolution.

PHYSICS LIBRARY OPERATIONS

The library operations may be grouped into three broad categories involving the physical plant, the collection, and the staff.

Physical Facilities

The problems centering around the physical plant are few, with one notable exception: the location and size of the library. What is the optimum physical location of the physics library in relation to both the users and the larger library organization? This problem is one of centralization versus decentralization. Physicists have taken this particularly to heart; see, for example, the articles by Wells (*32*), Shera (*33*), and Waldhart and Zweitel (*34*). The issue is whether it is better for the physicist as a user of the physics library to have a rather poor collection of materials in physical proximity to his working area or to have a voluminous, nearly complete collection at a somewhat time-consuming distance away. Since we have spent some time here discussing the fundamental and interdisciplinary nature of physics, one would assume that the more complete the collection, the more useful it would be to the physicist, given reasonable physical distances. This is most emphatically not the case (*35*). The use of a given facility can depend upon distances of as little as hundreds of feet and certainly—in far northern climates—having to go out of doors can create an insurmountable barrier. There have been many examples of a small group of physicists setting up their own tiny library when the official physics library was moved only a short distance away. With such a seemingly strong argument for many small specialized collections one may wonder where the problem lies. The problems are that each small library has a certain irreducible amount of overhead and also that each small library has a group of users who are determined to see that their small library becomes a large library, duplicating other collections and wasting funds. Obviously, compromises must be struck, unique to each situation. The size of the library is governed mostly by the size and extent of the collection and by the work space necessary for the perceived user group.

Other minor points often develop into problems in particular situations. One common area of contest between librarians and users is the availability of the collection, particularly at odd hours of the day, or night. The security of the collection and integrity of circulation procedures must be balanced against the unreasonable demands upon the literature that creative talent can make. In general, the smaller the library, the more homogeneous the user population and thus the more relaxed the use restrictions can be. Also, there is much to be said for the library having the atmosphere of an all-hours meeting place and informal seminar room. If, as *Physics in Perspective* states, "personal oral communication is approximately ⅓ of the physicists information gathering method" (*10*), why not promote the library as the center for that communication?

Other equipment of considerable value to physics libraries is that equipment used to read and reproduce microfilm. Most of the report literature of projects funded by government money is now made available on microfiche by the National Technical Information Service (NTIS), Springfield, Virginia, at a cost substantially below that of the hard copy. Most universities and colleges now contract with University Microfilms of Ann Arbor, Michigan, to handle their dissertations. The dissertations are on microfilm and University Microfilms will, on request, provide either a paper version or a microfilm-to-microfilm copy at a fixed rate. Universities who contract to have University Microfilms handle their dissertations will no longer lend or copy those dissertations themselves. Many publishers of primary journals are developing packages whereby a subscriber, for an extra cost, can also receive the microfilm copy of the entire volume. The cost of the volume on microfilm is comparable with the cost of binding and, obviously, needs less space. Looking into the future, computer output on microfilm (COM) is increasing in popularity both for journal publication and also in the use of secondary sources on computer-readable files (*36*). To end the discussion of microform readers, it must be noted that physicists are no different from other library users in their continuing strong preference for paper copy over microforms.

In physics as in other fields, the one piece of equipment which has now become almost indispensable for library users is the photocopy machine. Questions over photocopy and copyright have not yet been completely resolved and probably face changes due to federal legislation. However, the physicist has his files filled with photocopies of pertinent articles and the photocopy machine has become an integral part of the library.

To conclude this discussion of physical facilities there should be some comment on library layout. As with most scholars, physicists seek secluded spots in which to work. If one has some influence over the design of interior physics library space, it is desirable to break up work areas into small units by using either stacks or physical walls as dividers. It has a positive impact on use and raises the user's opinion of the library as an appealing place in which to work.

The Collection

To many people the library *is* the collection. Functionally, the most important part of the collection is the newest part, so collection development is the library's

most important responsibility. We have discussed the two basic types of physics libraries: mission-oriented and subject-oriented. This division is most noticeable in the manner in which the collection is built. The mission-oriented collection develops in response to the programs it supports and, most often, changes in the program precede changes in the collection. The mission-oriented collection is much more interdisciplinary by nature and can be considered harder to develop because of the lack of unified current bibliographies. Listings of newly published materials are usually available, organized by subject. Thus, to build a mission-oriented—or interdisciplinary—collection, many subject lists must be scanned.

The subject-oriented collection attempts through its comprehensiveness to precede changes or perhaps even initiate changes in the programs it supports. The subject-oriented collection requires less time to develop because it usually does follow the same organizational pattern as most of the current bibliographies. Since the subject areas are usually broad (i.e., all of physics), more critical evaluation of the material selected is done for the subject-oriented collection.

The guides and services used to develop the physics collection (regardless of mission or subject) are numerous but usually related in several groups. The monographic bibliographies of Parke (*37*), Whitford (*38*), and Yates (*39*) are rather outdated but still are useful for both covering all of the subjects considered to be in the scope of physics libraries and also as a listing of the classic treatises and reference works that should appear in most physics libraries. Journals of current bibliography such as *Publisher's Weekly*, *Subject Guide to Forthcoming Books*, and specific quarterly issues of the *Library Journal* announce the availability of newly published books in physics as well as all other subjects. Table 2 lists all of the primary journals in physics which contain as a regular feature either reviews of newly published books or announcements of titles received. Most of these journals are limited to one subfield of physics and their choice of books to review reflects their specialization. Also, most reviews are written by authorities and are signed. Coverage of these reviews as the journals arrive is a solid yet conservative way to develop the physics collection.

Publishers will on request mail out announcements of books both in process and in print from their press. By covering only the major publishers of physics literature, one can be alerted to a significant portion of the available publications. Presently (1977) the major publishers of physics monographs are the following: Addison-Wesley, Academic Press, American Elsevier, Cambridge, University Press, Consultants Bureau (Plenum), Freeman, Harper and Row, MIT Press, North-Holland, Oxford University Press, Prentice-Hall, Pergamon, Plenum, D. Reidel, Springer-Verlag, Van Nostrand, and Wiley. All of these publishers produce yearly catalogs of in-print material and most mail out announcements of forthcoming books. A word of caution about publishers announcements: the publisher will claim that the book is intended or necessary for a wider group of potential users than may actually be the case.

The secondary services are a poor but possible choice as a current bibliography source for monographs. With the exception of *Astronomy and Astrophysics Abstracts*, none of the secondary sources segregates monographs from journal articles either within or in addition to their normal subject groupings. For the librarian with

TABLE 2

Journals Containing Reviews or Announcements of New Physics Books[a]

Title	Book reviews (no./mo.)	Books received (no./mo.)
Journal of the Acoustical Society of America	2	None
Acta Crystallographica A & B	6	Selected issues
Acta Physics	8	None
Acta Physica Austriaca	4	None
Acta Physica Polonica A & B	3	None
Advances in Physics	None	Selected issues
American Journal of Physics	6	21
American Scientist	80	100
Applied Optics	4	None
Applied Physics	5	None
Applied Spectroscopy[b]	7	None
Astrophysical Letters	2	None
Bulletin of the Atomic Scientists	4	None
Contemporary Physics[c]	15	20
General Relativity and Gravitation	Selected issues	None
Giornale di fisica (Italian)	6	None
High Temperature—High Pressures	1	None
Icarus	2	None
Infrared Physics	1	None
Indian Journal of Physics	1	None
International Journal of Mass Spectroscopy and Ion Physics	2	None
International Journal of Theoretical Physics	2	None
Journal of Applied Spectroscopy	1	None
Journal of Atmospheric and Terrestrial Physics	2	None
Journal of College Science Teaching	7	40
Journal of Magnetic Resonance	5	None
Journal of Non-Crystalline Solids	1	None
Journal of Plasma Physics	2	None
Medical Physics	1	7
Nature	8	None
Nuclear Fusion (French, Russian, Spanish)	4	None
Nuclear Instruments and Methods	1	None
Nuclear Science and Engineering	1	None
Nuovo cimento A & B (Italian)	6	Selected issues
Optica Acta	3	None
Optical Spectra	7 (unsigned)	None
Optical Society of America Journal	6	None
Optics and Spectroscopy	4	None
Optik (German)	4	None
Particle Accelerators	Selected issues	None
Physics Bulletin	28	25
Physics Education	4	15
Physics in Canada	2	10
Physics in Technology	10	None
Physics Teacher (2 film loop reviews)	8	20

(continued)

TABLE 2 (Continued)

Title	Book reviews (no./mo.)	Books received (no./mo.)
Physics Today	7	60
Review of Scientific Instruments	Selected issues	6
Science	6	50
Solar Physics	3	None
Soviet Physics Acoustics	1	None
Soviet Physics Journal	2	None
Transport Theory and Statistical Physics	4	None
Zeitschrift angewandte Mathematik und Physik (German)	14	None

[a] Prepared by M. Seymour.
[b] Also contains a list of government publications on spectroscopy.
[c] Also gives scope and level of the book reviewed.

access to Chemical Condensates, INSPEC, and SPIN (the magnetic tape versions of the physics secondary sources), it would be possible to run SDI searches against these tapes, pulling out those citations indicated to be monographs.

In physics and the sciences in general, the most difficult group of materials to acquire in any systematic manner are conference proceedings. If the conference is published by a major publisher (see list above) the problems are the same as for monographs. But conference proceedings very often are published by the agency responsible for the conference—a society, university, or some governmental agency (foreign or domestic). These organizations are not experienced publishers and their problems are predictable. The sponsoring organizations usually publish just enough copies of the proceedings to provide the attendants with a copy and to have a very few left over for sale. The organization does not wish to store extra copies for any long period of time; nor do they understand how to quickly announce the availability of their publication. The result is that by the time most librarians find out about the publication, the sponsoring organization, in order to rid itself of what it sees as minor responsibility and petty overhead, declares the proceedings out of print. One possible solution to this problem is to have such proceedings published in the primary journals where they will receive wide distribution (*10*, pp. 1359–1360).

Blanket acquisitions programs and approval programs are often useful for developing a physics collection. The jobber sends materials to the libraries based upon collections development profiles constructed by the library's bibliographers. Specificity of such profiles can be as broad as "physics" or as detailed as "physics—nuclear physics—nuclear structure." Often, utilizing such programs with the vast system of contacts, such companies can improve a library's chance of obtaining obscure monographs and conference proceedings. Many companies act as jobbers

for blanket and approval programs; prominent among them are Baker and Taylor (U.S.A.), Blackwell's (Great Britain), and Otto Harrasowitz (Federal Republic of Germany).

The most critical and expensive portion of the physics collection is also the most difficult to develop—the journal collection. The problem has always been that given the high and continuing cost of journal subscriptions, which journals must be subscribed to by the physics library and which can be accessed via interlibrary loan, or other network and cooperative programs. The problem is compounded in physics by the habit physicists have of scanning over the current issues of journals to obtain research ideas and to satisfy their information needs.

The publication *Current Contents* (published by ISI, Philadelphia) helps to solve this problem by providing facsimilies of the contents pages from the most prominent physics journals. One could supposedly rely upon the contents published therein to satisfy the current journal browser. However, *Current Contents* has two major shortcomings. First, publication of the contents page of a given journal does not correspond in time to the publication of the actual journal. The difference is unknown and it varies. Second, the two faces of a given page may contain the contents of two distinct journals thereby making it impossible to separate the pages and collect the contents of a single title in a separate place. *Current Contents* is also published in many subject-oriented sections with the journals of physics divided between the Physical Science section and the Engineering Technology section.

Member libraries of the Center for Research Libraries (CRL, Chicago) as of July 1975 are able to request any journal article in the area of science, technology, and social science, and they will receive either the original journal issue on loan or a photocopy of the desired article. Some preliminary results of the CRL program may soon be available describing the services and savings to participating libraries.

The development of a retrospective physics library collection utilizes the usual routes of reprinters, out-of-print book and journal dealers, and microfilm retailers. The development of ongoing collections in physics requires the librarian to become aware of what material is in the process of being published, what major conferences are to be held, and what minimum number of journal titles must be subscribed to in order to meet the programs supported by the library.

Other problems arising in connection with the maintenance of the collection—organization, circulation, security, etc.—are no different in physics libraries than in other types of special libraries and are not detailed here.

The Staff

As previously mentioned, the two factors describing a special library are its specialized collection and its special service to its users. Such specialized services are, of course, the responsibilities of the staff. The size of a physics library staff can vary greatly from a part-time clerical worker to several professional librarians and information scientists. Clericals need only standard business skills. With enough experience and natural ability, the clerical may advance to the level of paraprofes-

sional. The paraprofessional usually has had undergraduate training in either physics, mathematics, or another physical science. What the paraprofessional does not know about the physics of the programs his library supports, he is capable of learning. The paraprofessional may have no formal training in library science but have gained such knowledge through experience.

The professional librarian (or information scientist) holds an advanced degree in library science (usually the M.L.S.). Very often the librarian will hold an undergraduate degree in mathematics or one of the physical sciences, but such a degree is not necessary. The physics librarian must have, however, a good understanding of the structure and use of mathematics, of the philosophy and process of science, and of the relationship of physics to the rest of science. It is perfectly conceivable for a librarian to have such an understanding while having had a liberal arts education. The most desirable quality for a physics librarian to possess is an active imagination. Because of the nontaxonomic nature of physics, the librarian should be able to imagine several different routes through the literature for a given problem.

Professional advancement and development for physics librarians is the same as it is for all special librarians. Advanced degrees may be taken in either physics, a field related to physics (e.g., the history of science), or the library sciences. The largest organizations for the promotion of the profession are the Library Association (LA, Great Britain), the American Library Association (ALA), the Special Library Association (SLA, especially the Physics, Astronomy, and Mathematics Division and the Nuclear Science Division), and the Association of Special Libraries and Information Bureaux (ASLIB, Great Britain). Similar organizations exist in other countries. For their names, see the directory of the International Federation of Library Associations.

As with libraries in general, data on the numbers of physics librarians are not available. Such a detailed survey would not prove to be practical or even possible.

PHYSICS LIBRARY AFFILIATIONS

Physics libraries can be viewed as a part of their parent organizations and, as such, can be divided into four similar groups: academic, archival, industrial, and governmental. Each group is unique either by its collection, its service, or its purpose within its organization. Public libraries usually do not divorce physics libraries from the other sciences and thus are not significant enough to warrant discussion.

Academic Physics Libraries

Academic physics libraries make up a large proportion of the physics literature collections. It is difficult, however, to make exact counts because it is the academic situation in which the problem of centralization versus decentralization is most acute. The purpose of an academic physics library is threefold. First and foremost, it exists to support the research of the physics faculty, their advanced degree stu-

dents, and their research assistants. The second function is to support the graduate education of advanced degree candidates. Its third purpose and least active function is the support of undergraduate education. The ratings of these three functions are due to the methods of traditional physics education which do not stress library research before the undergraduate degree.

Because of the stress on research support, academic physics departments have traditionally insisted upon a departmental physics library (*31*). Academic libraries, in general, tend to view themselves as single, vast repositories for materials of all subjects. Also, most academic libraries must strive to maintain reasonable budgets, thus demanding low overhead and little duplication (*32*). So the battle of library administrator (centralization) versus physicist (decentralization) goes on.

As was mentioned earlier, academic libraries tend to maintain subject-oriented collections. This is both in response to the educational purpose of the academic physics library and also to support the wider and more fluctuating interests of the academic physicist. It has often been mentioned how important the breadth and depth of a decentralized physics collection is to a physics department's ability to attract quality faculty.

The staffing of an academic physics library mostly depends upon the size of the collection. Academic physicists tend to rely upon their library staff for their information needs less than their industrial or governmental counterparts do. The main function of the library staff is to oversee the collection (easily accomplished by a nonprofessional) and to develop the collection. Many academic physics libraries are combined with other collections (e.g., mathematics and/or chemistry) so that duties may be held by a common staff. In an academic subject-oriented collection, services provided by the staff are minimal.

Industrial Physics Libraries

Since most industrial libraries are mission-oriented, it is difficult to describe any as being strictly physics libraries, but one can say that the research of the parent organization is more closely aligned with physics research than that of the other sciences or engineering. The purpose of the industrial physics library is simply to support the research organization to which it belongs. The industrial physics library is usually close to the research area. Time spent by researchers going to and from the library is time and money wasted. Access to the library is usually the same as the hours worked by the research staff.

The collection is strictly dependent upon the research goals of the industry. Very little attempt is made to acquire even a basic physics subject collection. Rather, industrial physics libraries tend to rely heavily upon either interlibrary loan or information networks. In industrial physics libraries the librarian is usually responsible for preparing the complete library budget and presenting it to the head of the research group. The materials and services the librarian desires to be financed are considered research overhead and are counted in the profit/loss statement of the organization. This accounts for the great care in selecting materials and the heavy use of other collections. Often, because time is more important to industry

than are funds, industrial physics libraries are heavy users of the commercial informational retrieval and bibliographic data base services (e.g., SDC and Lockheed).

Archival Physics Libraries

As is implied by their group name, archival physics libraries exist to preserve the records and artifacts of the history of physics. Usually, any contemporary material these libraries collect is acquired as a record of current research for the use of future historians rather than for the use of active researchers. It is most common that archival physics libraries are affiliated with scientific societies. This is usually because the society's own archives form a nucleus around which the larger collection can eventually grow.

The headquarters of the society usually serves two functions: administration of the society, and as a site for the library. Specifically, the library contains the published (and often unpublished) physics literature since the beginning of the society; the records and transactions of the society; writings, correspondence, photographs, and other memorabilia of physicists (both members and nonmembers)—or, if the society is or was wealthy enough, a sizable collection of rare scientific works. The parameters governing the collection of the archives are usually determined by the interests of the society. Those parameters may be by subject (as in the case of the Niels Bohr Library) or geographical (as with the Lunar Society of Birmingham). Archival libraries of societies often receive as gifts the personal libraries of their members.

Such archival physics libraries tend to be staffed by professional librarians, physicists, historians and/or antiquarians. Typically, the director of the library is a historian of physics and the manager of library operations is a professional librarian. Archival physics libraries are few in number but large in size and thus support large and varied staffs. Their budgets come from either their society or from governmental charters, or both. The archival libraries support only valid historical research and usually only within the confines of the physical library—that is, they do not usually engage in interlibrary loan activities.

Governmental Libraries

Governmental libraries are those libraries which exist within governmentally supported research laboratories. These need not be *uni-national*. This group of libraries is the newest type of physics library because the idea of research establishments which are wholly funded by governmental agencies has existed only since the 1940's Manhattan Project. They are located as close as possible to the actual research areas, and with large sites such as the Argonne National Laboratories or Oak Ridge National Laboratories, the libraries are decentralized within the installation. The purpose of such libraries is to support the research undertaken at each particular site, but the sites now tend to be so large and the research so varied that the collections develop more as subject-oriented than mission-oriented collections.

The only unique aspect of the collections of such libraries is that they may con-

tain classified material. Such material takes special handling and the staff must have been subject to security clearances. Services provided are similar to those of industrial physics libraries and relatively large budgets enable those libraries to take advantage of commercial mechanized information services. The budget is usually part of the operating expenses of the laboratory and is submitted to the sponsoring governmental agency(s). The scope of these laboratories is so great in terms of support dollars that even a small percentage (given to library resources) of support tends to be a large figure in actual dollars.

The Future

Traditional physics libraries and literature will, in the near future, face strong organizational problems. At the time of this writing, it seems clear that society is demanding that physics de-emphasize its attack on the fundamental questions of nature and give a concerted effort to solving the more applied problems of our contemporary life. In the United States, for example, governmental funding agencies are reinforcing this attitude with their financial support. In addition, many physicists presently feel that traditional physics is entering a static period and thus work on applied problems is more stimulating. With an increasing emphasis on interdisciplinary research, some reorganization of the literature will be necessary.

Libraries will be forced to either return to the centralized library concept or to increasingly utilize networks in order to anticipate any possible permutation of interdisciplinary studies. Physicists will, we hope, become more sympathetic to use of the information systems made available to them by librarians and information scientists. As can be seen by their chapter on "dissemination and use of information" in *Physics in Perspective* (*10*), the members of the physics community are capable of addressing the critical problems of physics information, but it has yet to be shown that they care enough about their own proposed solutions to demand action from their peers. Information systems continue to be underutilized by physicists.

Physics libraries and literature cannot help but be affected by the projected increase in the use of information systems and library networks. A greater emphasis on machine-readable data bases will cause physicists to receive many more alerts to possible information sources. Most alerts will be references to journal articles—at a time when individual libraries are under economic pressure, and are reducing their journal subscriptions. The ability to reduce subscriptions has come about from the increase in library cooperative efforts and the use of library networks. However, as was previously mentioned, such a decrease in journal subscriptions has a direct and negative impact on the economic health of the journal.

It is felt by most scientific publishers (profit and nonprofit) that serious cooperative efforts by libraries would ruin the traditional system of primary information publishing. Subscription prices have already gotten beyond the point where they can be purchased by individuals and soon will be so high that libraries must re-evaluate their subscriptions.

A dramatic decrease in subscriptions will affect the profit-making publishers first. Without the benefit of page charges, they must maintain a given number of subscriptions to break even. If the profit-making publishers fail, the nonprofit publishers, utilizing page charges, will be forced to carry the burden. Because most page charges are paid through research grant money and most grant money (at least in the United States) comes from federal agencies, there is a fear among nonprofit publishers that too much control could possibly be exerted by government agencies over research publishing. Most nonprofit publishers welcome the profit-making publishers and feel that they are necessary to the general health of primary publications. The next 10 years—considering the growth of information systems, library networks, and the possible development of a comprehensive copyright law—will be critical to the long-range future of physics libraries and literature.

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PICTURE DIVISION, SPECIAL LIBRARIES ASSOCIATION

The Picture Division of the Special Libraries Association was established in 1952.

In the early fifties, librarians working in picture collections, government archives, and commercial picture agencies felt a need to join a professional association in order to establish a body of basic knowledge needed in the field and to lend mutual support to their efforts to arrange and disseminate "picture" knowledge among themselves and their colleagues spread throughout the many different types of picture collections in every part of the United States and Canada.

The Picture Division has 183 members at present. The common interest of these librarians and other professionals in the picture field is the picture format. The subject content of these pictures covers every aspect of human knowledge: art and architectural history, anthropology and the history of medicine, banking and military history, numismatics and ecology, United States history and iconography, development of the Third World and space exploration.

The Picture Division publishes a quarterly newsletter, *Picturescope.* This publication includes news from the two Picture Groups (New York Chapter and Washington, D.C. Chapter), descriptions of picture collections in different cities, articles on the preservation and handling of prints and photographs, and news of publications devoted to printmaking, photography, art exhibitions, or any related subjects of interest to picture researchers. Picture Division members are encouraged to use this newsletter as a forum for their concerns.

The Picture Division joined the American Society of Picture Professionals in sponsoring the publication of *Picture Sources 3* in 1975. This directory lists over 1,000 picture collections in the United States and Canada. The Picture Division hopes to continue to publish this important directory at regular intervals because it is the primary reference tool for many picture searches which encompass collections in many different locations.

In 1973 the Special Libraries Association published a guide to the techniques and tools of picture work: *Picture Searching,* by Renata V. Shaw.

The "Annual Directory Issue" of *Special Libraries* lists division members alphabetically under Picture Division as well as under their personal names and professional affiliations. This directory is a useful tool in contacting special librarians in different types of libraries.

The officers of the Picture Division consist of an annually elected chairman, chairman-elect, and secretary-treasurer. The three immediate past chairmen serve as directors of the division. The Picture Division chairman appoints a membership chairman, a public relations chairman, and three members for the nominating committee.

The New York Picture Group and the Washington Picture Group also elect a local chairman, a chairman-elect, and a secretary-treasurer. The Washington Group has a public relations and hospitality chairman.

The two local Picture Groups offer many activities to their members. The Washington Group makes a point of visiting from six to eight different picture collections yearly. These collections range from government agencies to historical societies, and from art museums to local newspaper "morgues." Programs consist of a short presentation by a picture specialist and a chance for a personal acquaintanceship with the files and finding aids of the collection visited.

Picture Division members participate in the programs of the annual conference of the Special Libraries Association. Visits to art galleries and museums are often shared with members of the Museums, Arts and Humanities Division, who share many of the interests of picture librarians. The small size of the Picture Division encourages active participation and close communication among members.

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PIERPONT MORGAN LIBRARY

The Pierpont Morgan Library at 29 East 36th Street in New York City had its beginnings in the private collection of the international banker J. Pierpont Morgan (1837–1913). He is generally regarded as America's greatest collector of art, history, and literature. At his death, the manuscripts, books, letters, and drawings that constituted his library accounted for only about one-eighth of the value of his vast collections, about which he said in his will: "It has been my desire and

intention to make some suitable disposition of [them] . . . which would render them permanently available for the instruction and pleasure of the American people." Although the library passed by inheritance to his son J. P. Morgan (1867–1943), the latter carried out his father's wishes in 1924 by transferring it to a Board of Trustees with a maintenance endowment, and soon afterward it was incorporated by a special act of the New York State Legislature as a public reference library.

The founder's concern with literature and history on the one hand, and with art on the other, has resulted in the library's being partly a museum and partly a research library. It is a treasury of the cultures from which our nation has developed. Its collections are unsurpassed in the Western Hemisphere in the fields of Medieval and Renaissance Illuminated Manuscripts, Master Drawings, Early Printed Books, and Bookbindings. The library also has outstanding collections of ancient written records (seals, tablets, and papyri), autograph manuscripts and letters (both European and American), and musical manuscripts. In general, the library owes its distinction to its unconventional fields of concentration, and to the exceedingly high percentage of its holdings that are unique and therefore basic to scholarly research. The use of the collections is restricted to qualified and accredited scholars, and no original material is permitted to leave the library except for loans to exhibitions approved by the trustees.

In the 50 years since the Pierpont Morgan Library's establishment as a public institution, its collections have continued to grow, in recent decades largely through the generosity of people who have responded to the special quality of the library, and who recognize that, although it is a New York institution, it has no real limits of city, or country, or century. Its services to scholars and the visiting public have steadily increased. From very modest beginnings, the exhibition program has expanded to the presentation of four major exhibitions and seven or eight smaller ones each year, most of them drawn in whole or in major part from the library's own collections, but including also loan exhibitions from public and private collections on both sides of the Atlantic. The establishment of an intramural conservation department and a bindery, both staffed by experts, has done much to preserve material which is often fragile, and is subject to the hazards of handling and (despite climatization control) to some atmospheric pollution. A publications program, which may be said to have been initiated by the catalogs of his holdings privately printed by Pierpont Morgan, continues to provide information on the resources of the library, and to perpetuate the record of many of its major exhibitions. Photographic services, provided by a well-equipped department, make the collections readily accessible for scholarly use and publication.

The original library building, designed by the noted architectural firm of McKim, Mead and White, was constructed on property along 36th Street adjacent to Pierpont Morgan's house on the corner of Madison Avenue, and was completed in 1906. McKim created a Renaissance palazzo, with a grandiose interior flawless in every detail. This building and its interior decoration (including many of the founder's favorite works of art) have been carefully preserved. Francis H. Taylor called it "one of the Seven Wonders of the Edwardian world" and the architectural historian Wayne Andrews said that it reveals "all that an architect might accomplish

FIGURE 1. *The East Room of the Pierpont Morgan Library. Reproduced with the permission of the Trustees of the Pierpont Morgan Library.*

in the Age of Elegance." It has been designated a National Historic Landmark by the secretary of the interior, and a New York City Landmark by the municipality. The Morgan Library is a treasure house which must itself be treasured (see Figures 1 and 2).

After "Mr. Morgan's Library," as it was known originally, was dedicated to public use in 1924, it soon became apparent that the original building was inadequate for the library's new role. In 1928 J. P. Morgan constructed a large annex on the site of his father's house, more than doubling the size of the library, and providing an exhibition hall, a reading room, staff quarters, and ample shelf space for the rapidly growing collection of reference books. In time, an addition to the annex became necessary. Completed in 1962, this provided private office-study rooms for the curators; a new and enlarged Print Room for the collection of drawings and Rembrandt prints and the relevant reference works; a Meeting Room seating 200 for lectures, concerts, official dinners, and meetings of cultural organizations; a bindery; a conservation laboratory; a sales desk area; and additional stack space. A total of more than $3 million was raised to pay for this addition and to provide for a substantial increase in the endowment; these funds were provided by 665 individual donors and foundations. A second addition to the annex was completed in 1977.

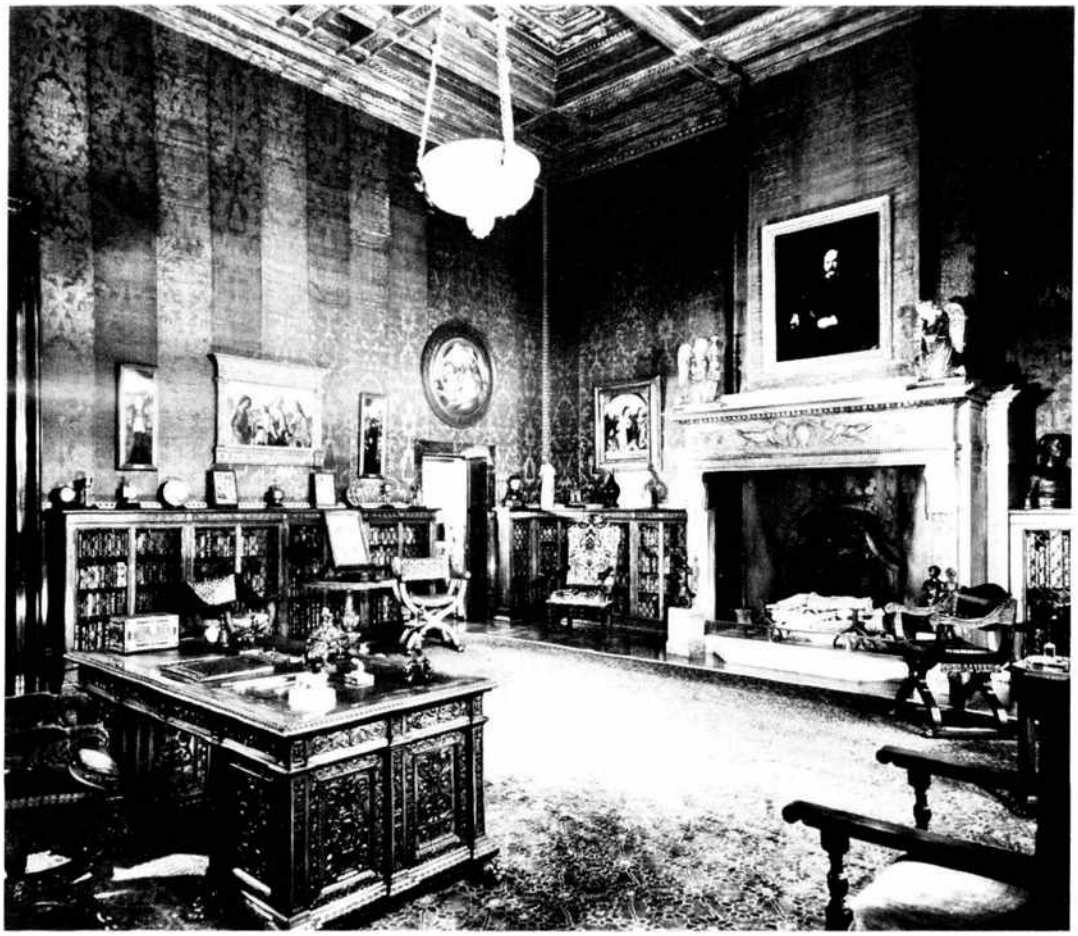

FIGURE 2. *The West Room (Morgan's study) of the Pierpont Morgan Library. Reproduced with the permission of the Trustees of the Pierpont Morgan Library.*

The Morgan collection began modestly enough with the enthusiasm of a schoolboy for autographs. In Pierpont Morgan's diary, the following entry appears under the date of August 4, 1851: "Received letter from Pres. Fillmore." The communication was a little, orange card inscribed with Fillmore's signature, enclosed in an envelope personally franked by the president. The 14-year-old collector thus acquired two presidential signatures in answer to his request for one. These are still in the library, now surrounded by many hundreds of letters and documents of the first 34 presidents.

The collection grew but slowly during the first 50 years of Pierpont Morgan's life. A catalog of his books and manuscripts compiled by Joseph F. Sabin in 1883 contains only a few nuggets, though these include (characteristically) a set of autograph letters and documents of the signers of the Declaration of Independence, a long letter from Robert Burns incorporating the texts of three poems, and the first Bible printed in North America. Pierpont's father, Junius, was also a collector, and by this time owned a superb, six-page George Washington letter of 1788 expressing his hopes for the new nation, and the original manuscript of Sir Walter Scott's *Guy*

Mannering, bought at auction against Ruskin's agent. These and other early acquisitions by father and son are in the library today.

It was not until after Junius Morgan's death in a carriage accident on the Riviera in 1890 that Pierpont began to buy in earnest and on a princely scale. He was both aided and stimulated by his nephew, another Junius Morgan, who was a passionate connoisseur of books, prints, and manuscripts. During the final decade of the 19th century, Pierpont Morgan made such notable individual purchases as a Gutenberg Bible on vellum, the 1459 Mainz Psalter, the famous ninth-century Lindau Gospels with its sumptuous, jeweled binding, the four Shakespeare Folios, and the original autograph manuscripts of Keats's *Endymion* and Dickens's *A Christmas Carol,* not to mention the Byron manuscripts which the poet had given to his mistress, Countess Guiccioli. He also began to buy collections en bloc, when he was convinced of the general excellence and appropriateness of the contents. In 1899 he acquired the choice George B. de Forest collection of French literature and, from James Toovey, a fine run of Aldine imprints and a superior group of tooled leather bindings. In the following year, he purchased the best part of the library formed by Theodore Irwin of Oswego, New York, which included the Duke of Hamilton's famous "Golden Gospels," a French manuscript Apocalypse that had belonged to the Duc de Berry, and an admirably chosen group of 270 Rembrandt etchings.

Two years later came the collection of Richard Bennett of Manchester, rich in illuminated manuscripts and early printed books, which incorporated a large part of the medieval library of William Morris. By 1905 Pierpont Morgan had purchased from English sources alone some 700 incunabula, among them 40 from the press of William Caxton, which formed the nucleus of the great Morgan collection of Caxtons. While such major acquisitions were being made, Pierpont Morgan was also buying first editions of his favorite English and French authors, the manuscripts of nine more Waverley Novels to set beside his father's *Guy Mannering,* and quantities of autograph letters and historical documents, such as the incomparable collection of letters of the kings and queens of England assembled by Sir John Fenn in the latter part of the 18th century.

In 1906, having assembled his books and manuscripts in his new library building and made them accessible for consultation, Pierpont Morgan seemed more than ever inspired to increase the quality and density of his collection, in the special areas which had all along aroused his enthusiasm. In this consolidation and growth, he was skillfully aided by the brilliant young librarian recommended by his nephew Junius, Miss Belle Da Costa Greene, whose only previous training had been as a cataloger in the library at Princeton University. She continued as librarian and later as director for 43 years, presiding with wit and acumen over the growth of the collections, the activities of the staff, and the conversion of the library from private collection to national asset. Upon her retirement in 1948, she was succeeded as director by Frederick B. Adams, Jr., who was in turn succeeded in 1969 by Charles Ryskamp.

During the 7 years of his life remaining after the completion of the McKim building, Pierpont Morgan was more interested in filling gaps than in making group

purchases. The Parisian bookseller Rahir tempted him successfully in 1907 with 50 exceptional bookbindings; Lord Amherst's Caxtons were swept up by Miss Greene just before they were scheduled to be sold at auction; the extensive Stephen H. Wakeman collection of American 19th-century literary manuscripts, especially rich in Poe, Hawthorne, and Thoreau, was purchased through George Hellman in 1909; a large group of Coptic manuscripts (mostly of the ninth century) found on the site of a monastery at Hamouli was purchased in 1911, which proved equally remarkable for texts, miniatures, and original decorated leather bindings; and, after several years of hesitation, the collection of master drawings formed by C. Fairfax Murray was acquired from him in 1910, this single coup making the library's drawings the most important collection in America.

In this same fertile period, large numbers of illuminated manuscripts, incunabula, and autographs were acquired, some at the great Hoe and Huth sales, others from dealers or by private treaty. Notable among the latter was the Gospels of Countess Matilda of Tuscany, written and incompletely decorated in Italy about 1100; this was the library's first acquisition from the vast manuscript hoard of Sir Thomas Phillipps, the continuing source of many of its finest purchases. Other individual prizes included a perfect Gutenberg Bible on paper; the only surviving complete copy of the first edition of Malory's *Morte d'Arthur* printed by Caxton; holograph manuscripts of Pope, Burns, Scott, Dickens, Thackeray, Zola, Meredith, Ruskin, and Mark Twain (to name only a few); the earliest manuscript of Aesop's *Life and Fables* in Greek; and the library's finest Persian manuscript, a bestiary of the late 13th century that is the earliest surviving example of the art of the Persian Mongol school.

Fortunately for the future of the library, J. P. Morgan had always loved and understood its collections better than his father's other acquisitions. He had given his father the manuscript of Thackeray's *Vanity Fair*, and when the manuscript of *The Rose and the Ring*, with the author's own delightful illustrations, became available in 1915, it proved irresistible. The extent of his interest in illuminated manuscripts did not become clear until the following year, when he acquired from the Phillipps heirs the famous French 13th-century "Old Testament Illustrations," a volume which had once belonged to Shah Abbas the Great, King of Persia (see Figure 3). This was followed shortly after the end of the First World War by the purchase at the H. Yates Thompson sale of six exceptional manuscripts, including a sumptuous Greek Gospel Lectionary of the 11th century and a Spanish Apocalypse dated 926, majestic in size, profusely illustrated with vivid miniatures transformed from a late classical prototype. In 1920 the Phillipps collection yielded up the 10th-century Greek illuminated manuscript of Dioscorides, *De Materia Medica*, which is the cornerstone of the library's fine botanical collection.

Two other never-to-be-repeated opportunities occurred during the 1920s, and the prizes were carried off by J. P. Morgan. The Earl of Leicester agreed to sell him the four superb manuscripts that had been "liberated" during the Napoleonic Wars from the Benedictine monastery at Weingarten in southern Germany. Two of these were richly illuminated and bound Gospel-books made in England before the

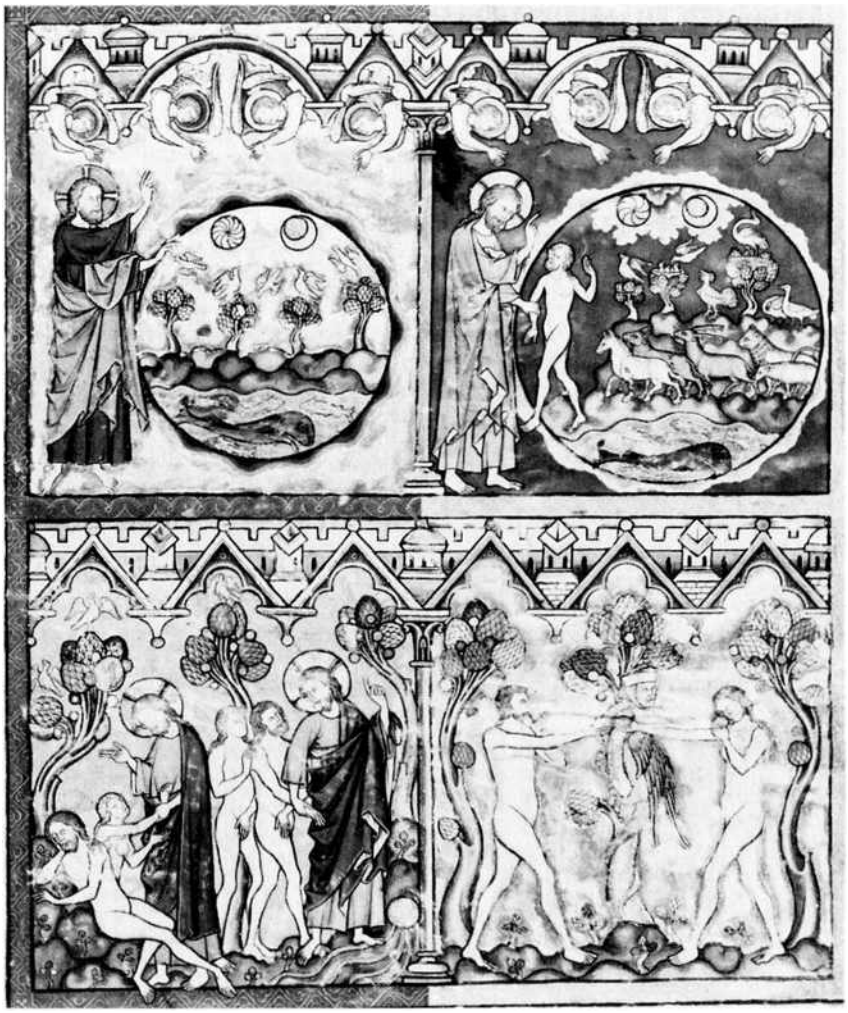

FIGURE 3. *The creation of Adam and Eve, from a volume of Old Testament Illustrations (13th century, French). Reproduced with the permission of the Trustees of the Pierpont Morgan Library.*

Norman Conquest and owned by Countess Judith of Flanders, the sister-in-law of both William the Conqueror and his opponent King Harold; a third, still in its resplendent, jeweled, silver-gilt binding, was the Missal of Abbot Berthold, considered by many to be the finest surviving 13th-century German manuscript. The second opportunity came when the trustees of the estate of Lt. Col. Sir George Holford offered to sell privately the six finest manuscripts in his collection. These included a ninth-century Reims Gospels in pristine condition, with portraits of the four Evangelists, and the entire text written in gold; a profusely decorated Gothic Psalter made for Yolande de Soissons; and a 12th-century *Life, Miracles and Passion of St. Edmund* with 32 miniatures, one of the two earliest known cycles of pictures illustrating the life of an English saint. This, and not a few other manuscripts bought by the two Morgans, would now be classified as national treasures and therefore nonexportable.

J. P. Morgan purchased about half as many incunabula as his father had before him, bringing the total to nearly 2,000. Among these were the two earliest editions (Rome, 1493) of Columbus's account of his epochal voyage of discovery, an indulgence printed by Gutenberg in 1455, and several Caxtons, four of them unique. In the acquisition of author's manuscripts and letters, he was considerably less active than his father, but among his notable purchases were the manuscripts of Scott's *The Antiquary* and Balzac's *Eugénie Grandet,* and 173 autograph letters from Thomas Jefferson to his daughter Martha. Most fascinating of all was the Codex Huygens, a treatise on art theory by a follower of Leonardo da Vinci, preserving some of the lost designs of the master.

J. P. Morgan died in the midst of World War II. Postwar inflation, which depreciated the buying power of the endowment income, and taxes, which cut heavily into the capital inheritance and annual income of his heirs, combined to present a gloomy forecast for the library's future development. A collection of coins and medals belonging to the library but on loan elsewhere was gradually sold to public and private buyers, and this made it possible to resume buying manuscripts and drawings. Of greater long-term importance was the formation, late in 1949, of the association of "Fellows of the Pierpont Morgan Library," with the purpose of providing funds for exceptional acquisitions and encouraging the use of the collections. This association, which has always numbered 20 Honorary Fellows among its membership, has been of inestimable assistance to the library; without its help, the collections would have had to remain virtually static. In 1974 the Morgan Library celebrated a double anniversary: its 50th as a public institution and the 25th of the Association of Fellows, which had grown to number 600 members. In that admittedly exceptional year, the cash contributions from the Fellows amounted to over $575,000, and their gifts in kind to the collections were valued at over $1,000,000.

Since 1949, therefore, the library has been able to add steadily to its collections, without departing from the principles of selectivity set by the founders. Among the illuminated manuscripts acquired in this quarter-century are two ninth-century Gospels, one from the school of Tours, the other from St. Amand, and both purchased from Mrs. Chester Beatty; the Gospels of the Church of St. Severin in Cologne, an Anglo-Saxon manuscript of about the year 1000, decorated with spirited pen drawings in colored inks, from the library of the Duke d'Arenberg; a richly illuminated 13th-century Missal made for the monastery of Seitenstetten in Austria, another Beatty manuscript; from the library of the Duke of Coburg and Gotha, a monumental Bohemian Bible, dated 1391, illustrated with 87 large pictorial initials painted in the court atelier in Prague of King Wenceslaus; and several 15th-century Books of Hours. Five of these are oustanding: One comes from the atelier of the famous French artist, Jean Fouquet; a second was illuminated in Spain, predominantly in black, gray, and gold, by a Flemish artist for Don Alfonso of Castile; a third, conceived in the grand manner, was made in England for the Duke of Warwick; a fourth, of great delicacy, is the surviving masterpiece of Michelino da Besozzo; and the fifth, the now justly celebrated Hours of Catherine of Cleves, in two volumes finally reunited after a century of separation, has earned a distin-

FIGURE 4. *A page from* The Hours of Catherine of Cleves *(illuminated manuscript, ca. 1435, Dutch). Reproduced with the permission of the Trustees of the Pierpont Morgan Library.*

guished place in the history of art (see Figure 4). Another fine manuscript acquisition of this period was the enormous Gradual in two volumes written for the church of St. Lorenz in Nuremberg, 1507–1510, and illuminated by Dürer's contemporary, Jacob Elsner, which was given to the library by the Kress Foundation.

During this recent period, the Morgan Library has acquired a number of early manuscripts without miniatures: a ninth-century Pliny *Natural History;* the oldest and most complete copy known of the *Fables* of Phaedrus; the Tegrimi *Computus,* a north Italian scientific compilation of about 1020; and several chronicles and romances of special textual interest.

In 1963, following the sudden death of William S. Glazier, a trustee and devoted benefactor of the library, it received on deposit his collection of medieval and Renaissance manuscripts, the finest private collection in this field in the United States. In the same year, the library of Dannie N. Heineman, principally German and French literature, science, and music, with a few illuminated manuscripts, was received on deposit from the Heineman Foundation. Both these collections enjoy the same care, and are available to scholars and for exhibition on the same basis as the library's own resources and are supported, respectively, by the Glazier and Heineman Foundations.

Purchases for the library's incunabula collection continue to be selective, concentrating on books individually important in the development of the art of printing and its diffusion, and on books notable for their texts and illustrations, in the finest obtainable examples. The most controversial volume added since 1949 is the so-called Missale Speciale, one of four copies known, a book which some believe was printed by Gutenberg about 1450 (predating the Bible), while others hold that it cannot have been produced before 1472. Printings by Caxton and Wynkyn de Worde, first and early editions of Greek and Latin classics, and illustrated books of legends and romances are among the volumes added to existing strengths, sometimes with the aid of a purchase fund established by Dr. and Mrs. Lathrop Colgate Harper.

While the Morgan Library does not have sufficient space to add extensively to its holdings of about 60,000 later-printed books, it has been happy to receive Miss Elisabeth Ball's collection of children's literature with a purchase fund established by the donor, the William Blake collection of Mrs. Landon K. Thorne, the Van Antwerp collection of Sir Walter Scott, and the Marrot collection of John Galsworthy. The renowned collection of Gilbert and Sullivan formed by Reginald Allen is being transferred by him to the library year by year, and to this the library has added the papers of Sir Arthur Sullivan and several manuscript scores and librettos of the Savoy Operas.

The library has greatly expanded its holdings of autograph letters of writers and artists, often of persons not heretofore represented in the collection. In other cases, the library has added to strength, notably some 350 Voltaire letters, an equal number of Coleridge letters, some 750 letters of Charles Dickens, and about 2,000 from Ruskin, his wife, and their families.

There has been less activity in acquiring original literary manuscripts, but recent accessions have included Sir Philip Sidney's draft of his *Defence of the Earl of Leicester*, the most important surviving Sidney holograph; the dedication manuscript of Perrault's *Tales of Mother Goose* (1695) (see Figure 5); the one volume of Thoreau's Journal that had been missing for half a century from the series, the other 38 volumes having been purchased by Pierpont Morgan from Wakeman in the author's original pine chest; Hawthorne's *Tanglewood Tales*; the working manuscript (with drawings) of Saint-Exupéry's *Le Petit Prince*; the manuscript of his best volume of short stories, *Ah King*, presented by W. Somerset Maugham; and a number of journals and manuscripts of John Steinbeck, presented by the author.

FIGURE 5. *Frontispiece from the dedication manuscript of Charles Perrault,* Contes de ma mère l'oye. *Reproduced with the permission of the Trustees of the Pierpont Morgan Library.*

In 1968 the Mary Flagler Cary Music Collection, mainly of holograph scores and letters of composers and musicians, was deeded to the library by the trustees of her Charitable Trust. This was the foremost private collection in America, and it has been considerably enriched each year through funds provided by the Mary Flagler Cary Trustees. The originally modest holdings of the library have also been expanded by gifts from Robert O. Lehman of manuscripts by the leading French composers of the 19th century. These, with the autograph scores deposited in the Heineman Collection, make the concentration of musical manuscripts in the Morgan Library second in America only to that in the Library of Congress.

The supremacy of the Morgan collection of tooled bookbindings was maintained during this period by the acquisition of more than a hundred examples, ranging in date from the beginning of the 15th century to the 20th. The principal fields of concentration were French, English, and Italian bindings of the 16th and 17th centuries, and Irish and Scottish bindings of the 18th century, but there are also unusual examples from Spain, Bohemia, Denmark, Hungary, Mexico, and the United States. In H. M. Nixon's *Sixteenth-Century Gold-Tooled Bookbindings in the Pierpont Morgan Library* (New York, 1971), approximately one-quarter of the bindings illustrated had been acquired since 1949.

A strong revival of activity in the field of master drawings was inaugurated auspiciously in 1949 with the exhibition of more than 100 drawings by Piranesi from the collection of Mrs. J. P. Morgan, subsequently presented to the library by her sons. From the same collection and in the same manner came several other important groups of architectural and botanical drawings and books. The first major purchases of this new phase of expansion were 12 watercolor designs by Blake for Milton's *L'Allegro* and *Il Penseroso,* and a *Mountain Landscape* of monumental grandeur by Pieter Bruegel the Elder. These were followed by many hundreds of drawings, sketchbooks, and albums, by Italian, French, Spanish, German, Dutch, Flemish, and British artists. There are outstanding sheets by Filippino Lippi, Signorelli, Fra Bartolomeo, Pontormo, Vasari, Tintoretto, Annibale Carracci, Reni, Guardi, and the Tiepolos among the Italians; Bellange, Claude, Natoire, Boucher, Fragonard, Gabriel de St. Aubin, Hubert Robert, and Prud'hon among the French; Dürer, Rubens, Goltzius, Jacob van Ruisdael, and van Gogh among Northern European draughtsmen; and Fuseli, Gainsborough, Lawrence, Samuel Palmer, and Ruskin among the British. An album of 201 drawings for book illustration by Piazzetta and his atelier presented by the Kress Foundation and a group of 267 drawings by the Anglo-American Benjamin West and his son Raphael have made the Morgan Library's holdings of these artists exceptional. Among major acquisitions in progress are the Janos Scholz collection of about 1,500 Italian drawings before 1800, and the choice collection of Mr. and Mrs. Eugene V. Thaw, which these donors have begun to transfer to the library. In general, the Morgan collection, concentrating on artists born before 1800, continues to be, as it began, the peer of any in America.

The library has been particularly fortunate in the ongoing enthusiasm, guidance, and generosity of the children and grandchildren of J. P. Morgan, many of whom have served and are serving on the Board of Trustees. Of these, the library owes most to Henry S. Morgan, who gave from his own collection the single most valuable printed book acquired during the past quarter-century, a splendid set of Audubon's Elephant Folio *Birds of America.*

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FREDERICK B. ADAMS, JR.

THE PIPE ROLL SOCIETY

The Pipe Roll Society was founded in London in 1883 by a group of eminent English historians interested in royal administration in the 12th century, and more particularly in its financial aspects. According to its original set of rules, the primary object of the society was the publication of the Pipe Rolls of the reign of Henry II, but all national manuscripts of a date prior to the year 1200 were to be dealt with in order of their importance. The society issued its first volume in 1884 and by 1915 had completed its first objective and had published all those financial accounts, known as Pipe Rolls, of the time of Henry II. By that date the importance of the work was widely recognized and the terminal date was extended, first to the end of the reign of King John (1216) and later to 1250. The society is now issuing volumes for the early years of Henry III.

Meanwhile, under the general coverage of national manuscripts the society undertook the publication of Ancient Charters, rolls of the court of Richard I for 1194–1195, and early final concords. The scope has recently been widened still further to include important collections held outside the Public Record Office, such as the Worcester Cartulary, published in 1968, and the first part of the Norwich Cathedral Charters, published in 1975.

The early volumes contained a preface rather than an introduction to the material being edited. The introduction proper, initiated by F. W. Maitland and at first extremely brief, has now become an important part of the volume. The editors have included such important historians as J. H. Round, V. H. Galbraith, J. C. Holt, and, above all, Lady Stenton. She became secretary of the society in December 1923 and general editor within a matter of months, and it was she who not only found scholars prepared to transcribe and edit Pipe Rolls and final concords but herself edited no fewer than 17 volumes. She gave up the editorship in 1961, and the following year the society paid tribute to her work by issuing *An Early Medieval Miscellany* "for her pleasure."

The society issued 38 volumes of the original series, almost all of them editions of Pipe Rolls of the reign of Henry II. The New Series began with the Pipe Rolls of Richard I. Forty volumes have been published. They include all the extant Pipe

Rolls of the reigns of Richard I and John, and those for the second and fourteenth years of Henry III. They also include Feet of Fines for Norfolk, Suffolk, and Lincolnshire; *Cartae Antiquae;* the Herefordshire Domesday; and Interdict Documents of the reign of John. The last four volumes to be published are:

N.S. 37: Pipe Roll 17 John and Praestita Roll 14–18 John
N.S. 38: The Worcester Cartulary
N.S. 39: Pipe Roll for 2 Henry III
N.S. 40: Norwich Cathedral Charters, Part I

Membership in the Pipe Roll Society has always been open to interested scholars and to libraries. Institutional members include university and college libraries both in England and abroad, and the private membership of the society has always included the leading medieval scholars of the time.

BARBARA DODWELL

PIRACY

This colorful term, in the book industry, is used to mean the unauthorized publication of works. It differs from plagiarism in that the original author may be given credit for the intellectual content, although he almost never benefits from the publication. It is easy to think of piracy as a 19th-century phenomenon—Charles Dickens fought to have copyright laws made international in scope—but the problems of piracy are as much prevalent today as earlier, perhaps more so. Piracy is not always illegal, although it is always unethical. It has been practiced on so extensive a scale as to endanger a book industry, and even the slightest incident is regarded with horror by publishers. Librarians may be victimized as well through common practices of piracy.

The least excusable form of piracy is the publication in a country of works originally published elsewhere. Infringement of copyright can be punished and restitution forced only within countries where laws provide for the enforcement of copyright statutes. If international agreements do not recognize copyright elsewhere, a country may, in effect, foster piracy, almost always to the detriment of the publishing industry everywhere, even in the country where the practice is prevalent. Such was the case in the United States during the early period of copyright laws, when copyright was registered with the clerk of the local district court. Dickens wrote very popular novels, copyrighted in England but with a large readership in the United States. Each was republished without any provision of royalty payments to Charles Dickens. The revision of the copyright statutes was combined with protection of the printing industry, so that only books printed in the United States could be copyrighted. The Berne Convention, signed by most of the developed countries of the world in 1911, was never ratified in the United States. In its stead,

the United States proposed the Universal Copyright Convention, which is far from being universal and still protects local printing industries.

Works published in the United States may be translated and republished in other countries, particularly the U.S.S.R., with no credit given the original publisher and often little credit given the original author. (An example would be Maurice F. Tauber's book *Technical Services in Libraries.*) To combat this practice in developing countries, Franklin Books Program was founded. In the more than 20 years of their existence, the book industries of Iran, Lebanon, and Egypt have been greatly aided by having fully authorized translations prepared and published locally on the basis of agreements made with American publishers. A developing book industry chiefly requires material in the local language, and this often means translations rather than original works. The success of the Iranian book publishing industry can largely be credited to the favor of the Imperial government coinciding with the efforts of Franklin Books Program and its representative in Iran. Under the rules of the organization, the local representative of Franklin is always a national of the country, a bit of foresight that accounts for the success of Franklin as compared with the inconsequential efforts of the United States Information Service.

From a librarian's point of view, republication of a work, although in the public domain, without acknowledgment of the original publication is unethical and highly confusing from a bibliographic point of view, although not at all illegal. The Olympia Press in Paris published many important literary works along with some valueless erotica because the books were considered obscene in the United States and Great Britain at the time. This is the reason that Vladimir Nabokov's novel *Lolita* was first published by the Olympia Press. No British or American publisher would take the risk of running afoul of censorship provisions enforced against publishers who violated accepted canons concerning erotica. When *Lolita* was published in the United States, agreements were made with the author, but Maurice Girodias failed to obtain what he considered just recompense as the original publisher. A suit failed to justify his claims and subsequently all of the titles in his list were republished without his permission. Some of these, such as novels by Henry Miller, brought the wrath of the censors down upon the publishers in the United States, particularly Grove Press. The efforts of Girodias to establish the Olympia Press in the United States failed, primarily because the end of censorship restrictions left authors of talent with many outlets for their works. The authors that Girodias was supposed to have developed went on to find careers within the book industry of their own country.

The practice of piracy was particularly prevalent during the 19th century when books were written and published on the continent to be sold secretly in England. The bookdealers were liable to be fined and imprisoned, because of the subject matter. Henry Ashbee, in his bibliography under the name Pisanus Fraxi, spent much time and effort tracking down the original publication of such suppressed books as John Cleland's *Memoirs of a Woman of Pleasure*. A book might be published in English, translated into French, republished as a book in two parts (each with a separate title), and retranslated into English and published as new works. *Fanny Hill* was the accepted title of Cleland's novel through some such process as

this. Although prohibited in all English-speaking countries, *Fanny Hill* was remarkably available, at least among those who could afford the very high prices charged for the work. Piracy is largely motivated by greed.

The high prices of American textbooks and reference works and the problems of currency exchange account, in part, for the growth of a kind of piratical book industry in Taiwan. Utilizing cold-type methods, a book originally published in the United States was copied and republished in Taiwan at a fraction of the American price. Because of the abundance of cheap labor, an $18 textbook or a $7 bestseller would be sold for $5 and $2, respectively. These books could be bought in bookstores throughout the Far East, although customs regulations prevented their importation into the United States. Nevertheless, many servicemen and other temporarily expatriate Americans availed themselves of the bargains and shipped copies of pirated books home in their personal possessions. Few were confiscated.

The United States Department of State made sufficient protest so that the Taiwan book industry came under the control of customs, so far as export of the books was concerned. The luggage of passengers was examined both at entry and exit from Taiwan, but few such works were seized as the passenger went through customs on his way out of the country. A plan for the publication of American technical books in Asia foundered because of the Taiwan experience. Worldwide inflation and the devaluation of the dollar has now reduced the problem to the vanishing point.

Infringement of copyright is rather easily proven in the case of publication for sale and rarely attempted when the laws are enforced. A different and much more troublesome issue is the question of duplication of material for personal or local use. Publication, as a legal term, encompasses much more than the customary use of the word. An office duplicating machine can serve as the printing press, a typist becomes a compositor, and the individual who supervises the production of the material and its distribution becomes a publisher. There seems to be little doubt that preparing a mimeograph copy of extensive passages of text constitutes piracy. The argument that office duplicators are somehow different and that production of many copies of a work does not constitute piracy is rather dubious. Libraries that make a practice of making several duplicate copies of a passage from a copyrighted book or a periodical are engaged in piracy so far as the publisher is concerned.

There is, however, a gray area where piracy and fair use seem to merge. The reserve book service in a college or university library has to choose between purchasing several copies of a book for a chapter or two of assigned text and making sufficient copies to satisfy instructors and students. Unfortunately, the easy solution is piracy, since the number of copies, the method of reproduction, and the purpose served are inconsequential. If carried to its logical conclusion, even a single copy for the use of one person would also constitute piracy. However, the doctrine of fair use has developed to excuse this rather justifiable use of copyrighted material. Publishers are discontented with the doctrine and would like to license copying in whatever form it takes. Possibly the practice of making offprints of certain parts of the book, which librarians and others could purchase, would meet the objections and maintain the author's right to a reward for his efforts.

In point of fact, as Nasri notes in his recent study of copyright, the publisher is

protected (*1*). The real question of copyright legislation pending at this writing is whether the author or the publisher will be the primary beneficiary of laws that are meant to prevent piracy. Should the question be resolved in favor of either necessary group of a book industry, new problems will arise. As information retrieval methods are perfected, the availability of text rather than abstracts or bibliographic citations will bring this technology into question, so that a copy of a copyrighted work produced on demand will introduce a new consideration into the definition of piracy. Availability of material in a system that can reproduce copyrighted portions of works on demand will also constitute piracy.

Granting that piracy is to the book industry what forgery is to financial institutions, some different method of publication is demanded by the technology available now or soon to be developed. This is not surprising. The inventiveness of human beings has always preceded the social structures that make the technology useful rather than dangerous. For instance, only recently Belgium developed tests for drivers who had previously been given a license on the payment of a fee and completion of an application. This was the pattern in the United States for as many as three decades after the automobile became an accepted means of transportation. Just what form the publication of material will take is a matter of speculation, but a chief consideration is a way of saving piracy with a duplicating machine from being one of those easy crimes that only massive supervision can prevent. Hopefully, new publishing methods will prevent piracy or make it so costly that it will cease to exist.

REFERENCE

1. William Nasri, "The Impact of Reprography on the Commercial Publication of Scientific and Technical Periodicals with Particular Reference to the Case of the Williams and Wilkins Company v. the United States," dissertation, University of Pittsburgh, Graduate School of Library and Information Sciences, Pittsburgh, Pa., 1975.

JAY E. DAILY

PISSARRO, LUCIEN

The eldest of seven children of Camille Pissarro and his companion Julie Vellay, Lucien Pissarro (1863–1944) was born in Paris on February 20, 1863, and grew up with Impressionism. The year of Lucien's birth, Camille Pissarro exhibited in the first collective exhibition of Impressionists, at a "Salon des refusés." (The "refusés" were those artists whose works had not been accepted by the Jury of the Salon.) Throughout his childhood Lucien heard the impassioned discussions of the familiar visitors to his home—Guillaumin, Monet, Cézanne. He saw his father work relentlessly in his residences on the Ile-de-France (La Varenne-Saint-Hilaire, Pontoise, Louveciennes) where he could paint a lot and live on little. Encouraged

by his father, as were his younger brothers later, Lucien was already drawing by 1870 when the Pissarro family emigrated to Great Britain, where a half-sister of Camille's, Mrs. Phineas Isaacson, lived. France had been invaded by the Germans, and the house at Louveciennes was laid bare by enemy guns. Camille found Cézanne and Daubigny there and met Paul Durand-Ruel, who had opened a gallery in London. (Lucien was never to forget the motifs painted by his father during this period.) Returning to France in 1872, the Pissarro family lived in turn in Pontoise, Osny, and finally, from 1884 on, near Gisors, at Eragny, the village whose name Lucien later used for his publishing enterprise.

At age 15 Lucien was the object of a conjugal quarrel: Camille was in favor of his artistic vocation while Julie, worried about the large family's precarious situation, wanted him to go into business. Julie won, but only briefly. Settled in Paris as a shipping clerk with an importer of English products, Lucien was found to be inept at making up packages and was returned to his father and his apprenticeship as a painter. He also assisted Camille in the conduct of his affairs and in the preparation of exhibits.

In 1883 Lucien was sent to London, to his uncle Phineas Isaacson. This was another attempt on Julie's part to have him go into business, while Camille wanted to help his son disengage himself from his artistic influence and find his own way. London charmed Lucien with its landscapes and the riches of the British Museum, where he copied the Egyptian statuary. He met Whistler and became interested in the young English school of painting. He became able to paint from nature and did his first wood engravings.

Returning to France, Lucien was a devoted partner to his father from 1884 to 1890. It was Lucien who, in 1885, put Camille in contact with Paul Signac and Georges Seurat and won his father over to Divisionism. Still uncertain about his talent, Lucien concentrated his artistic activity on engraving and illustration. However, in 1886 he exhibited with a group of Impressionists at the Restaurant Doré and participated in the Salon des Indépendants; in 1890 he exhibited in Brussels, in "The Group of Twenty," along with Theo van Rysselberhe and James Ensor.

Another sojourn in England, from 1890 to the middle of 1891, marked an important step in Lucien Pissarro's artistic evolution and in his personal life. It was then that he began a relationship with a group of young literary and artistic people, some of whom remained his companions for the rest of his life: the poet T. Sturge Moore, John Gray, Charles Ricketts, and Charles Shannon. In their works Lucien saw the confirmation of his own inclinations. He wrote to Camille: "They . . . are very much of our ideas and—curious thing—they do all of their engraving on wood! Really very good, very simple, and in the tradition of the old masters, and we have the same ideas as they do on subject matter."

It was also during this sojourn that, earning his living by giving design lessons, he had among his students one who would become his wife and partner, Esther Bensusan. His life became fixed in England, where he became a citizen during World War I.

Married in 1892, the young couple settled in Epping (Essex), where their

daughter Orovida was born. Lucien acquired a press and founded, under the name of Eragny Press, a publishing enterprise which remained active until 1914.

A serious illness prevented him from working from 1897 to 1899. Paralyzed at first, he later walked with a limp, and his natural shyness increased.

Lucien Pissarro and his family settled in 1901 at Stamford Brook, Hammersmith (Middlesex) in a picturesque 17th-century cottage, where he spent the greater part of his life. However, he made frequent and sometimes long visits to France. Some of these visits were for such family reasons as the death of Camille Pissarro (November 12, 1903), his sister Jeanne's marriage (1908), and his mother's illness (1922). He also went to see again the places of inspiration and meditation that had inspired him to persevere with his own painting: Riec-sur-Belon (Finistère), Les Andelys (Eure), La Frette (Seine-et-Oise), Chaumont-en-Vexin (Oise). Beginning in 1925, he frequently spent the winter in the south of France, more precisely in Var, at Bandol, at Brusc, and at Bormes-les-Mimosas; he acquired a farmhouse near Toulon which he named Campagne Orovida. In England his research on motifs led him to Finchingfield, Rye, Fishpond (Dorset), Coldharbour (Surrey), East Knoyle, Shaftesbury (Dorset), Hastings (Sussex), Dartmouth (Devon), and Richmond (Surrey).

Lucien's devotion to his father's memory and his fidelity to the friends of his youth, Monet and Signac in particular, led him to become one of the ambassadors of the Impressionists and post-Impressionists in England. Through him the artists who constituted the Camden Town Group came to know the work of Camille Pissarro. The exhibition of his father's work that he organized at Leicester Galleries in London, in 1920, was highly acclaimed, as were the exhibitions of "Three Generations of Pissarros" in London in 1943 and 1954. In 1910 he became friendly with the painter James Bolivar Manson, who was employed at the Tate Gallery and became its assistant director. Lucien frequently guided him and facilitated the gallery's acquisition of Impressionist works.

The war of 1939 marked the decline of Lucien Pissarro. Weakened, deaf, threatened with blindness, having left Stamford Brook (which was too exposed to bombing), he settled with his wife at Hewood, where he was still able to do several paintings. The wartime restrictions, the lack of heat, and his despair over the destruction, by a bomb, of the safe depository (when Camille's watercolors disappeared) ruined his health. After his last great work, "The Yellow Farm," he stopped painting almost entirely. He died on July 10, 1944, and was buried at Weymouth.

His Painting

The output of Lucien Pissarro is known to be about 350 tableaux and several designs and watercolors. Despite the precocity of his first attempts, mastering his art demanded constant effort. It seemed that the examples of the eminent artists who had surrounded his youth, while all of them impregnated him with a certain vision, had inspired in him an excess of modesty. His encounters with Seurat and Signac were important. Although Camille disengaged himself from Divisionism after a few years, Lucien remained faithful to it. In 1894 his father wrote to him: "I have seen

your two canvases at Contet's; they are very nice. . . . Of the way in which things stand out, one might say that the division technique has dried you up; you fear to mix. . . . One feels that you constrain yourself, or where there is constraint, there is not pleasure."

However, in spite of, or because of, this constraint, Lucien obtained an intensity of color vibration that characterizes him. Octave Mirbeau in 1897 styled Lucien Pissarro as a "landscapist luminous and delicate, of an exquisite sensibility." Frank Rutter, art critic for the Sunday *Times* (London), wrote of his subject: "that exquisite landscape painter from whom I have learned all that I know of the science of colour."

Although the publishing house was an important part of his activity until 1908, Lucien continued to exhibit in Paris at the Salon des Indépendants and in London, with the Allied Artists' Association. At the entreaty of James B. Manson, he agreed to join the artists who separated themselves from the too conservative New English Art Club and formed the Camden Town Group. Lucien, thanks to his artistic heritage and much reflection on the principles of design and color, was considered by his comrades, such as Walter Sickert, Augustus John, and J. D. Innes, as their leader. Two years later the group took the name of the London Group, the cubists were admitted, and Lucien removed himself from the group. In 1919 he formed the Monaro Group, with his brother Rodo, Manson, and Miss Hassell.

He was at this time in full possession of his powers, and from 1911 to 1936 he knew a period of fruitful pictorial production. He remained faithful to the expression of sensation, as he wrote in 1919 to Monet: "As a bird sings!—that is now the motto of us all. It really doesn't matter if sensation arises from work painted in front of nature, or not, as long as the sensation is there." He had assimilated and tempered Divisionism, and he summarized his technique in his advice to his nephew and student John Bensusan-Butt, in 1937: "Work in dot to begin with, reserving the right to develop a freer handling when you are used to analysing the elements which make up the colour of things." His exhibitions, numerous and favorably reviewed, demonstrated his talent as a harmonious colorist.

His Engraving

We know of the artistic games which Camille Pissarro played with his children and which predisposed them to embrace all forms of the designing arts. Paternal advice permitted Lucien Pissarro to develop an original talent. At the time of Lucien's first stay in England, Camille involved him not only in design but in engraving, sending him as models the lithographs of Daumier and Delacroix. When he returned to France, Lucien met with Lepère, sent illustrations to the anarchist journal *Le Père Peinard*, to the *Revue illustrée*, and to the *Vie franco-russe*. He worked at the Manzi publishing house at chromography, a thankless task but one from which he profited. As early as 1884, Lucien and his father collaborated, Lucien engraving his father's designs. They planned a series of wood engravings devoted to country scenes, which was only partially realized.

Lucien's first illustrations reflected the influence of Keene, whose illustrations (which had appeared in *Punch* and been carefully saved by Camille) had given pleasure to the entire Pissarro tribe. Certain engravings of 1891 revealed a pre-Raphaelite influence (notably "La Dame au manteau"). But the source of Lucien's endeavors in the study of engraving was the Renaissance, and he quickly came to express, in his beautiful way, a naive, sincere poetry, sustained by a harmonious decorative sense.

Among his engravings one should note several portraits of his father; the wood engravings from "Les Travaux des Champs" of Camille Pissarro; the album of "Twelve Woodcuts in Black and Colour" published in 1891 by Ricketts; "La Ronde" (1891); the illustrations for "The Queen of the Fishes," published at Epping in 1894, and those of the "Livre de Ruth et Esther" (1896); the wood engravings illustrating "l'Histoire de la reine du Matin et Soliman ben Daoud," by Gérard de Nerval (1906); and "La Charrue d'érable," by Emile Mosselly (1910).

For information on Lucien Pissarro's activities as a publisher, see *Eragny Press*, Volume 8 of this encyclopedia, pages 161–164.

Exhibitions by Lucien Pissarro are:

Participant in group exhibitions

1886: (May 15–June 15) Exhibit of a group of Impressionists at the Restaurant Doré
1886: (and later years) Salon des Indépendants
1890: Group of Twenty, Brussels
1908: Allied Artists Association, Royal Albert Hall, London
1911: Camden Town Group, Carfax Gallery, London
1912: same
1913: same
1914: (June) A group including Lucien Pissarro, Manson, M. Milne, H. Squire, Diana White; Carfax Gallery, London
1919: Monaro Group, Galerie Goupil, Paris
1934: (December) Pissarro and His Sons, Galerie Marcel Bernheim, Paris
1934: Three Generations of Pissarros, Lewes, then Lancaster Galleries, London
1954: Three Generations of Pissarros, O'Hana Galleries, London

Individual exhibitions

1922: Leicester Galleries, London
1924: Galerie Marcel Bernheim, Paris
1935: (June–July) City Art Gallery, Manchester
1946: (January) Memorial Exhibition, paintings; Leicester Galleries, London
1947: (December) Memorial Exhibition, wood engravings; Leicester Galleries, London
1950: Designs and Engravings for the Eragny Press, Leicester Galleries, London
1963: Centenary Exhibition, Arts Council Galleries, London

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FRANCOISE PY-CHERAU
Translated from the French by Mildred S. Myers

THE PITTSBURGH BIBLIOPHILES

The Pittsburgh Bibliophiles was founded on February 9, 1962, at Pittsburgh, Pennsylvania. It was conceived by Mr. Bernard S. Horne, the first chairman of the Advisory Committee and inspired by the establishment of the Hunt Botanical Library at Carnegie-Mellon University by Mrs. Rachel McMasters Miller Hunt. The founding members were Mr. Horne, who had built an outstanding collection of Walton's *Compleat Angler;* Mrs. Hunt; Dr. George H. M. Lawrence, botanist and director of the Hunt Botanical Library; Mr. William Oliver, an authority on books, especially those having to do with sporting prints; Mr. Thomas C. Pears III, Pittsburgh printer; Mr. Charles J. Rosenbloom, eminent book collector (whose library has since been bequeated to the Beinecke Library at Yale, the Rare Book Room of the Hunt Library, and other libraries); Mr. Jack W. Stauffacher, printer-in-residence at Carnegie-Mellon University; and their spouses, since the society considers husband and wife as one membership.

The Pittsburgh Bibliophiles hold five or six meetings a year to which distinguished scholars are invited to present programs on book collecting, manuscripts, calligraphy, graphic arts, typography, bibliography, authors and their works, and other related subjects. Exhibitions are often arranged to illustrate the current lecture. The meetings are usually held in the handsome penthouse setting of the Hunt Institute.

The group has made many pilgrimages to other cities where they have been the guests of famous libraries. Visits have been made to Philadelphia, Washington, Baltimore, Upperville, Charlottesville, New York City, Princeton, Boston, Chicago, and Cleveland. Most trips have been marked by the issuance of a booklet distributed to members, hosts, and friends. The first visit abroad, to the Vatican and some other great Italian libraries, took place in May 1976.

The seal of the Pittsburgh Bibliophiles.

The Pittsburgh Bibliophiles have had written and have published three books: *Five Hundred Years of the Printed Bible* (1964), by Dr. Clement Harrison; *Hunt Roman: the Birth of a Type* (1965), by Dr. George H. M. Lawrence, Jack W. Stauffacher, and Hermann Zapf; and *The Compleat Angler 1653–1967, A New Bibliography* (1970), by Bernard S. Horne. The club has recorded its activities, roll, and bylaws in five editions of its *Yearbook*. It takes pride in the printed notices sent to members for each meeting.

The society has a Rare Book Fund and furnishes the means to local libraries to purchase books of their choice within a stipulated price bracket. Recipients of books from this fund are the several libraries represented by St. Vincent College, Carnegie-Mellon University, University of Pittsburgh, Duquesne University, and Chatham College.

The seal of the Pittsburgh Bibliophiles was designed by the late Theodore Bowman, architect and calligrapher of the University of Pittsburgh.

THOMAS C. PEARS, III

PITTSBURGH. CARNEGIE LIBRARY OF PITTSBURGH

See *Carnegie Library of Pittsburgh*

PITTSBURGH REGIONAL LIBRARY CENTER

Background

Early in 1947 Director Ralph Munn, Carnegie Library of Pittsburgh; Chancellor Fitzgerald, University of Pittsburgh; President Doherty, Carnegie Institute of Technology; and Director Weidlein, Mellon Institute, requested their librarians to study all phases of possible cooperative activities. Of concern was the need to render the most effective library service within available budgets, and especially the avoidance of unnecessary duplication of materials. On June 15, 1948, the two universities and the Carnegie Library released an announcement of a new program:

> Libraries of the University of Pittsburgh, Carnegie Institute of Technology and the Carnegie Library of Pittsburgh have developed a cooperative program designed to avoid duplicate purchases of expensive materials and to make all of the library collections available to college faculty members, graduate students and qualified research workers of the city.

Subject areas were divided for the acquisition of research materials and the libraries agreed to exchange catalog cards on books purchased in the assigned subjects. "Serial and periodical publications will be listed in a union catalog which will list not only such material in the three institutions, but also that in other educational, industrial and business, and special libraries in the area." The release stated that the two universities had agreed that faculty and graduate students could use materials in either library and that faculty could borrow materials directly from either library. "In addition, a liberal system of inter-library loans with regular book deliveries between Pitt and Tech is being started." Because of the shortage of space, undergraduates "will have to depend upon the library facilities on their own campuses." This cooperation was the seed which was to grow into a regional organization, the Pittsburgh Regional Library Center (PRLC).

The growth of neighboring institutions increased the pressure for access to library resources. Regular meetings of academic librarians with the director of the Carnegie Library were revived in 1962. The librarians who met to find joint ways of dealing with increasing user and financial pressures called themselves the Pittsburgh Cooperative Council of Academic Librarians, or "Coop Group." This group was the immediate predecessor of PRLC. Included were Eleanor McCann of Duquesne University, Keith Doms and Daniel Pfoutz of Carnegie Library, C. Walter Stone and Harold Lancour of the University of Pittsburgh, Kenneth Fagerhaugh of Carnegie-Mellon University, Sister M. Camillus of Mount Mercy College, and Benjamin B. Richards of Chatham College. By June 1965 it was agreed that a legal body should be established to carry on current projects and explore new cooperative activities. Broad areas of concern were discussed wherein libraries might benefit through regional coordination: acquisition, storage and preservation of resources, and insuring access to the totality of research materials; evaluation, selection, analysis, and dissemination of materials; bibliographic and research services on a contractual basis; selected technical services. Gordon Williams, Center for Research Libraries, spoke to the librarians about the formation of a regional library council. At his suggestion, a list of pressing needs was developed. These were (*a*) centralized technical processes, including shared staff time for the Carnegie Library; (*b*) storage of little-used materials; (*c*) improved bibliographic access, reference centers, and faster interlibrary loan; (*d*) cooperative collection building and special collections; (*e*) local delivery of library materials; (*f*) photoreproduction and microfilming services; (*g*) telefacsimile.

Organization

During 1966 Articles of Incorporation and Bylaws were drafted, the name chosen, project funding sought, membership assessments levied, and Thomas

Minder hired as executive director. The center's offices were located at Chatham College. Minder's first tasks were to obtain funds for the conversion of a Union List of Serials from cards to machine-readable form and to develop planning documents for the new organization. *The Regional Library Center in the Mid-1970's, a Concept Paper,* was one of the results of his efforts and gained a wide distribution.

On September 8, 1967, the Pittsburgh Regional Library Center became incorporated as a nonprofit Pennsylvania corporation. The Bylaws state that the center's purposes are for advancing library science, for the promotion of library services, and for the promotion of interlibrary cooperation among the public and private libraries in the City of Pittsburgh, Pennsylvania, and surrounding areas to a distance of 200 miles. The charter members were the Carnegie Library of Pittsburgh, Carnegie-Mellon University, Chatham College, Duquesne University, Mount Mercy College, Point Park College, Robert Morris Junior College, University of Pittsburgh, and the Mellon Institute. The first officers were: president, Keith Doms, Carnegie Library of Pittsburgh; vice-president, Kenneth Fagerhaugh, Carnegie-Mellon University; secretary-treasurer, Mary Celine Boyer, Robert Morris Junior College; and assistant treasurer, Edwin J. Brueggman, Carnegie Library of Pittsburgh. Before the year ended, the trustees adopted goals and moved to invite a representative of the Pittsburgh Chapter, Special Libraries Association to attend all board meetings. Virginia Sternberg became that representative. The goals were stated as (*a*) to improve the overall economic efficiency, service effectiveness and information-handling capabilities of the libraries of each member institution, primarily through joint efforts; (*b*) to provide the facilities and organization needed to help solve the research, administrative, and service problems of common interest to the members; (*c*) to coordinate the services of the libraries of member institutions and the Pittsburgh Regional Library Center with larger library and information systems being developed regionally, nationally, and within intellectual disciplines.

The present Bylaws call for each member institution to appoint two trustees each year. Of the persons so appointed, one must be the head librarian or other senior library staff member. An Executive Council is designated to guide the business of the PRLC between meetings of the full Board of Trustees, which meets three times a year. The Executive Council is comprised of the chairman, vice-chairman, secretary, treasurer, and immediate past-chairman. Standing committees of Budget, Ways and Means, and Membership are named in the Bylaws.

A revision of the Bylaws is being considered during 1976 which names the following standing committees: Budget and Finance, Research and Development, Operations, and Public Relations. This revision would add the chairmen of the standing committees to the Executive Council.

Ad hoc committees are appointed by the chairman, are task-oriented or advisory, and usually have a limited tenure. The executive director is an ex-officio trustee and an ex-officio member of all committees. Functionally, PRLC is much like a legislative body. Before presentation to the board, project proposals are hammered out in committee, reviewed by Ways and Means, and referred back to committee or recommended to the full Board of Trustees by the Executive Council.

At the close of the 1975/76 year, the voting membership consisted of 26 academic institutions and 9 public libraries. The Historical Society of Western Pennsylvania and the Nuclear Center Library, Westinghouse Corporation were nonvoting affiliates. The membership roll is:

Allegheny College, Meadville, Pa.
Altoona Area Public Library, Altoona, Pa.
B. F. Jones Memorial Library, Aliquippa, Pa.
Bethany College, Bethany, W.Va.
California State College, California, Pa.
Cambria County Library System, Johnstown, Pa.
Carlow College, Pittsburgh, Pa.
Carnegie Library of Pittsburgh, Pittsburgh, Pa.
Carnegie-Mellon University, Pittsburgh, Pa.
Chatham College, Pittsburgh, Pa.
Citizens Library, Washington, Pa.
Clarion State College, Clarion, Pa.
Community College of Allegheny County, Pittsburgh, Pa.
Davis and Elkins College, Elkins, W.Va.
Duquesne University, Pittsburgh, Pa.
Edinboro State College, Edinboro, Pa.
Erie City and County Library, Erie, Pa.
Geneva College, Beaver Falls, Pa.
Historical Society of Western Pennsylvania, Pittsburgh, Pa.
Indiana University of Pennsylvania, Indiana, Pa.
La Roche College, Pittsburgh, Pa.
Mercyhurst College, Erie, Pa.
Monessen Public Library, Monessen, Pa.
New Castle Public Library, New Castle, Pa.
The Pennsylvania State University, University Park, Pa.
Pittsburgh Theological Seminary, Pittsburgh, Pa.
Point Park College, Pittsburgh, Pa.
Robert Morris College, Coraopolis, Pa.
Saint Francis College, Loretto, Pa.
Slippery Rock State College, Slippery Rock, Pa.
University of Pittsburgh, Pittsburgh, Pa.
Warren Library Association, Warren, Pa.
Waynesburg College, Waynesburg, Pa.
Westinghouse Nuclear Energy Systems, Pittsburgh, Pa.
Westminster College, New Wilmington, Pa.
Westmoreland County Community College, Youngwood, Pa.
Wheeling College, Wheeling, W.Va.

Services and Facilities of the PRLC

TECHNICAL PROCESSES

The first item in the 1966 list of pressing needs was for a centralized way of assisting the members to process library materials. Two approaches were tested. Exploratory talks with the Ohio College Library Center (OCLC) began during the

spring of 1970 for a pilot project offering on-line cataloging services for PRLC members. Late in November 1970, an agreement was signed for a Spiras terminal to be installed in the Hillman Library, University of Pittsburgh. The terminal was to be installed during the following July. It became operational during September 1971 and was used cooperatively by the University of Pittsburgh, Carlow College (formerly Mount Mercy College), and Robert Morris College. In January 1971 a subscription was entered for the Information Dynamics Corporation's MCRS service. A reader-printer was installed in the Hillman Library and staffing arrangements completed to receive and process member libraries' cataloging data requests. By January 1972 members were still experiencing serious difficulties in obtaining reproducible copy for catalog cards through MCRS. An improved reader-printer was tested, with only marginally satisfactory results. The MCRS experiment was concluded June 30, 1972. While the cards ordered from OCLC were quite acceptable, sufficient time for using the terminal and the inconvenience and expense of transporting cataloging data to and fro illustrated the necessity of acquiring separate terminals for those who wished to use the OCLC system.

In 1974/75 PRLC was awarded an LSCA grant of $250,000 for the provision of OCLC on-line cataloging services to 11 libraries designated as District Library Centers and 13 public and private academic libraries in western Pennsylvania. The grant provided for the purchase and installation of terminals for all participants plus first-time-use, terminal service, and card and telecommunication costs for the District Library Centers. A subsequent LSCA grant has continued support for the District Library Centers. By June 30, 1976, 26 libraries were using 35 terminals for cooperative cataloging and accessing the OCLC data base. Participation in OCLC services through PRLC by several more members has been made possible through the Kellogg Foundation's nationwide Library Demonstration Program. Bethany, Davis and Elkins, Geneva, Waynesburg, and Wheeling Colleges received grants to enable their libraries to go on-line during the 1976/77 year.

UNION LIST OF PERIODICALS

Similar to the experience of many library consortia organized in the late 1960s and since, a union list of periodicals provided PRLC members with tangible benefits of cooperation. The local chapter of the Special Libraries Association started the list, issuing printed editions as early as 1926 and 1934. In the 1940s and 1950s, the University of Pittsburgh, Carnegie-Mellon University, and the Carnegie Library of Pittsburgh maintained the union list on cards at the Carnegie Library of Pittsburgh. By the close of 1961 some 13,768 titles, representing the holdings of 56 area libraries, were on file. It was reported that for the 1948–1960 period, the number of calls made upon the list increased nearly 330%. Some 2,184 queries were made of the file during 1961.

PRLC obtained a National Science Foundation grant in 1968 to study the manual operation of the union list, with the goal of converting it to machine-readable form. Conversion was accomplished at Carnegie-Mellon University. When

computer time was offered by Allen Kent at the University of Pittsburgh, programs were rewritten so that further processing could be accomplished and maintained. With aid from LSCA grants, two printed editions were published by the center. The latest, dated 1973, included more than 40,000 unique titles found in 85 of the region's public, academic, and special libraries.

The members of PRLC foresaw an increasing use of the OCLC system and in March 1974 concluded an agreement with OCLC wherein the tapes of the PRLC Regional Union List of Periodicals were sold to OCLC. The PRLC serials data base would have been the first of its kind on-line nationally had not technical problems and other factors intervened. The PRLC tapes are now scheduled to be loaded and available throughout the OCLC system during the 1976/77 year. This list will add some 23,800 unique titles to the Minnesota Union List of Serials presently in the OCLC data base.

BIBLIOGRAPHIC ACCESS

Increasing the range of bibliographic control, aiding cooperative acquisitions, and readers' services were the focus of several projects which resulted in the publication of finding lists or union lists for the center's members. A checklist of holdings for selected items listed in Winchell's *Guide to Reference Books* was developed. A file of items purchased by members costing $100 or more was accessed by telephoning the center's office until computerized listings were distributed. In 1973 two finding lists were published: *Major Microforms in Eight PRLC Libraries* and the *PRLC Newspaper Directory*. Revised in 1975 and published in 1976, the second edition of the newspaper list cited holdings in 42 libraries of member institutions. Six Pittsburgh libraries met together during 1974/75 to determine the overlap in their periodical lists and to decide for cooperative access. Some $9,000 of duplicative subscriptions were cancelled. Presently, the PRLC is cooperating with the Pittsburgh Council on Higher Education in an inventory of ethnic collections and records.

As the center's membership grew, a newsletter was inaugurated, as was a membership directory. The latter listed subject collections and strengths as well as other information which assisted members to cooperate. The newsletter has become a regular bimonthly publication. The directory was expanded to cover the majority of southwestern Pennsylvania libraries. It was published in 1975 as *Western Pennsylvania Resources* in loose-leaf format to facilitate additions and corrections. The first addenda, over 100 pages, were issued in May 1976.

READER ACCESS

The delivery service inaugurated in 1948 was maintained by the University of Pittsburgh for many years. When PRLC was formalized, additional members requested delivery service and soon the university's truck was making stops throughout the metropolitan Pittsburgh area. This expansion grew to be a larger investment than the University of Pittsburgh could maintain. Since PRLC members could not

contribute to the funding, the university was forced to discontinue the service. In January 1975 the Interlibrary Delivery Service (IDS) began using LSCA funds to expand from its Lancaster County base into a statewide library-dedicated delivery system. Many PRLC members are now interconnected via IDS not only with other members, but with libraries throughout Pennsylvania.

The present direct access and borrowing program supported by most PRLC members developed from the cross-borrowing agreement established between the University of Pittsburgh and Carnegie-Mellon University in the late 1940s. Through this program, a college student, on recommendation from his or her own library, may borrow materials directly from another PRLC participating library. A special preprinted form is used which specifies the materials required. The availability of materials and conditions of the loan are according to the policies of the lending library.

CLEARINGHOUSE FOR INTERLIBRARY LOAN

Almost from its inception in the 1930s, librarians recognized the utility of the Union Library Catalogue of Pennsylvania. However, only two western and central Pennsylvania libraries were represented by extensive holdings in that union file. The center's members wished to more fully utilize the wealth of library resources within the central and western areas of the state. With funds from the Hillman Foundation, the PRLC Clearinghouse for Interlibrary Loan was established. After several months of planning and organization, Clearinghouse Librarian Karen Worman Silverberg was able to start the monograph location service for PRLC members in October 1974. Library locations are provided for books, but the Clearinghouse has no authority to channel requests directly to a library it learns holds those books.

An LSCA grant provided funds sufficient to microfilm the card catalogs of nine resource libraries in the region. Four other members donated microfilm or book catalogs of their holdings and an OCLC terminal was installed. The location of the Clearinghouse in the two-plus-million-volume Carnegie Library of Pittsburgh permits quick access to another major bibliographic resource and the sharing of a TWX. In calendar 1975, nearly 8,800 location requests were fielded. Requests are accepted by mail, telephone, and TWX and a reply is sent out during the next working day. With the addition of the Union Library Catalogue on microfilm in April 1976, the PRLC Clearinghouse became the largest resource bank for interlibrary loan locations in the state. Although the service has been restricted to PRLC members, extension on a fee basis to nonmembers was inaugurated in the fall of 1976.

The activity at the Clearinghouse has fostered the establishment of an internship program in cooperation with the University of Pittsburgh's Graduate School of Library and Information Sciences. Dean Thomas J. Galvin and the Clearinghouse Librarian Karen Worman Silverberg select one student each term for 6 hours per

week of work at the Clearinghouse. In addition to learning searching procedures and the operation of various machines—including the OCLC terminal—readings on networking, interlibrary loan policies, and the operations of other clearinghouses are part of the program. The student visits the interlibrary loan departments of several PRLC members during the internship period. Several interesting term papers have resulted from the students' study and participation in this aspect of regional resource sharing.

During February and March 1976, data on regional interlibrary loan were collected by PRLC's Advisory Committee on the Clearinghouse. The May/June and July/August issues of the *PRLC Newsletter* reported that the public library members directed 54% of their February interlibrary loan requests to the Clearinghouse for initial searching; academics sent 22%; special libraries, 30%. Of the total 2,089 interlibrary loan requests sent out in February by member libraries, 844 (40%) were first sent to the Clearinghouse for locations. Of the requests not sent to the Clearinghouse, locations were found for 17% in the OCLC data base and for 16% in the *National Union Catalog*. Other sources, including "hunches," provided location information for the remainder. Of the 844 requests searched by the Clearinghouse, locations for 699 books were found. The Clearinghouse was unable either to verify or find locations for the remaining 145 citations. A full 16% of the requests received had major citation errors which had to be corrected in order to identify the item. Follow-up on borrowing revealed that 50 of the successful 699 searches were not requested to be borrowed from other libraries. For the 649 books which were requested to be loaned, the Clearinghouse gave 1,869 library locations, or 2.9 locations per book. The study revealed that 399 books requested for loan were actually loaned, or that 61% of the books for which locations had been found by the Clearinghouse were actually borrowed by member libraries.

A two-page worksheet on costs was a part of the survey instrument. Borrowing, lending, clerical and professional time, and transmittal costs (postage, teletype, etc.) were assayed. Mrs. Silverberg reported that there was a wide range in the interlibrary loan costs detailed by member libraries. Costs to lend ranged between $1.00 and $4.00, while costs to borrow averaged between $1.50 and $5.00. Information gathered in this use and costs survey will help PRLC study the possibilities for making a more equitable interlibrary loan network throughout the region.

Conclusion

The Pittsburgh Regional Library Center is looking forward to further improvements in the region and in Pennsylvania which will assist libraries to provide the best information service possible to their clientele. As in the past, new methods and technology will be used where feasible to deal with the problems of faster document delivery, improved bibliographic and direct access, and the need for continuing professional education.

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STEPHEN B. FOLTS

PITTSBURGH. UNIVERSITY OF PITTSBURGH GRADUATE SCHOOL OF LIBRARY AND INFORMATION SCIENCES

The Graduate School of Library and Information Sciences at the University of Pittsburgh was established by action of the Executive Committee of the university's Board of Trustees on September 12, 1961, and opened officially to an initial class of 134 students on September 4, 1962, as the Graduate Library School, the 12th

professional school of the University of Pittsburgh. As the direct successor of the Carnegie Library School, originally founded in 1901 as the Training School for Children's Librarians of the Carnegie Library of Pittsburgh, the Graduate School of Library and Information Sciences represents today a continuous 75-year tradition of education for the library and information professions in the city of Pittsburgh. At present, the Graduate School of Library and Information Sciences is one of the largest of its kind in the United States and in the world. In the fall of 1974 the school was cited by *Change Magazine* as among the 10 outstanding schools in its field in the United States. Its present strength derives in no small measure from its continuous close relationships with the Carnegie Library of Pittsburgh and Carnegie-Mellon University (formerly Carnegie Institute of Technology), as a consequence of its historical origins.

The Carnegie Library School—A Brief Historical Sketch

As early as 1881, Andrew Carnegie proposed to establish a free library for the city of Pittsburgh by the gift of a central building to house a museum and library, as well as several branch library buildings, on condition that the city provide for their continued maintenance. Several years were required to overcome legal obstacles, but in 1890 the City of Pittsburgh accepted Mr. Carnegie's gift, and 5 years later, in November 1895, a central library, "free to the people," opened under the direction of Edwin Hatfield Anderson, later the successor of Melvil Dewey as director of the New York State Library and Library School, and ultimately, director of the New York Public Library.

In February 1896, a few months after the library opened, Anderson made provision for establishment of a separate children's reading room. Two years later, he invited Frances Jenkins Olcott, then assistant librarian of the Brooklyn Public Library, to join the staff of Carnegie Library as head of its newly established Children's Department. An early Carnegie Library account, *Brief History of the Training School for Children's Librarians*, notes that:

> The most discouraging feature at the time of the organization of the Children's Department of the Carnegie Library of Pittsburgh in 1898, was the lack of young women trained to do library work with children. Two or three untrained assistants were appointed and they had to be trained for the work after they became members of the staff. . . . This attempt at training children's librarians already on the staff was necessarily limited and unsatisfactory. It was soon found impossible to give time and attention to an assistant without previous experience in library work with children, no matter how willing and anxious to learn the assistant might be. Almost immediately the work of her children's room grew beyond her control, and her efforts to keep up with its development, instead of helping the work, retarded it. The Library then made a new experiment and drew its supply of children's librarians from the Pittsburgh and Allegheny Kindergarten College.
>
> It was not the intention of the Library to run a kindergarten, but the kindergartners had had some experience with children. This innovation was a great

> improvement over employing untrained help, but still was not satisfactory, for although the kindergartners were original and were personally adapted to work with children, still they lacked knowledge of technical library work and of children's literature, and it was difficult for them to discipline older children.
>
> The future opening of new branch libraries and a large new children's room at the Central Library, besides the prospective growth of work with schools and home libraries—small travelling libraries for poor children—made it necessary for the Library to have *a corps of trained, experienced workers.* With this object in view the Library started on October 1, 1900 a training class for children's librarians. Five students were admitted for the first year. . . .
>
> It soon became known among other libraries that the Carnegie Library of Pittsburgh was conducting a training class for children's librarians, and libraries began to apply for students to fill positions as the heads of children's departments or children's rooms. So in 1901, the Carnegie Library established a school for the training of children's librarians for other libraries, as well as for its own Children's Department. . . .

The initial class, organized October 1, 1901, included students from six states. Miss Olcott, as chief of the Children's Department, also served as director of the Training School. A 1-year course, leading to a certificate, was offered, with students "who have shown decided fitness and intelligence" permitted to pursue a second year of study and apprenticeship, culminating in a diploma. It was made clear that the entire energies of the new school and its faculty were to be devoted to training librarians for work with children, "not competing in any way with the general library schools." Students were trained for such positions as superintendent of the children's department, head of the children's room, supervisor of work with schools, supervisor of home libraries and reading clubs, and librarian of a social settlement. Admission was open without examination to college graduates, those who had completed a year's instruction at other library schools, or those with sufficient practical experience who came recommended by their library directors. Other candidates were admitted on the basis of satisfactory achievement on an examination encompassing literature, history, and general information.

In 1905 a special 1-year course was added for those who had graduated from another library school. By 1909 alumni of the New York State, Drexel, Pratt Institute, Simmons College, University of Illinois, and Wisconsin library schools had enrolled. Throughout its early years, the school was the direct beneficiary of the philanthropic interest of Andrew Carnegie, who provided annual gifts for books, supplies, staff salaries, and visiting lecturers from 1903 through 1916, when the school officially became a department of the Carnegie Institute. The then newly named Carnegie Library School remained, however, under the direct administrative supervision of the director of the Carnegie Library, Harrison W. Craver. Meanwhile, Miss Olcott had been succeeded as principal of the school in 1911 by Sarah C. N. Bogle, later secretary of the Board of Education for Librarianship of the American Library Association. During Miss Bogle's tenure, the post of principal of the school was separated from that of head of the children's department of the library, 1-year courses in school library work and in general library work were added, and in 1919, an optional 4-year program leading to a baccalaureate degree,

awarded by the Division of Academic Studies of Carnegie Institute of Technology along with the diploma from Carnegie Library School, was initiated. In 1920 a parallel joint program was established with the University of Pittsburgh.

In 1920 Miss Bogle was succeeded briefly as principal by Lucy E. Fay, who was, in turn, followed in the post by Nina C. Brotherton. Miss Brotherton served as principal until 1927, when she joined the faculty of the School of Library Science at Simmons College. In 1927 Frances Hamerton Kelly, who had served for 7 years as head of the Department of Work with Schools of the Carnegie Library, became associate director of the school, a post which she held until her retirement in 1948. In 1928 Ralph Munn succeeded John H. Leete as director of the Carnegie Library of Pittsburgh and dean of the school.

Responding to the 1926 recommendation of the American Library Association's Board of Education for Librarianship that library schools become affiliated with universities, rather than with public libraries, Dr. Munn in 1930 negotiated formal affiliation with the Carnegie Institute of Technology, thus enabling the school to confer the degree of Bachelor of Science in Library Science on those who were college graduates and who completed the postgraduate year of work in the library school. The financing of the school, however, remained the responsibility of Carnegie Institute, while the school continued to be housed in the Carnegie Library, with its director, Dr. Munn, retaining administrative responsibility and the title of dean, assisted by Miss Kelly. Munn's contributions to library education nationally included authorship of the 1936 survey *Conditions and Trends in Education for Librarianship,* sponsored by the Carnegie Corporation of New York.

The Carnegie Library School's new fifth-year baccalaureate degree program was initiated in the fall of 1930. In June 1931 Carnegie Institute of Technology conferred the degree of Bachelor of Science retroactively on some 161 eligible alumni of the school. By 1934 admission to the school was limited to those who were college graduates, and in that same year, accreditation as a Type II school was granted by the Board of Education for Librarianship of the American Library Association (ALA), which had 3 years earlier extended official recognition as a "senior undergraduate school."

In 1948 Elizabeth Nesbitt, a distinguished specialist in children's literature and long-time member of the faculty, succeeded Miss Kelly, upon her retirement, as associate dean of the school. In that same year, following the lead of the University of Denver's library school, the Carnegie Library School substituted the Master of Library Science degree for the fifth-year baccalaureate, a pattern subsequently adopted by all American library schools. The first M.L.S. degrees were conferred upon 19 graduates by Carnegie Institute of Technology in June 1949.

In November 1953 the school was visited by representatives of the American Library Association's Board of Education for Librarianship for the purpose of reviewing the new Master of Library Science degree program under the ALA's Standards for Accreditation as adopted in 1951. While accreditation was both recommended and subsequently granted in 1954, several of the board's recommendations, when combined with other considerations, led Dr. Munn to begin systematic exploration—initially with Dr. John C. Warner, president of Carnegie Institute of

Technology, and James Bovard, president of Carnegie Institute—of alternate structures for the school. These explorations led, 3 years later, to his recommending to Dr. Warner and Mr. Bovard that consideration be given to the transfer of the library school to another institution, suggesting that the University of Pittsburgh would offer the most favorable location. After careful study, President Warner, in August 1958, concurred in this recommendation. Shortly thereafter, the Executive Committee of the Board of Trustees of Carnegie Institute of Technology authorized negotiations to transfer the school to a general purpose university. In August 1960 the University of Pittsburgh formally requested support from the Commonwealth of Pennsylvania to establish a graduate school of library science, and in December of that year it was announced that the Carnegie Library School would graduate its last class in June 1962.

In its 61-year history, the Carnegie Library School educated many leaders for the library profession, not only in the field of children's library services, but in general public, academic, school, and special libraries as well. Its faculty, in addition to a distinguished succession of directors, principals, and associate deans, included such luminaries as Ernestine Rose, Margaret Mann, Effie Power, Elva S. Smith, Bertha T. Randall, and Sara Vann. The school established a strong tradition of innovation and excellence in professional education, combined with a deep commitment to service, that has continued to characterize the programs and activities of its successor, the Graduate School of Library and Information Sciences at the University of Pittsburgh.

The University of Pittsburgh's Graduate School of Library and Information Sciences—A Brief Historical Sketch

Appropriation Act 47A of the Pennsylvania Legislature, signed by then Governor David L. Lawrence on August 29, 1961, provided funds to the Trustees of the University of Pittsburgh to establish a graduate library school, thus assuring that library education would continue to be available in western Pennsylvania after the closing of the Carnegie Library School. Shortly thereafter Dr. Harold Lancour, associate dean of the Graduate School of Library Science at the University of Illinois, accepted appointment as Pittsburgh's founding dean, arriving on the campus in October 1961. Arrangements were completed for the University of Pittsburgh to assume responsibility for any Carnegie Library School students who would be unable to complete degree requirements there by June 1962; to receive the alumni records, equipment, and professional library of the Carnegie Library School, including its valuable historical collection of children's books; and to engage the services of its retiring associate dean along with two members of its support staff.

On July 1, 1962, the Graduate Library School was officially opened with a faculty of four in addition to Dean Lancour, including Elizabeth Nesbitt; C. Walter Stone, formerly of the United States Office of Education; J. Clement Harrison, a distinguished British library educator; and Andrew Osborn of the faculty of the University of Sydney, Australia. The first class of 134 candidates for the Master of

Library Science degree followed 2 months later. From the outset, a program leading to the Advanced Certificate in Library and Information Science was also provided to meet the need for postgraduate study at the sixth-year specialist level. More than 2,500 students earned the M.L.S. degree during the school's first 12 years, while nearly 175 postgraduate students have successfully completed the advanced certificate program.

On January 29, 1964, accreditation of the new school's first professional degree program was announced by the Committee on Accreditation of the American Library Association, following a visit earlier in that academic year. In that same year, the name of the school was officially changed from the Graduate Library School to the Graduate School of Library and Information Sciences, recognizing a growing emphasis on the application of new electronic and computer technologies attributable in large part to the appointment to the faculty a year earlier of Allen Kent, formerly associate director of the Center for Documentation and Communication Research at Case Western Reserve University. In 1964 a doctoral program was established in library and information science. In its first decade, 52 students have earned the Ph.D. degree as preparation for positions of major responsibility in library management and library education both in the United States and abroad. Their number currently includes 7 deans of library schools, 26 individuals of professorial rank in library education programs, and 6 directors and 5 associate directors of major academic and public libraries.

In 1968, under a grant from the Pennsylvania Commonwealth Science and Engineering Foundation, the University of Pittsburgh established a new, highly innovative Interdisciplinary Doctoral Program in Information Science. Managed initially by a university-wide interdisciplinary committee chaired by Professor Kent during the 5-year experimental period of its grant support, this second Ph.D. program, which has placed its graduates in both industry and in such diverse academic fields as library science, psychiatry, and business administration, is now administered, on a continuing basis, by the Graduate School of Library and Information Sciences.

In 1969, in recognition of the growth of the faculty and student body and the emergence of expanding programs of instruction and research in the new information professions, the school was reorganized administratively into two academic departments. This structure continues today, with faculty organized into a Department of Library Science and an Interdisciplinary Department of Information Science, each chaired by an associate dean.

In 1970, as a culmination of 2 years of joint curriculum development, the Graduate School of Library and Information Sciences and the School of Education assumed collective responsibility for the administration of a specialized curriculum leading to certification for school librarians in the Commonwealth of Pennsylvania. Concurrently, course offerings were expanded, in collaboration with the School of Education's Program in Educational Communications and Technology, in the areas of communications and human behavior, culminating in the establishment in the Department of Library Science of a Communications Media Research Center, directed by Dr. Patrick R. Penland. Two other specialized research centers exist in the context of the Department of Library Science: a Bureau of Urban Library Re-

search, founded in 1971 and directed by Dr. Frank B. Sessa, and an International Library Information Center (q.v.) presently directed by Dr. Richard Krzys.

In 1971 the Interdisciplinary Department of Information Science initiated course offerings at the undergraduate level in information science in the university's College of Arts and Sciences and in its School of General Studies. The latter program now provides a full undergraduate major. Two years later, the Department of Library Science, with initial support from the Pennsylvania State Library through Library Services and Construction Act funds, began development of a unique training program for paraprofessional library personnel. This has subsequently been expanded to a full certificate program in paraprofessional library studies, administered by the university's School of General Studies, and utilizing an innovative external studies format that has been widely emulated in other states.

In 1971 the school's founding dean, Dr. Harold Lancour, assumed the title of dean emeritus, and Dr. Frank B. Sessa was designated acting dean for a 3-year period while the school engaged, with the assistance of a national advisory panel, in an extended and far-reaching study of its structure and programs. One consequence of this review was the administrative reunification, in 1973, of all instructional programs in library science and information science into the context of an expanded Graduate School of Library and Information Sciences. In September 1974 Dr. Thomas J. Galvin, formerly associate director of the School of Library Science at Simmons College, assumed the deanship. In that same year, the newest of the school's graduate programs—leading to the Master of Science in Information Science degree and offering specializations in library systems design and information counseling—was inaugurated. In January 1976 the Master of Library Science degree program was reaccredited by the American Library Association under its 1972 Standards for Accreditation.

The Graduate School of Library and Information Sciences Today

At present, the school conducts major programs of research in a variety of areas of the library and information sciences, while providing instruction to more than 500 graduate and undergraduate students in eight degree and certificate programs. The Department of Library Science, with a full-time faculty of 15 and an adjunct teaching staff of equal size, offers graduate-level programs leading to the degrees of Master of Library Science and Doctor of Philosophy, an Advanced Certificate (sixth-year) in Library and Information Sciences, and a special certificate for School Librarians. The department also is responsible for the curriculum and staffing of the certificate program in Paraprofessional Library Science offered through the External Studies unit of the university's School of General Studies.

The Interdisciplinary Department of Information Science faculty, numbering seven full-time members of professorial rank, includes individuals jointly appointed with the university's School of Engineering, School of Business Administration,

Office of Institutional Research, and Knowledge Availability Systems Center. Graduate degree programs are the interdisciplinary doctorate in information science and the Master of Science in Information Science with specializations in systems design and information counseling. In addition, the department offers a major concentration in information science at the baccalaureate level in the School of General Studies, a program of introductory courses in the College of Arts and Sciences, and special courses in records management and criminal justice information systems.

Instruction and research are not confined only to the main campus in Pittsburgh. Graduate courses in library science are offered regularly during the summer session at the Chautauqua Institution near Jamestown, New York, in conjunction with the university's regional campus in Bradford, Pennsylvania. Courses in both library science and information science are also offered from time to time at all four of the university's regional campuses at Bradford, Greensburg, Johnstown, and Titusville, in western Pennsylvania. As a part of a state-related institution, the school also assumes responsibility for education and training in the library and information sciences throughout the Commonwealth of Pennsylvania, most notably through its external studies program for paraprofessional library personnel, which is available on a statewide basis.

Special and Unique Programs

While providing strong teaching and research programs of high quality across the broad range of the library and information sciences, the school has currently identified certain specific areas of special programmatic interest. These include the following areas.

BOOKS AND MEDIA IN EARLY CHILDHOOD EDUCATION

From the original founding of the Carnegie Library Training Class for Children's Librarians, children's literature and children's library services have been fields of special teaching and research interest in Pittsburgh. This rich tradition has been continued in the Graduate School of Library and Information Sciences most recently under the leadership of Professor Margaret Hodges, an internationally known children's author and specialist in children's reading. In May 1976 Fred Rogers, a Pittsburgh pioneer in children's television, was designated adjunct professor in the school. In October of that year, the Elizabeth Nesbitt Room, named in honor of the former associate dean of Carnegie Library School, herself a leader in the scholarly study of children's literature, was dedicated in the school. This room houses a collection of more than 5,000 children's books, along with the complete archives of the award-winning "Mister Rogers' Neighborhood" children's television series, constituting a unique national center for research in children's reading and in the place of print, audio, and visual media in early childhood education.

INFORMATION SCIENCE

The school's Interdisciplinary Department of Information Science is recognized internationally both for innovative basic research into the character of the information transfer process and for the preparation of scholars and managers in the information field. In the summer of 1976, its chairperson and the school's associate dean, Allen Kent, was named Distinguished Service Professor by the University of Pittsburgh in recognition of his national and international leadership in the information science field. In conjunction with the university's Knowledge Availability Systems Center, Campus Based Information System, and Hillman Library, members of the department faculty are currently engaged in large-scale research projects sponsored by major governmental and foundation grants. In 1972 the department was selected to conduct a North Atlantic Treaty Organization Advanced Study Institute in Information Science, and in the fall of 1976 the school sponsored a major national conference for more than 350 leaders in the library and information professions on library resource sharing, an area in which the university has been in the forefront in research and demonstration programs. A fully equipped Information Display Laboratory, incorporating a minicomputer, provides a sophisticated facility for systematic investigation into fundamental characteristics of human behavior in the information-seeking mode.

INTERNATIONAL AND COMPARATIVE LIBRARIANSHIP

The school is recognized as preeminent in the United States as a center for the international study of the role of libraries and publishing and communications media in their intranational, cross-national, and cross-cultural contexts. Its International Library Information Center (q.v.) is unique in North America as a scholarly resource, comprising primary source materials in 33 languages from 142 countries of the world and supported in part through grants from the A. W. Mellon Educational and Charitable Trust and the Ford Foundation.

From its establishment in 1962, the school has been enriched by visiting international faculty, and by an international student complement comprising approximately 15% of the student body, and currently representing 22 nations of the world. More than half of the faculty has had significant overseas teaching and/or consultant experience in Europe, Africa, Asia, Latin America, and Australia.

Since 1970 the school has hosted on a regular basis Multiregional Seminars for members of the international library community under auspices of the United States Department of State. In 1973 the Graduate School of Library and Information Sciences joined with the College of Librarianship, Wales, to establish the first International Summer School in Librarianship and Information Science, which convenes annually in Aberystwyth, Wales, under continuing joint sponsorship, attracting advanced students from throughout the world.

COMMUNICATIONS

The school has been cited nationally for its innovative programs of teaching and research centering on human relations training for library and information per-

sonnel. Recently, major research grants in this area have supported the conduct of a national institute on the role of the librarian as learning consultant, a pilot study of the function of the public library in informal adult learning, and a national examination of individual self-planned learning in America. The school was the first in the United States to offer a special program for the preparation of information counselors, and to sponsor a national conference on manpower needs in the new and emerging information professions.

FACULTY RESEARCH AND PROFESSIONAL ACTIVITIES

The school's faculty has a sustained record of productive scholarship and professional leadership in the library and information fields. Between 1970 and 1974, a study of faculty activities indicated that 11 members served as editors of monographic series or scholarly and professional journals, including the editorships of the *Encyclopedia of Library and Information Science* and the *Encyclopedia of Computer Science and Technology*. During that same 5-year period, these individuals were responsible collectively for authorship of a total of 44 book-length publications and 227 journal articles, excluding book reviews. This represents an average of 1.4 monographs and 7.3 journal articles per faculty member.

A close and continuing liaison with the library and information fields is also maintained through professional consulting and leadership in professional, scientific, and scholarly organizations. In addition to faculty participation in such groups, the school has the distinction of serving as the permanent secretariat for Beta Phi Mu, the international library science honor society, founded by Dean Emeritus Harold Lancour.

The Future Mission of the Graduate School of Library and Information Sciences

The mission of the Graduate School of Library and Information Sciences is to make the maximum contribution possible toward enhancing the quality of library, media, and information services to society. To the traditional role of the librarian in the conservation of recorded knowledge has been added an equal responsibility for the effective, timely dissemination of useful information to both specialized clienteles and to the general public.

The school combines programs of instruction, research, and service in the library and information sciences designed to expand knowledge and enhance understanding of the nature, organization, transmission, and utilization of information. Its activities are essentially interdisciplinary both in operational philosophy and in curricular structure. Chief among them are:

> To contribute to the growth of basic knowledge in the library and information sciences through the conduct of research and the dissemination of the results of research.
>
> To educate scholars who will teach and conduct research, practitioners who will serve as managerial and operational staff in libraries and information centers, and

designers of information systems who will take advantage of modern technological opportunities.

To offer superior programs of professional instruction that will be responsive to the needs of the Commonwealth of Pennsylvania, as well as to the broader needs of the national and world library and information communities.

To develop and conduct programs of continuing education adapted to the needs of library and information professionals in the Commonwealth of Pennsylvania, the region, the nation, and the community of nations.

To make available to libraries and information centers the expertise and educational services of the school in ways consistent with its primary functions of teaching and research.

To provide leadership and to cooperate in the development of training programs with state and local public agencies, and with other colleges and universities, to meet staffing needs at all levels in libraries and information centers.

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THOMAS J. GALVIN

PITTSBURGH. UNIVERSITY OF PITTSBURGH LIBRARIES

History of the University

The history of the University of Pittsburgh is interwoven with the history of the city. Pittsburgh is unique. It was once famous for its huge steel mills, belching black smoke, that brought great wealth to a few industrial giants. Pittsburgh pioneered in smoke control in the 1930s, and after World War II an all-out effort was made to clean up the pollution from the mills and factories. At the same time, inner city decay was replaced by skyscrapers rising in clean air at the confluence of three rivers. The city is equally proud of the rich heritage of the many nationalities who immigrated there to work in the coal and steel industries. All this vitality is reflected in the image of the Cathedral of Learning, Chancellor Bowman's far-sighted symbol for the university, and in Chancellor Litchfield's concept in the 1960s of a great university. Recent closer ties with the Commonwealth of Pennsylvania emphasize the university's commitment to urban and state interests.

The University of Pittsburgh was chartered in 1787 as the Pittsburgh Academy, a log cabin that formed the nucleus of the Western University of Pennsylvania, and was rechartered and incorporated in 1819.

Two great fires, one in 1845 which raged through one-fourth of the city, and one in 1849, destroyed the university buildings and equipment. The second fire closed the university for 6 years. During this period the trustees and faculty pondered the direction of the university—should it follow a classical tradition or should it follow the needs of a growing industrial community and provide a practical scientific training? The debate was resolved in a compromise that retained the classical education leading to an arts degree and developed a curriculum with an engineering degree. The admittance of the first woman student in 1893 led to the formal beginning of coeducation in 1895. After several moves from its beginning in 1787, the Western University of Pennsylvania moved to its present location in 1908 and was renamed the University of Pittsburgh (Pitt). In 1926 ground was broken for the Cathedral of Learning, the inspiration of Chancellor John Bowman, who envisioned a dramatic, evocative building to excite community interest and to enhance the university's reputation. Dollars poured in from major corporations, augmented by pennies from 97,000 children in the Pittsburgh public schools, to

build the 42-story building which made the institution known as the Skyscraper University (see Figure 1).

The university had long recognized the potential of the many ethnic groups who inhabited Pittsburgh and their desire to further their children's education. In 1918 the university opened the Americanization Institute to train teachers and social workers who worked with immigrants. Pittsburgh's population was one-third foreign-born and one-third first-generation Americans. University rosters attest to the great diversity of nationalities who attended Pitt from the early 1900s on.

The cultural heritage of the many ethnic groups who settled in Pittsburgh was enshrined in the world-famous nationality rooms which were conceived in 1926. Eighteen classrooms were provided in the Cathedral of Learning by specific nationality groups, who raised money and commissioned artisans to furnish each room

FIGURE 1. *The Cathedral of Learning.*

in authentic detail to reflect its heritage. Various national governments donated objets d'art to enhance the rooms.

After World War II the university experienced the upsurge in enrollment that swept the country. Pittsburgh was in the midst of a physical renaissance and many of the community leaders who brought new vigor to the city were members of the university's Board of Trustees. In 1955 Dr. Edward Litchfield was appointed as chancellor. Chancellor Litchfield's "Commitment to Excellence" sparked a renaissance within the university which took it from a regional institution to a university of national importance and international dimensions. The university issued a report to the community in 1965 that demonstrated the progress made by the institution in just 10 years. For example, in 1951, 64% of the freshman class was from Allegheny County, 31.5% from other counties in Pennsylvania, and 4% from outside the state. In 1965, 39% were from Allegheny County, 27% from other sections of Pennsylvania, and 34% from other states and foreign countries. In 1954 Pitt had housing facilities for 100 students; in 1965 this was expanded to 3,400. In 1955 there were 23 buildings on campus; in 1965 the campus doubled in size and contained 40 buildings. In 1955 there were 561 full-time faculty members, of whom 56% had Ph.D.'s; 10 years later, the full-time faculty numbered 1,091, of whom 85% had Ph.D.'s. In 1959 Pitt pioneered the trimester plan which, with modification, is still operating (*1*).

In 1964 the "International Dimensions" effort was initiated. Utilizing an interdisciplinary faculty, the university developed three areas of scholarly interest: Latin America, Asia, and Russia/East Europe. It also administered programs in foreign institutions and universities on a cooperative basis. The "International Dimensions" programs were coalesced into the University Center for International Studies in 1968.

Altogether, between 1955 and 1965, the university set up nine interdisciplinary centers, three new schools, and three new departments, and expanded the Medical School from 10 to 16 departments. One of the new schools was the Graduate School of Library and Information Sciences, which was moved from the Carnegie Institute of Technology. The university already had a branch campus in Johnstown, Pennsylvania, founded in 1927. During the 1960s three more branches were established, at Greensburg, Titusville, and Bradford, Pennsylvania.

In 1965 Dr. Litchfield resigned his position after suffering a heart attack. A tragic plane crash in 1968 ended his life and the life of his wife, two sons, and his mother.

In 1966 the university became part of the Commonwealth System of Higher Education. Pitt is still a private institution but now has a special relationship with the Commonwealth of Pennsylvania. Following two interim chancellors, Dr. Wesley Posvar was appointed chancellor of the university in 1967. He continued the commitment to develop an excellent university and emphasized its potential as an influential urban center. In his first annual report, Dr. Posvar focused on the university's unique opportunity to meet the challenges of urban society. And again in 1972 he wrote: "Urban society is not only where the University is geographically, but it is

where most of our students come from, where we gain our practical experience, and where we deliver our public service. The city is both our home and our laboratory; the megalopolis is our milieu" (*2*).

The university's expansion of resources and facilities progressed with input from the surrounding community in the planning stages. In 1974 the University of Pittsburgh, including four regional campuses, had 24,810 full-time equivalent students, 2,136 full-time faculty, 49 buildings plus 8 affiliated institutions, 15 schools, and 169 academic departments.

The Library: A Brief History

University of Pittsburgh catalogs prior to 1875 mention a library of 20,000 volumes, but most of the collection was presumably destroyed in the fires of 1845 and 1849. Founding of the present University Library may be said to have taken place in 1874 with receipt of the Robert Watson Collection. The Watson Collection included some 2,000 volumes in mathematics, natural science, and in ancient and modern languages. In 1907 the library was further enriched by a gift of over 2,500 volumes from the heirs of Peter Alldred. Later the family established an endowment which even today enables the library to buy works of current fiction, travel, biography, poetry, and drama.

In 1908, when the Western University of Pennsylvania became the University of Pittsburgh and moved to its present site, the University Library was housed on the first floor of State Hall, the main campus building. This was razed in 1970 to provide space for the new chemistry building.

In 1910 the university was designated a depository for U.S. government documents. At first, every document printed by the government for distribution was acquired, and in 1910 these amounted to some 1,000 publications a year. Every year the output increased and in 1922 the superintendent of documents advised that new legislation provided for sending only requested documents; so the library had to accept only those classifications that it required.

In 1918 the university received from Mary and Edith Darlington a collection of 11,000 volumes, known as the William H. and Mary C. Darlington Memorial Library, in honor of their parents. With the death of Mary in 1925, the university received several thousand more volumes and a contribution toward a library building fund. Even a cursory survey of materials reveals William M. Darlington to have been a man with wide reading interests including poetry, drama, biography, and natural history. The collection is rich in volumes which tell of pioneering travels in western Pennsylvania and the Ohio Valley as well as some 325 holograph letters which refer to persons who were prominent in early U.S. history. It contains Audubon elephant folios and first editions of Dickens and Thackeray. The library is best described as a gentleman's library of the 19th century. The collection contains primary and secondary source material for the colonial period, the Revolution, and the War of 1812, with particular emphasis on western Pennsylvania and the Ohio Valley.

In 1924 the University Library collections were reclassified from the Dewey

Decimal System to the Library of Congress Classification scheme. Librarians serving the School of Medicine had previously adopted the Library of Congress plan. In 1940–41 the periodical holdings of the University of Pittsburgh Libraries appeared for the first time in the Union List of Serials sponsored by the Library of Congress.

In the early years of the University Libraries a succession of professors assumed charge of the libraries along with their teaching duties. For brief intervals, several catalogers were administrators. In 1920 Mr. J. Howard Dice was appointed head librarian and held this post until his death in 1939. Following several interim years, Mr. A. L. Robinson served as head librarian, from 1942 through 1951.

Although the professional schools had always maintained separate libraries, over the years the shortage of space for library growth brought an increasing number of demands to establish departmental libraries. By 1930 the university had developed some 31 separate library units, ranging in size from 110 volumes in industrial engineering to 12,750 volumes in law. Except for the Evening School of Business Administration, all department libraries were run by student help or by the departmental secretary, with cataloging done by the main library.

In 1934 it was decided to move the main library to the fourth, fifth, and sixth floors of the new Cathedral of Learning, which had been under construction since 1926. When the new library quarters first opened for use in 1936, individual seating was offered for 640 readers and the new book stacks afforded shelving for 140,000 volumes. Six departmental library collections were now merged with main library holdings. The attractive new facilities greatly improved library service. Only 3 years after its move to the Cathedral, however, the librarian reported that once again library stacks had been outgrown and, despite expansion to the third floor and later to the basement, in every report submitted from 1945 to 1966, succeeding librarians stressed the need for additional space as a continuing problem and warned that failure to provide space would cause strangulation.

In 1950 Mr. Ralph Ellsworth, librarian at the State University of Iowa, was employed as a consultant to prepare an analysis of the library system. In his report he gave much credit to the library staff's dedication, stating: "I am sure that there is no library staff in the country that accomplishes so much work per man-hour as does the Library staff at Pittsburgh" (*3*). He recommended that the library should have three focal points: a new, separate structure should be erected to hold the main library collections; a Science-Technology Library should be built adjacent to the science buildings; and the Medical Library should be housed in the Medical Center. He also recommended that all library planning should be coordinated and that the director of libraries should participate in all new planning. Many years were to elapse before Mr. Ellsworth's recommendations were implemented; the main library building was not opened for another 17 years and a science library never was built.

Miss Lorena Garloch was appointed head librarian in 1952 and served through 1963. Miss Garloch, working under great financial handicaps, nevertheless increased the library holdings substantially. She secured Mellon funds to acquire significant materials and inaugurated the Gift and Exchange Department. She also developed a library trainee program and created the position of bibliographer. When Dr. Litch-

field was appointed chancellor in 1955, his plans for expanding and improving the university gained some advantages for the library. A generous endowment established the Stark Collection of spoken recordings and the Stark Collections in Economics and Judaica. The library acquired the Mary Roberts Rinehart Collection of books, manuscripts, and memorabilia. In 1960 the Ford and Harriet Curtis Theatre Collection was donated and the Human Relations Area Files were acquired in hard copy. In 1960–61 two new libraries were opened, one for the Natural Sciences and one for the Graduate School of Business. The following year a library was set up for the new Graduate School of Library and Information Sciences. In 1961 library holdings reached the one-millionth volume (including microtext), and that year the library was admitted to the Association for Research Libraries.

In 1963 the first major purchase of Latin American materials was made. The Chinese collection was started in 1960 when the Department of East Asian Languages and Literature was established. In 1965 this collection formed the nucleus of the East Asian Library, which within 10 years emerged as 14th among 50 East Asian collections in the United States.

Despite these high points, the libraries struggled under the perennial handicaps of shortages of space, money, and personnel. While the university enlarged its scope and enhanced its reputation, the library functioned poorly. For 2 years (1963–1965) the library was administered by an executive committee, consisting of four department heads and the dean of the Graduate Library School. The Senate Library Committee in 1965 pressured the university administration to upgrade the library. Their report to the University Senate listed the current problems:

1. Lack of leadership.
2. Lack of funds and personnel. (The library budget was 1.2% of the total university budget. Only $57,000 in unencumbered funds were available for library materials for the year.) Staff was extremely short (one person was in charge of acquisitions, bibliographic services, and Gift and Exchange). Special areas such as Latin American materials had no personnel. The Slavic librarian was bibliographer, cataloger, and reference librarian, with no supportive staff for processing.
3. Lack of space. (The stack area had boxes in all the aisles, and whole collections were in storage.)
4. Service (reduced hours, staff attrition with no replacements, causing huge backlogs).
5. Lack of prestige (resentment from faculty and students; prospective faculty discouraged from coming to the university because the library was inadequate and archaic) (*4*).

All through the years the library had fought valiantly for a modest share of the university budget. Before Chancellor Litchfield's tenure, the majority of students were commuters and, consequently, were not prone to spending long hours doing library research. The rise of dormitories and resultant influx of resident students, coupled with the new, strong graduate programs, changed the library climate. Unfortunately, although money became available to support specific research programs, the library had to compete with the enormous costs of expanding buildings

and academic programs. Therefore, it was not suddenly affluent but striving desperately to compete. Particularly during the expansion period, new programs and whole departments were established without the library's knowledge. Thus, no opportunity was provided to select appropriate materials to support new courses.

The year 1965 proved to be a turning point for the libraries. Dr. C. Walter Stone was appointed director of University Libraries with the university administration's pledge to upgrade the libraries. Dr. Stone immediately launched pilot studies on staff utilization, work flow, and management of library services; recruited senior professional personnel to implement new organizational plans; and prepared to automate all possible routines and processes. He established an administrative policy, an accounting system, and personnel benefits including classifications for nonprofessional staff that reflected library duties; ordered new equipment; and opened up communications with academic departments. An inventory of the collection was started because at that time no one really knew the exact holdings of the main library or the specific weaknesses in various areas of the collections.

Simultaneously, money became freer. NDEA funds were acquired to expand the acquisitions program. Foundation money was available for several new academic programs including library materials. For example, special emphasis was placed on Spanish-speaking Latin America, which would become the university's major overseas area of concentration. The library purchased the Andreana Collection, rich in volumes representing major poets of Latin America, Spanish drama of the late 19th and 20th centuries, and Mexican and Latin American periodicals. Several years later complete files of important Bolivian serial publications and sets of Cuban publications issued during the revolutionary period were purchased. As a result of these and other acquisitions, the University of Pittsburgh has one of the finest research collections on Bolivia in the United States. In 1965 interlibrary loan statistics showed for the first time in many years that more volumes were loaned than borrowed.

All of the reorganization was geared to operations in the new library building, which was under construction. This would be the first separate library facility in the 177-year history of the university. The groundbreaking ceremony had been held in 1964 following Commencement exercises. L. Quincy Mumford, librarian of Congress, gave the Commencement Address revolving around the Commencement theme "Knowledge Availability."

The Hillman Library, named in honor of John Hartwell Hillman, Jr., was financed by the Hillman Foundation, the Hillman family, and the legislature of the Commonwealth of Pennsylvania. In January 1968 the five-story library opened at the corner of Forbes Avenue and Schenley Plaza, adjacent to the Cathedral of Learning (see Figure 2). The completely modern library features an open-stack arrangement and includes a Communication Center providing nonprint resources and staff for producing them. The building has a capacity for 1,200,000 volumes and 2,067 reader seats, including 538 carrels and 75 faculty studies.

Dr. Samuel Gould, chancellor of the State University of New York, gave the dedication address, appropriately titled "The University Library in an Urban Setting." His examination of the changes in American institutions of higher learning

FIGURE 2. *The Hillman Library.*

to meet the needs of a shifting society since the days of the small frontier colleges reflected the changes the University of Pittsburgh had undergone since its log cabin beginning in 1787. He specified the library's role in meeting the need of an urban university to aggressively broaden the spectrum of its services to the community (*5*).

Because of the new accessibility to all its collections, in its first year of operation Hillman reference services increased 160%; circulation increased 63% over a 2-year period; and requests for government documents rose 436% (*6*).

In 1968 the University of Pittsburgh joined the Center for Research Libraries, a nonprofit service corporation established in 1949 by a group of major universities as a central storehouse of specialized research material, those items that do not require heavy use.

In 1970 Mrs. Glenora Rossell, the present director, was appointed to head the library system. Mrs. Rossell established the Library Resources Department which combined the operations of the bibliographers, Gift and Exchange, and Special Collections. It was organized to implement a dynamic collection development program. An expanded bibliographic staff concentrated on an extensive analysis of the library holdings in the various academic areas and energetically enlisted faculty support of the library. The Technical Services area was reorganized to separate original cataloging from the remaining processing functions, which were directed by a coordinator. Automation has streamlined the processing operation and has generated a current record of an order through each processing stage. Since great emphasis is placed on cooperation among the various areas, the public service and technical service staff work together to promote new concepts of service.

For many years Pitt library administrators have recognized the value of sharing resources and have actively promoted cooperative programs. In 1947 the first

committee on library cooperation was appointed, which included the librarians from Carnegie Library of Pittsburgh, Carnegie Institute of Technology (now Carnegie-Mellon University), and the University of Pittsburgh. The first suggestion was for a joint library for Pitt and Carnegie Tech, but the idea was vetoed. The committee did agree on a Union List of Serials for the Pittsburgh area, keeping each library informed on costly purchases, exchange of catalog cards for new books, and cooperative lending privileges for graduate students and faculty. The committee also decided that Pitt should concentrate on building social science and humanities collections, while Carnegie Tech should focus on physical science, engineering, and fine arts. Following the recommendation for exchanging catalog cards, Pitt libraries filed cards from Carnegie Tech until 1952. The catalog drawers became too crammed, so the exchange was discontinued. This tentative beginning toward cooperation led eventually to the establishment in 1966 of the Pittsburgh Regional Library Center (PRLC), a nonprofit corporation. Within one neighborhood of the city there exist five academic institutions, three giving graduate degrees, and two at the bachelor's level. Located in their midst is the Carnegie Library of Pittsburgh, with holdings of 905,025 (7). Much duplication of material was draining the financial resources of these libraries. Altogether, eight Pittsburgh academic institutions, plus Carnegie Library, founded PRLC, which drew up three basic goals:

1. To improve the efficiency of each member library through cooperative efforts.
2. To solve research, administrative, and service problems of common interest.
3. To coordinate and integrate member libraries and the center into the larger library and information systems being developed regionally, nationally, and within intellectual disciplines (*8*).

PRLC members immediately explored methods to create a computerized Union List of Serials available in the Pittsburgh area, the cooperative ordering of selected materials, storage of little-used items, and cooperative microfilming.

PRLC libraries extend lending privileges to all students of member institutions. In 1971 the Ohio College Library Center invited PRLC to participate in shared cataloging to reduce telephone line charges for Ohio members. The first computer terminal was placed in Hillman Library; now there are terminals in 23 PRLC libraries (8 public and 15 academic). In 1976, the membership of PRLC had expanded to include 29 academic institutions, 9 public libraries, and 2 special libraries.

The University of Pittsburgh Libraries Today

Besides the main library, the University of Pittsburgh Libraries include the following:

1. Allegheny Observatory Library, which has an outstanding collection of star photographs.
2. Bevier Engineering Library—holds all relevant material for the many branches of engineering taught at the university, performs data bank searches in the engineering fields.

3. Buhl Library of Social Work.
4. Chemistry Library—includes current awareness and retrospective computer search service, using the *Chemical Abstracts* data base.
5. Collection in Regional Economics Library—devoted to regional and urban economics, and demography. Maintains several data bases.
6. Computer Science Library.
7. Darlington Memorial Library—rich in primary and secondary source material for the colonial period, French and Indian War, the Revolution, and the War of 1812, emphasizing western Pennsylvania and the Ohio Valley.
8. East Asian Library.
9. Graduate School of Business Library—collection includes American corporation reports, financial and industrial services, and government documents relevant to curricular and research needs of the Graduate School of Business.
10. Graduate School of Library and Information Sciences Library—contains a collection of historical children's literature dating back to the 17th century.
11. Graduate School of Public Health Library.
12. Graduate School of Public and International Affairs Library.
13. Henry Clay Frick Fine Arts Library—moved in 1965 to a beautiful renaissance building built by Helen Clay Frick; important collections in Oriental art and materials covering the Byzantine, early Christian, Medieval, and Renaissance periods.
14. Langley Library of the Natural Sciences.
15. Maurice and Laura Falk Library of the Health Professions—the main library of the University Health Center. Operates a computer-based Medical Literature Analysis and Retrieval System and contains a significant History of Medicine collection.
16. Law School Library.
17. Mathematics Library.
18. Physics Library.
19. Stephen Collins Foster Memorial Library—largest and most complete assemblage of material relating to the life and works of the 19th-century American composer.
20. Theodore M. Finney Music Library—the Finney Collection contains valuable historic materials and original manuscripts.
21. Western Psychiatric Institute and Clinic Library.
22. Branch campus libraries at Bradford, Greensburg, Johnstown, and Titusville, Pa.

Hillman Library, the main library of the university, is primarily the Social Sciences/Humanities Library. It also houses the East Asian Library, the Buhl Collection in Social Work, the Afro-American Collection, and Special Collections. Besides rare books and manuscripts, some of the major collections in the Special Collections Department are: the Curtis Theatre Collection, the Hervey Allen Collection, the Mary Roberts Rinehart Collection, the Nietz Collection of Education Books, and the Archives of Industrial Society. One hundred seventy-one collections comprise the archives, which include historical records of business, ethnic cultural and social organizations, public records of governmental agencies, and the private papers of individuals and families. The orientation is on the urban industrial society of western Pennsylvania.

The Communication Center contains an Instructional Production staff to assist

faculty members in the development of courses employing nonprint media and to provide TV support for instruction, including production of nonprint resources not otherwise available. The center also supports a graphics department, audiovisual services, and an Independent Study Center featuring individualized mediated instruction.

The Processing Department in Hillman Library prepares materials for the main library and 13 department and professional school libraries. Computer technology is an integral part of the library's operation. All basic routines are automated: in-process, OCLC cataloging, accounting, and lending. The University of Pittsburgh was in the vanguard in automating its book processing and circulation, and especially in developing base searches.

The libraries are components of the Campus-Based Information System (CBIS), administered by the university's Office of Communications Programs, which affords expansion of traditional library service to meet today's information needs, particularly through the use of data bases. Information Utilization Laboratories for the social sciences and engineering sciences have been created. Data bases available at the university include Engineering, Chemistry, Economics, Social Science, Political Science, Medicine, and Education; these are located in various parts of the campus. Many of the data bases are searchable with one program. The Pittsburgh Information Retrieval System (PIRETS) program was written by Pitt staff and all tapes received are converted into PIRETS-searchable format. Hillman Library houses the New York Times Information Bank, the first computerized hook-up with the Information Bank ever installed outside the *Times*'s own office.

The Hillman Library system is administered by the director and a management staff consisting of four coordinators who supervise, respectively, cataloging, information services, library resources, and technical processing; and two assistants to the director who are responsible for administration/fiscal control and library systems development (see organization chart, Figure 3). The director of libraries reports to the provost. An Executive Committee for Libraries and the Senate Library Committee act as advisers on policies and goals. In 1970 the professional librarians were granted faculty status.

Total staff in the University Libraries in 1976 was 128 professional and 129 supportive full-time staff. Total holdings in 1976 of the University of Pittsburgh Libraries were 2,916,198, including microforms.

The primary goal of the University of Pittsburgh Libraries is expanded service within the framework of economical operation. The libraries' constituency has expanded, requiring a variety of tools, ranging from the scholarly tome to the sophisticated information retrieval base. As the university has developed its academic programs, the libraries have strengthened their collections; as the university's role has broadened to serve the community, the libraries have emerged as a dynamic agency for communication.

Automation of library processes will be refined continually in order to provide instantaneous access to records on library holdings, locations of materials, and operating statistics as well as bibliographic files. Because cooperative systems provide improved services at reduced cost, the libraries strongly endorse the concept of

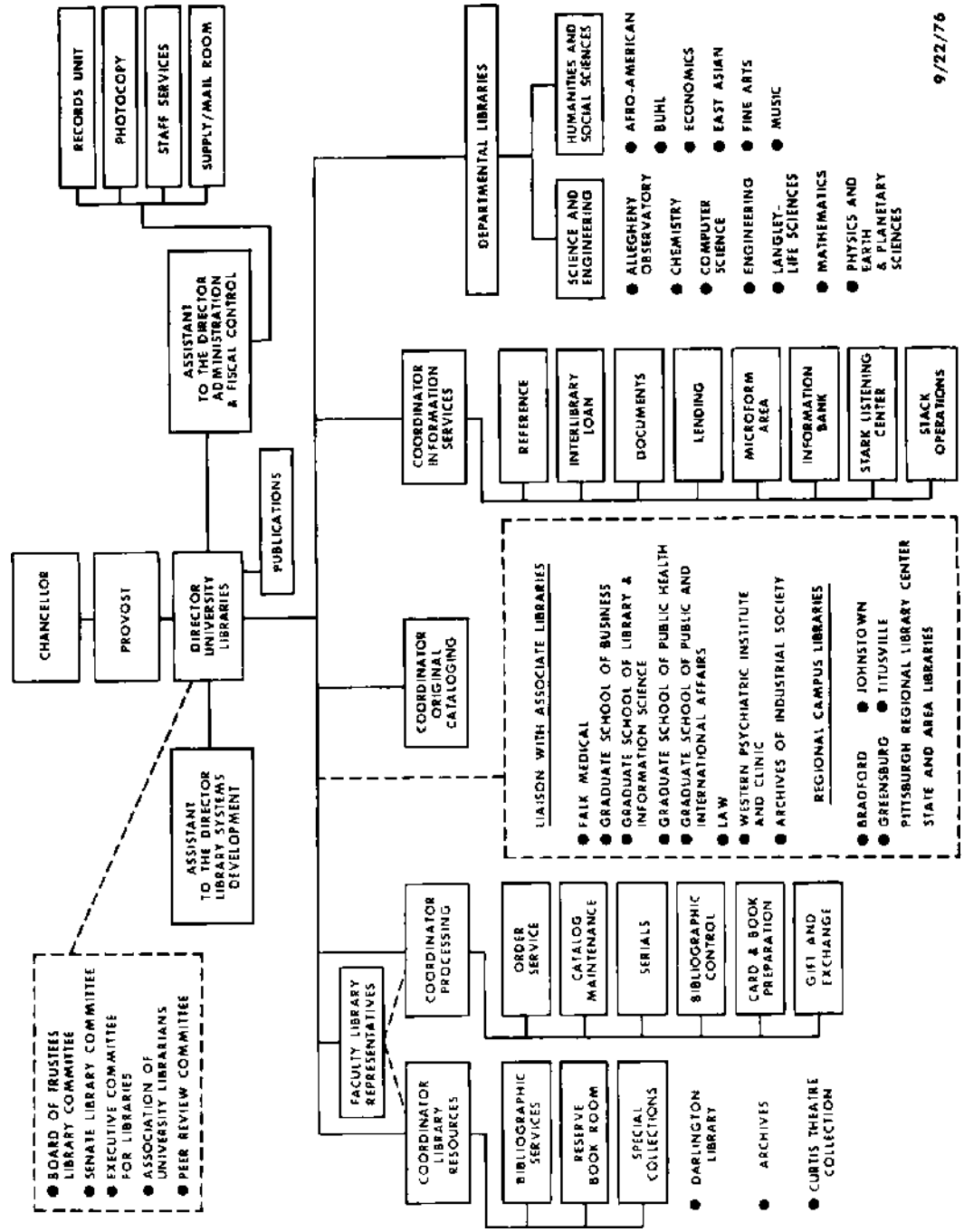

FIGURE 3. *University of Pittsburgh libraries organization chart.*

interlibrary cooperation and will continue to explore all possible ways to extend networking and shared resources.

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PLACEMENTS, LIBRARY SCHOOL

Historical Background

Melvil Dewey, advertising the opening of the first school for the training of librarians, specified in the *Circular of Information for 1886–87* that the main purpose of the school was:

> . . . to provide satisfactory librarians, cataloguers, and assistants for the rapidly growing number of libraries public and private, town and college, reference and circulating, that wish help in starting anew or reorganizing with the best and cheapest methods, and in the modern library spirit. A number of assistants have already been sent out from the preliminary classes to fill such vacancies before they had opportunity for the regular training. A registry will be kept of all students wishing positions, with notes of their qualifications, experience, salary required, and position, or kind of work and section of country preferred. The school will undertake, for any library or individual wishing such services, to recommend the student who seems best adapted to the work required. In this way the most satisfactory assistant can be secured for a given salary. Every student will be entitled to free registration and to such recommendations for vacant positions as his abilities and work while in school, or elsewhere, have merited. No definite promise of position or salary can be made, but the experience of the past year justifies the opinion that there will be applications each year for considerably more than the ten students of whom provision has been made.

In addition to founding the first library school, Dewey thus created the first employment registry for library school students and graduates. As other library schools became established, each also developed placement services of some sort.

The 1948 Princeton Conference on Library Education report summarized the basic points concerning placement throughout the period. It was clear that no school guaranteed employment to a graduate, but all did recognize varying degrees of responsibility for placement of graduates; no school charged either the graduate or the employer for the service; effective operation required active records, since not only new graduates but those already working were considered in making recommendations; finally, schools made recommendations not only on the basis of the school record but also on the professional record.

Practically speaking, the library schools, and to some extent the American Library Association (ALA), were the only sources through which employers could find trained people. No other major agencies existed; not only did the library schools hold the most accurate and complete records, but faculties were interested in placing trainees and alumni and were in a position to know the field, many of the practicing librarians, and the current students or alumni seeking new positions. Despite the cost to the sponsoring schools, the advantages to the schools of maintaining a placement service were, and still are, in the strong ties developed with alumni, the strong ties developed with employers (many of whom were also alumni), the strengthening of

the reputation of the school to the extent that alumni were well trained and appropriately placed, and the influence of the school on general professional development.

The 20-year period from about 1950 to 1970 was a period during which jobs were relatively plentiful and professionally trained personnel scarce. By the middle 1950s the trend was increasingly away from highly individualized service and toward a contact or clearinghouse type of service in which employment openings and qualified people could be matched but which was generally no longer a highly selective service.

In the 1950s and 1960s other sources of job information expanded and developed. Some professional journals carried classified listings as early as the 1920s and these listings increased as employers found it more difficult to find employees. Nonprofessional publications such as *The New York Times* and the *Saturday Review* published advertisements. Many of the specialized library associations increased their services, and a professional employment network operating through state employment services was instituted. A formal national registry for librarians under the auspices of the Illinois State Employment Service started in 1965 and still operates in cooperation with the American Library Association. Special purpose registries designed to recruit people for all types of work at schools and colleges became available. Commercial employment agencies, particularly teacher-placement agencies, became useful sources of job information. In the 1970s job seekers have innumerable sources from which to seek guidance and job information.

The Role of the American Library Association

The American Library Association offered placement service as early as 1917 and by 1920 a placement office had been established at ALA headquarters. Called the Personnel Division until 1946, the office then became known as the Office of Placement and Personnel. In 1948 the office was abolished as an economy measure. A much curtailed service was then offered for a short time.

The "Placement Service Report" of 1953, prepared by an ALA subcommittee, analyzed the placement function of ALA for the Executive Board. Although a placement service was felt to be necessary and desirable, the decision was made that the ALA should not finance such a service but should continue to work with existing placement operations, helping them to improve the quality of service. It was feared that to proceed with any of the plans suggested by the subcommittee on Placement Service would be to jeopardize the tax-free status of the ALA as a professional organization. The ALA has continued that policy to the present time. The Office for Library Personnel Resources, established in the early 1970s, functions in the areas of recruitment, library education, and employment, but not directly with placement. It serves as the major component within ALA that concerns itself with librarianship as a profession, with career goals, and with the development of policies and practices which enable staff to develop professionally.

Methods of Placement

Most accredited library schools maintain placement services either within the school or through a centralized college or university service. A majority of the schools provide service to current students and to alumni, but the emphasis is on current students. The services are supervised in a variety of ways: by faculty members, the dean, the assistant dean, or by full-time or part-time placement officers. Placement services vary in the amount and quality of the aid given but most provide a variety of basic services.

Placement services act as clearinghouses for job information on available positions. Information received by mail or telephone or called from other sources for part-time or full-time professional or preprofessional positions, or positions in related lines of work, is usually posted on bulletin boards and in notebooks. Listings are often arranged by type of library, geographical area, or both. Keeping such listings current is a time-consuming but important task.

Another service is provision for interviews for potential employers and recruiters who often use school facilities to interview applicants. Potential employers, frequently graduates known to faculty members and placement officers, often request information about individuals directly from faculty and staff, who may suggest graduates or current students for particular jobs.

Using the information contained in the job listings, statistical analyses of the job market and placement opportunities can be developed and used by placement officers in counseling. Counseling job-seekers is an important placement function. Students and alumni who need advice on job direction, prospects, résumés, and tactics in job-hunting are encouraged to use the service where it is provided. Many schools have assemblies and organized workshops for the discussion of job-search strategies and the state of the marketplace.

In recent years, schools have expected students to take the initiative in the activation of their placement files, requesting references, and developing résumés, in contrast to an earlier time when such activities were the responsibility of the placement officer in many schools. Personal placement files vary from simple to elaborate, but generally include a current résumé and several letters of reference. These files are maintained at the schools and mailed to prospective employers at the request of the employer or prospective employee. They may or may not be confidential records. Keeping such records up to date is difficult and the responsibility is on the user of the service to do that.

Most schools request new graduates to inform the placement service about their first positions and salaries, but little attempt is made to keep track of subsequent moves. Several schools publish job-information newsletters for alumni seeking positions in an effort to help those to whom the postings are not readily available. As placement services try to meet the employment needs of growing alumni groups and to place graduates in a tight job market, the cost of doing so is increasingly becoming a major concern for schools. Many schools now charge varying fees or are considering charging in an effort to continue quality service.

Sources of Assistance in Seeking Placement

There are many sources of assistance in seeking placement. Positions to be filled are widespread geographically and vary widely in type.

General sources of information are classified listings in national professional journals such as *American Libraries, Special Libraries,* and *College and Research Libraries;* and in the commercial professional press in the *Library Journal* and the *Wilson Library Bulletin.* Newsletters of various state, regional, and special groups also carry listings. Prominent among these are the AECT *Bulletin,* the ALA Black Caucus *Newsletter,* ARLIS/NA *Newsletter, Bulletin of the American Society for Information Science, Catholic Library World, Colorado State Library Newsletter, Law Library Journal, New Jersey Libraries,* and *North Carolina Libraries.* Library journals from other countries also carry job information. The Sunday *New York Times* lists openings for librarians, as do local newspapers throughout the country.

The National Registry for Librarians in Chicago, Illinois, was established in 1965 as a no-fee, centralized, nationwide clearinghouse for professional librarians seeking positions, and for employers. The Registry cooperates with the American Library Association at its midwinter and summer meetings by providing a placement center with opportunities for job interviews. In addition, there are commercial employment agencies which provide service for a fee.

Specialized library associations and groups are important sources for highly specialized positions. Many not only publish newsletters but also maintain data banks. Some distribute résumés and some are able to match positions and qualified applicants available. The newsletter and the services are generally free, or free to members, or available for a modest fee. A partial listing would include the American Association of Law Libraries, the American Chemical Association, the American Society for Information Science, the American Theological Library Association, the Medical Library Association, the Society for American Archivists, and the Special Libraries Association.

Many state library agencies and associations provide job listings and formal or informal referral services. State or regional library associations sometimes provide placement centers at annual meetings. The *Library Vacancy Roster,* compiled by the Federal Library Committee, lists federal vacancies monthly.

A recent innovation is the establishment of "job hotlines" sponsored by various groups, which are taped telephone listings of current vacancies. These are updated weekly and the caller pays for the call.

Library school placement services are an important source of job information and help in job-search techniques, particularly for current students. Most schools post job listings and many have newsletters. The majority of schools provide service only to their own students and alumni.

There are many other general sources of placement information not specifically designed for library job-seekers. For example, librarians seeking school positions find commercial teacher agencies helpful. *The Chronicle of Higher Education* lists positions in academic libraries, and the American Association of Junior Colleges

Career Staffing Center includes provision for placement of librarians. Numerous other such clearinghouse sources exist and are available to the imaginative jobseeker.

Certification

The issue of whether or not librarians should be certified to practice, as are members of some other professions, has been a topic of discussion since the turn of the century. A proposal to develop a certification system was examined in depth by an ALA committee in 1921. It recommended the establishment of a national certification board which would provide for several types of certification and which could award certification on the basis of examinations to those with no formal library school training. These proposals were not well received at the time and the issue has continued to be a controversial one. Currently only school and public librarians are concerned with certification to any degree. Public school librarians, like public school teachers, must be legally certified by the state in which they are working. In about half the states certification is mandatory for public librarians; other states have voluntary or no certification. Certification requirements vary from state to state although some states have made reciprocal arrangements or are in the process of doing so. Graduation from an approved library school program gives automatic provisional certification in most states where it is mandatory. School certification often requires the completion of very specific course work. Individuals should consult the most recent information available when preparing to meet requirements in a given state.

Neither academic nor special librarians are required to have certification, although some library associations, notably the Medical Library Association, do issue certificates to those completing specified course work. In the past such certificates have not usually been required of jobholders.

In periods when librarians are in short supply, formal certification is generally given lip service regardless of the law. In a tight market the law is carefully observed, and placement is contingent on appropriate credentials.

Recruitment and Selection Methods of Employers

Recruitment and selection methods reflect the times. During periods when there are more jobs than qualified people to fill them, such as the 1960s, employers compete strongly to fill each vacancy. Employers located in the less popular geographical areas, or whose salary scales are low, or whose general working conditions are unattractive are often unable to compete successfully for well-qualified personnel. When jobs are scarce and many well-qualified people are seeking employment, such as the mid-1970s, employers everywhere usually have large numbers of applicants for every job opening.

Employers recruit and select employees in a variety of ways. Generally the posi-

tion is advertised and applications solicited. Affirmative action programs require that positions be advertised as widely as possible in fairness to all who might be seeking employment, particularly women and those from minority groups. Ideally, employers acknowledge the receipt of every application. When great numbers of applications are received, many employers feel they are not adequately staffed to respond to each or take a long time to do so. Many anxious job-seekers feel that such treatment is needlessly rude. Employers usually describe the ideal qualifications in the advertisement. Respondents who are overqualified or underqualified are weeded out. Those applicants who appear to be the most promising are usually invited in for an interview. When the position to be filled is at a high level, for example, a director, associate director, or the head of a large unit, it is becoming common practice, particularly in academic libraries, to entrust the decision making to a "search committee," made up of several people representing various constituencies.

Individual employers, staff members, or the search committee interview the candidates chosen. A personal interview is considered to be very important, and frequently a candidate will be interviewed by many individuals and groups. Employers are interested in individuals who not only have the basic qualifications sought, but who also seem to have the ability to work smoothly and effectively with the staff and the community served. The expenses of getting to the interview are usually but not always borne by the potential employer.

The evaluation of recommendations is an important matter. Employers depend on written recommendations, which may or may not be confidential, and on word-of-mouth recommendations. References from professional colleagues and from former supervisors are considered the most reliable, those from friends the least reliable.

A tight job market permits the potential employer to be extremely selective.

Type of People: Easy/Difficult to Place

The Bureau of Labor Statistics Manpower Study, which has projected needs for library personnel through 1985, predicts that despite a tight job market there will continue to be a demand for Black and other minority librarians, outreach librarians, media specialists, automation specialists, and experienced administrators and supervisors.

Beginning-level librarians are the easiest to find and thus the hardest to place. New librarians with advanced degrees, particularly the Ph.D., and no library work experience sometimes encounter difficulties in finding positions suited to both their specialization and lack of experience. The impact of the increased number of holders of subject master's degrees and particularly of Ph.D.'s on the field is yet to be determined, but they should serve to upgrade quality. Librarians with experience and highly specialized training are harder to find and easier to place. The poised, articulate, and well-groomed person who is able to work well with staff and the public is easier to place than one who lacks these attributes. The nonconformist is usually more difficult to place, as are the ill-prepared and the emotionally unstable. Employ-

ers with tight budgets and many qualified people to choose from tend to take the fewest possible risks in hiring.

It is more difficult to place people who are unable or unwilling to move from a given area than it is to place someone who is willing to relocate. Those who are willing to work evening and weekend hours are easier to place than those who are inflexible about the working day.

Legal Implications

Since 1963 there has been a considerable body of federal legislation in both the United States and Canada which bears on placement practices and employment. In the United States, the Equal Pay Act of 1963, amended in 1972 to include professional employees, the category in which most librarians are classified, has been one of the most effectively enforced federal statutes barring discrimination in salaries and fringe benefits on the basis of sex. Executive Order 11246 of October 1968, amended by Executive Order 11375, prohibits discrimination on the basis of race, color, religion, sex, or national origin by any organization receiving government contracts. Executive Order 11478, August 1969, which also amended Order 11246, directed the establishment of affirmative action programs by all federal employers, and by all institutions receiving federal contracts. Academic libraries particularly have felt the impact of this legislation, which requires the employer to take positive steps to make equal employment opportunity a reality for minority personnel, including women.

Title VII of the Civil Rights Act of 1964, amended and enforced by the Equal Employment Opportunities Act of 1972, prohibits discrimination in employment conditions such as salary, benefits, hiring practices, and training. Guidelines set up by the Equal Employment Opportunity Commission stress minority recruitment; and many libraries and library systems seek to comply by advertising in widely circulated professional journals, by listing positions with various types of placement agencies, and by recruiting at schools which have large minority enrollments. Since the number of trained minority professionals is relatively small, the competition for such qualified people has been keen and has pointed up the necessity for recruitment to the profession of larger numbers of minority members.

Under the Federal Family Educational Rights and Privacy Act of 1974 (the Buckley Amendment), students in general are permitted access to confidential letters and recommendations written after January 1, 1975. A student or graduate may, by signing a waiver, relinquish the right to inspect recommendations respecting applications for employment. No one is required to do this but can choose to do so, since many potential employers prefer confidential letters of recommendation because they believe that these tend to be the most candid and helpful. Confidential records are sent to employers with the consent of the student or graduate and with the understanding that they are not to be shown to the person involved. One result of the Buckley Amendment is thought to be an increase in the number of recommendations given orally, helping to perpetuate the arrangement commonly called the "old boy

network" whereby individuals are identified and recommended or not recommended on the strength of personal contacts.

Canada has also enacted a considerable body of legislation concerning human rights and discriminatory practices. The most significant of these acts are the Canadian Bill of Rights of 1960, the Canada Labor Code of 1970, the Public Service Employment Act of 1970, the Unemployment Insurance Act of 1971, and the several Provincial Equal Pay Acts.

Current Problems

Many of the problems of placement are related to tightened budgets, the present dearth of jobs, the qualifications and expectations of those seeking positions, and the current state of the American economy. In 1970 library personnel needs began to decline in every type of library because of declining school enrollments and the imposition of increasingly austere budgets. At the same time there was a large increase in the number of librarians available, both new graduates and people seeking reentry to the profession. The literature of the 1960s is replete with articles on the increasing need for more librarians, and the number of library schools and graduates grew dramatically in these years. During these years qualified graduates who wanted professional stimulation and opportunities for growth and advancement, in an interesting community, combined with an equitable salary, could find such positions with relative ease. In the 1970s such positions became increasingly difficult to find, and current library literature on various aspects of placement reflects a disenchantment with schools and the field in general in handling of problems created by large numbers of people applying for almost every job available.

Despite the best efforts of many school placement services the problem of the lack of communication between schools and recent graduates is a serious one, partly because of staff shortages at schools and partly because of the failure of recent graduates to respond to requests for information on what they are doing and salaries received. There is some evidence that many new graduates go directly into other graduate programs, or do not immediately seek work for various reasons.

Skilled counseling for those at the entering level and those who are or ought to be seeking higher-level positions is a necessity in the current job market. Unfortunately it is not always available. The uncertainty of the current job market creates anxieties in student groups particularly, which are difficult to dispel. At the same time the expectations of many graduates are unrealistic in terms of the current scene.

There is a need for constantly updated, accurate statistics on salaries, number of positions available, type of positions available and qualifications expected, and the geographic location of positions. Such information would be most useful for those planning to enter the field, those about to graduate, and those who counsel. Several reasons are commonly given by both placement officers and employers for many placement difficulties. People who have limited geographical mobility for family reasons or because they prefer specific regions or localities may be limiting their opportunities. Poor local, regional, and national economic conditions creating a

scarcity of vacancies limit opportunities. Those who lack reasonable flexibility in the type of work which they will accept or in salary expectations are difficult to place, as are those with personality quirks which employers find unacceptable.

In recent years two trends have been evident in hiring practices. Employers appear to be upgrading requirements for entry at the beginning level to an unnecessary degree, demanding qualifications which only a short time ago would have eliminated people as being overqualified. At the same time, many libraries are upgrading nonprofessionals who are employed and giving them work which previously was considered to be professional work. Many people have had the unhappy experience of being interviewed for beginning-level positions, only to find out that the positions were filled by librarians with experience or filled from within by a paraprofessional.

Many placement services now advise new graduates to remain in, or even take, preprofessional positions in order to stay in the field. In many instances, however, employers do not allow degree holders to work in nonprofessional positions. Students or those seeking reentry are often encouraged to take volunteer posts in order to get experience.

A serious problem for the profession which reflects in placement activities is that of minority recruitment to the profession, and the influence of affirmative action programs at all levels of employment. Placement services are inundated by requests expressed in terms of affirmative action for racial and ethnic minority applicants and for higher-level positions for well-qualified women. At the same time many library staffs need men to balance the "feminine image" of the profession.

Future of Placement

Several trends in placement can be noted. Many sources of placement information will be developed and used, not school sources alone; the student or graduate undertakes the prime responsibility for placement; there will continue to be a nationwide interest in employment problems and an increasing interest in and insistence upon fair employment practices; schools appear to be more concerned with the beginning graduate than with those in the field; automation is still not much in evidence; through the operation of the Office for Library Personnel Resources, the ALA is taking a more active role than it has in many years.

Successful placement depends on the initial recruitment to a library school program and depends on quality programs designed to meet current and future needs in the profession. Cooperation among library schools, libraries, and related organizations is essential, and constant, planned interchange is necessary.

The cost of maintaining placement services within library schools must be weighed against the cost to the school and to the profession of not maintaining such a service. The current Standards of Accreditation of the ALA do not mention placement activities and so there is no attempt to measure effect. The quality of the placement service is not only a concern of the alumni in many schools but can serve to attract students to the school. Many schools continue to feel that their successful survival depends in part on the ability of the placement service to help

graduates, and that a centralized service is less likely to be as sensitive or efficient. This matter will continue to be debated.

The future will see large numbers of highly qualified people seeking positions and raising standards in the profession at the same time as paraprofessionals are being given opportunities to qualify on the basis of examinations and work experience for professional positions.

Library employment is projected to grow at a slow rate through 1985. The main source of jobs will be as replacements for librarians who retire, die, or leave the work force, rather than in an increasing number of beginning-level jobs. Projected requirements can be met by the estimated number of new graduates who will be entering the profession. Those people seeking reentry will be at a disadvantage.

Melvil Dewey's advice on placement still holds true:

> . . . If you chose to enter we will do the best we can to help you to success, but as in every other profession you must win your position by superior work. . . .

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CAROL L. LEARMONT

PLANNING LIBRARIANS, COUNCIL OF

See *Council of Planning Librarians*

PLANNING LIBRARY SERVICES: CONFERENCES IN LATIN AMERICA

This article does not pretend to be definitive, although it is concerned in part with the stages already passed in the evolution of Latin American library philosophy. There are various reasons for this decision, the most important of which relate to the following factors: the small editions in which the majority of Latin American meetings are reported; the impoverished collections in special libraries where the reports might be consulted; and the scant value and interest, at times nonexistent, of much of them. Despite these difficulties, the reports of 200 meetings have been consulted, of which only 40 are cited here.

Not to extend this article unnecessarily, meetings of specialized groups such as agricultural centers and libraries, biomedical libraries, and libraries of educational documentation have not been included, because the reports of such meetings do not aggregate fundamental recommendations for long-range planning, even though some of them will be found to contain interesting and valuable decisions. However, some nonlibrary meetings and those that took place outside Latin America are included, because they were devoted to planning in relation to our continent and because at these meetings Latin American specialists attended.

The major conclusions have not always come from the most important meetings. At times, small gatherings surprise the investigator with the quality of their work, usually the result of some highly respected person in attendance. In all cases, this article is confined to the approved decisions and recommendations. This scarcely reflects the wealth of the discussion and the effort which produced the decisions. Therefore, the most important of these meetings are cited in the reference list. In selecting the meetings to be included, another first consideration has been to embrace all kinds of libraries and information centers in a wide variety of countries.

Antecedents of and First Description of the Idea of Library Planning

The idea that libraries ought to be managed and developed according to a plan is not new. Nevertheless, the scientific concept of planning did not make its appearance until the decade of the 1960s, although it is possible to trace the earlier tentative beginnings of the emergence of libraries from isolation to take advantage as much as possible of their resources by means of the work of collaboration.

It should not seem strange that international organizations interested in libraries were troubled by the number of isolated gestures having no significant consequences. Thus, in the decade of the 1950s the need to provide for better library services in Latin America was centered in the declaration made in several meetings of the necessity of cooperation, coordination, and centralization of library services and activities. As an example, the Conference on the Development of Public Library Services in Latin America, convened by UNESCO in São Paulo, Brazil, in 1951 (*1*), insisted on such concepts as regional development, coordination and cooperation, and centralized and cooperative cataloging. It dedicated one part of its recommendations to "Kinds of Library Activity Coordination," in order to further the creation of organizations with coordinated functions which, in addition, were expected to assume responsibility for establishing standards in public library activities.

Progress from the idea of national cooperation to regional cooperation and from that to planning library services is not abrupt, but it is sufficiently rapid. In this often vacillating advance, in which ideas were usually unclear, we can take note of two facts: first, the role played by the Regional Center for the Western Hemisphere of UNESCO with its headquarters in Havana and by the Organization of American States; second, the parallel concepts of educational planning and library planning.

The concept of educational planning in Latin America arose in the Second Meeting of the Ministers of Education held in Lima, Peru, in 1956 (*2*). Its Resolution II stated:

> *Integral Planning of Education*
> In consideration of the fact that American countries have problems both quantitative and qualitative in the field of education for the solution of which it is advisable to use modern techniques of planning, *it is recommended that:* each of the governments of member states prepare an integral plan of education to establish a Department of Planning and that they send to the Organization of American States a report on their integral plans; that the Organization of American States and UNESCO provide assistance to the member states.

Nevertheless, the conference showed no great concern with libraries and, above all, not the slightest understanding that they should be included in this planning. They were limited to the brief mention in Resolution XV, "Methods and Materials for Campaigns and Programs of Literacy and Fundamental Education," recommending to the governments of member states the encouragement of the establishment of libraries in the same way the governments were advised to do what was

appropriate in the use of audiovisual materials, in the stimulation of interchange of reading materials, and other similar activities.

From the year following the Second Meeting of Ministers, noted above, and for a period of 10 years after, 1957–1967, the Regional Center for the Western Hemisphere of UNESCO had in its charge the realization of the Principal Project for the Extension and Improvement of Primary Education in Latin America. The chief enthusiast of this project was the Chilean educator Oscar Vera, who worked in the Havana headquarters of UNESCO with the Argentine librarian Carlos Víctor Penna. The reciprocal influence that the ideas of one of these men exercised on those of the other was made apparent by Vera's incursions into the field of librarianship, in his articles and other writings, and in the enthusiastic adherence of Penna to the idea of planning, translating its principles and concepts, requirements and specifications to the field of librarianship.

The first manifestation of this double influence appeared in the librarians' meetings that in notable number were held in Latin America in the course of 1956 and 1957. Among these we can cite the Mexican Meeting on Librarianship, Bibliography, and Exchange (*3*); the fourth meeting of Argentine librarians (*4*); the Costa Rican library science meeting (*5*)—all of 1956—and the first Panamanian library science meeting (*6*) of 1957. At each of these, the Regional Center of UNESCO presented a paper entitled *Basic Plan for a National Service of Academic Libraries* (*7*). This collaboration, which is unsigned, belongs to Penna and Vera. In it, they affirm strongly that academic libraries form part of the system of primary education and that the improvement of education ought to be realized by means of a "gradual plan whose development will be foreseen in various years of work." It includes, also, a "Sketch for the Organization of Library Service in Primary Schools" (*4*). Of all the meetings noted above, the Panamanian with the commentary of the local librarians and the Costa Rican were the ones that showed the greatest acceptance of the *Plan* presented to them and that introduced certain elements allowing us to think of the importance of planning for a given type of library. This first and hesitant encouragement to librarians to formulate plans beyond the problems of individual libraries found its echo in some of the recommendations approved by the Costa Rica meeting (*5*):

> 1. Centralization of Services
>
> a) That competent authorities organize the centralization of services of school libraries in conformity with the plan explained in the preconference paper presented by the Regional Center of UNESCO in the Western Hemisphere, already cited.
>
> b) That a Section of School Libraries be organized in the Ministry of Public Education whose mission will be to create and develop this type of library and to coordinate their activities. As a preliminary step, for experimental purposes, this section ought to organize a model school library with the intention of attaining standards necessary for the installation of other similar libraries. . . .
>
> 4. Organization
>
> a) That technical processes of school libraries (selection, cataloging, preparing

> for circulation, inventorying, planning extension services, promotion of services) be given top priority by the Section of School Libraries referred to in Point 1 of the Centralization of Services. . . .
>
> 6. Interlibrary Cooperation
>
> a) That in localities where there are no public libraries, the school library assume the responsibility, as far as possible, of providing service to the community.

The decade of the 1950s was rich in librarian's meetings of distinct types. Outside those of a national character, the most numerous were those concerned with exchange of materials. Among all these, the Meeting of Experts on International Exchange of Publications in Latin America, Havana, 1958, is outstanding (*8*). It is noteworthy because it brought together the conclusions reached in eight other meetings held between 1953 and 1956 in as many countries of the region. In all these, the creation of a national center of exchange was advised that in any event ought to be Latin American in scope. Although there was no discussion of planning as such, the programs of action formulated and the steps indicated to achieve them presuppose a planning effort. In the Meeting of Experts in Havana, the concept of a pilot national center for exchange and a project of an inter-American agreement on exchange was added.

Something similar occurred in the same decade in meetings held to study the problem of bibliographic control in the various countries of the continent. In the Second Bibliographic Seminar of Central America and of the Caribbean, Panama, 1958 (*9*), its recommendation is entitled "Study of the Planning of Library and Bibliographic Services in Latin America," and states: "that taking into account the need to formulate a plan that will indicate the best means of coordinating the library and bibliographic efforts that are foremost in Latin America, the Regional Center of UNESCO in the Western Hemisphere should prepare a document containing a study of Latin American librarianship and bibliographic practice that will effect the coordination already mentioned." As can be seen, in addition to thinking of a plan to coordinate library and bibliographic activities, the word "planning" is used in a way that until that time was rarely found in the professional literature.

Turning to the field of education, the Inter-American Seminar on Integral Planning of Education, Washington, 1958 (*10*) further developed the ideas revealed in 1956. In an extensive document there was indicated the significance and value of education planning as much as its organization and methods. Libraries again appear as something attached that is not really integrated in that organization and does not use its methods. Libraries are cited from time to time when the talk is about the investigation of educational reality, about projects of investment and of physical facilities, but without ever thinking of their functions or of their planned arrangement. Two articles are, nevertheless, auspicious. Under the heading Cultural Extension an article by the Pan-American Union appears, "Libraries as an Aid to Education," in which all types of libraries (not only school, college, and university), their techniques, and their services are analyzed along with their relation to the

educational process. Finally, in an Appendix, is a "Summary of the Information Service Needs of Latin America" taken from the work, later published, of Marietta Daniels, *Studies and Understandings in Action* (*11*).

While educational planning continued its upward march and the Principal Project of UNESCO was developed, the idea of library planning burst forth in Latin America as a result of an article by Penna, the title of which is suggestive: "Planning the Library Services: The Library Services and the Planning of Education" (*12*). In his article, Penna explains his position at the time: the solution of library problems in Latin America will be found in planning library services. This planning for libraries is part of educational planning.

Meanwhile, in the field of library science, those steps were taken that today, from a distance, have acquired a preparatory character. The terminology related to planning was determined (at least that concerned with the activities of planning) and the idea of educational planning was formulated more definitively. This planning will appear today as closely bound up with national programs of development and also will be assigned an integral character. In this consideration, of great importance are the resolutions of the Extraordinary Meeting of the Inter-American Economic and Social Council at the ministerial level, which took place in Punta del Este in 1961 (*13*). Resolution A.1 of the *Decennial Plan of Education in the Alliance for Progress* states in its deliberations that:

> . . . the primary purpose of education is the integral development of every human being, and aside from its value as such, the achievement of this purpose is a decisive factor in the true economic and social development of the people. . . . In order to assure the success of the Alliance for Progress and the maximum return of expenditures for education, it is indispensable to integrate plans of educational development with national programs.
>
> Recommended: 1. The adoption of integral plans of education in every country to pursue well-defined goals in the next decade in order to elevate the cultural level of the people of Latin America and to enable them to participate constructively in economic and social development.

So far as libraries are concerned, Punta del Este made no innovations. Libraries are thought of as one of the means by which the educational goals can be reached.

In summary, we can say that until 1960, the idea of planning library services arose in the mind of some librarians but they had not found the opportunity to express themselves in a meeting of regional importance.

The Appearance of the Idea of Library Planning for Regions

The year 1960 marks the inclusion of the idea of planning in the field of librarianship as a result of the first specialized meeting in which planning was referred to specifically. It is treated in the Latin American Seminar of Bibliography, Documentation, and Exchange of Publications, Mexico, 1960, which was at the same time the Third Bibliographical Seminar of Central America and the Caribbean (*14*).

If we accept the theme of the meeting as well as the preconference papers presented, we would not expect that the meeting would produce declarations and approve expostulations with themes that are not strictly in line with the announcements of the seminar. Nevertheless, on two occasions, the recommendations for planning of library services are set forth: in a general way in the "Summons of Mexico" and in a much more concrete way in Resolution CII-2, "Planning for Bibliographic Services and for Documentation."

The "Summons" was required by the conviction that the solution of the problems which held back the development of library services in Latin America were beyond the control of professional librarians, who claim the support of their governments and the vital forces of society. Therefore they directed their summons to all for the kinds of action possible. Two of these requirements related directly to planning.

SUMMONS

to the GOVERNMENTS to consider the services of librarians, bibliographic and of documentation, as themes to be studied by councils or other organizations of national planning with the goal of extending and improving these services through necessary resources;

to UNESCO and the OAS (Organization of American States) that they convene as quickly as possible after adequate preparation at the national and international level a meeting of representatives, on one side, of national planning—educators, economists, scientists, industrialists, and on the other, qualified librarians, bibliographers, and documentalists. This meeting should determine the best way to integrate the activities of librarians in general with the economic, scientific, technical, cultural, and social development of Latin American countries;

to CEPAL (Center for Economic Planning in Latin America), that it include among its studies and projects of economic development, the encouragement of the activities of librarians, bibliographers, and documentalists. . . .

CII–2 *Planning bibliographic services and documentation*

Taking into account the great scientific and technical development in the world today which has made adequate and efficient bibliographic services and documentation urgently needed, it is recommended that:

1. Coordination and greater cooperation be established among the university libraries, documentation centers, and special libraries of each country. . . .
3. Library and bibliographic services, and documentation, be planned as an integral part of the socioeconomic process in accord with the needs for information that such development requires.
4. That the resources of libraries and bibliographic and documentation centers be inventoried in each country to determine the needs and the means of financing these institutions as a preliminary study looking toward a possible and desirable international meeting at a high level between economists, scientists, sociologists, educators and librarians with the object of planning their activities in intimate relationship with the economic and social development of their respective countries.

It is necessary to insist that Resolution CII-2 did not issue forth easily from the deliberations of the attending factions that figured in the development of the seminar, nor did it follow from the consensus that made up the remaining decisions of the Second Commission, the organization that prepared the statement for publication.

The impression one gains is of a recommendation made somewhat forcefully and without the support of the rest of the statement, something, therefore, that is an expression of desires or an emotional declaration.

A year later the situation changed radically on the occasion of the seminar concerned with planning a national service of school libraries, Bogotá (*15*). The idea of planning is applied here to a single section of school libraries, those which are closely related to primary education. But for the first time, planning was the central theme of a library meeting, not simply an expression of goodwill. Penna, referring to the seminar, later said: "We ought to consider it the first effort toward systematization directed at presenting those problems which established the methodology of this discipline (planning) (*16*).

The Bogotá Seminar was organized by the Regional Center of UNESCO under the sponsorship of the National Commissions of Colombia and Ecuador. The level of success of the meeting, the importance of the papers presented, and the conclusions reached gave the seminar, nevertheless, a continentwide significance. We can affirm that the seminar was the first Latin American meeting of modern structure with conclusions of great value that went far beyond the field of school libraries. Before the seminar, a work of great interest was presented dealing with habits and levels of readers, an accomplishment of the Regional Center of UNESCO (*17*). Aside from the limitations and imperfections of this investigation, it served to corroborate the thesis of the paper which stated that a close relationship existed between the low level of reading habits and ability of certain sectors of the Latin American population and the demonstrated inability of the state to sustain a network of public libraries. The objectives of the seminar were as follows:

> 1) To improve relations between educators and librarians and to encourage the exchange of ideas in the study and analysis of common problems;
> 2) To stimulate organic interdependence of planning library services with the planning of educational services, in a way that would incorporate all these services functionally and effectively in the educational process;
> 3) To foster systematic investigation indispensable to the future planning of library services;
> 4) To review the fundamentals and establish the criteria for the preparation, application and evaluation of plans for the extension and improvement of library services. . . .

The conclusions related to planning were supported in the debates which took place in consideration of papers presented on the theme of the seminar (*18*). Even so, these papers and the conclusions reached had no other point of view than planning. For the members of the seminar, the development of library services in their respective countries was not satisfactory. It is notorious how little importance the directors of education placed on library development. There existed no systematic and effective methods or procedures that would impel library progress. The remedy to these evils could only be the adoption of a "program of encouragement and development of library service, inspired by the principles and techniques of planning; programs that, to be felt and effective, would be a segment and an element organically incorporated within the framework of general and integral planning of educational

services." Along with propounding the objectives and stages of library plans, the seminar approved an organic plan for a national school library service and decided to solicit its immediate adoption by the governments of Colombia and Ecuador.

The seminar at Bogotá was, thus, the first such meeting where principles were announced for the planning of library services and also in formulating a plan supported by these principles for a predetermined type of library. This accomplishment shows the difference between the two seminars discussed so far: while that of Mexico recommended planning, the one at Bogotá centered its debates on planning, trying to outline the activity, and it finally applied the methods it had designed to a concrete plan. Many years have passed since this second meeting and it is proper to recognize that the clarity of its objectives, its interesting presentation, and the rigor of its conclusions are still worthy of consideration.

Later in the same year of the Bogotá seminar (1961), the first meeting took place that was dedicated to planning for a single country, the Second Chilean Library Conference at Santiago (*19*). Three preliminary papers were concerned with the theme of the conference, two of which are of special interest. One, by Andrea Morales Vázquez, was a tentative evaluation of the library situation of the country, but it was based on a limited questionnaire submitted to a few selected libraries. Even so, the conclusions of the work did not refer to planning. The other was prepared by Maria Teresa Sanz and Jaime Navarrete Barrueto, and in this paper they proposed the creation of a commission including experts from UNESCO, ALA, OAS, etc. This commission would formulate a program for the development of the public libraries of Chile.

The papers presented and the recommendations made show that the terrain was but little explored; the ideas were not always correct; and the steps taken were tentative. But this meeting of Chilean librarians showed that planning was already a preoccupation in 1961 and it indicated the rapidity with which the principles and sense of value in planning were assimilated.

Of all the recommendations approved, the most important were the following:

1. That administrative and educational authorities and the members of the legislature be informed of the results of the meeting with the expectation that they will support the efforts of librarians to give the country a library system that is organized technically, served by qualified professional librarians, with adequate financial resources, it being understood that such a library will effectively contribute in elevating the cultural level of the people and assist in making every Chilean useful in the supreme battle of our time: the improvement of living conditions, the increase of productivity, a more equal and just distribution of wealth, and progress toward perfecting the democratic system.
2. Planning of library services, for which statistical studies should be completed which with other preparation will permit exact knowledge of the national situation with regard to the needs of readers, the distribution of the population, etc., soliciting the help of respective technical institutions.
3. That the planning of the Chilean library system be accomplished on the basis of an adequate classification of various kinds of libraries required by the country, giving especial emphasis to the creation of actual public libraries and school libraries. . . .

5. That a means be found to unite and recast all the decisions of a library character into a single legal corpus which may be the result of a profound study of the library needs of Chile.

A year later, in 1962, four important conclusions were reached in as many meetings, all of regional character, which are set forth below in chronological order:

First Meeting of Librarians of Central-American Universities, Rodrigo Facio University Campus, Costa Rica (*20*)

Conference on Education and Social and Economic Planning in Latin America, sponsored by OAS, UNESCO, CEPAL, and the Directorate of Social Affairs of the United Nations, Santiago, Chile (*21*)

Meeting of the Working Group on National Planning of Library Services of the Pan-American Union, Miami Beach (*22*)

Regional Seminar on the Development of University Libraries in Latin America, Mendoza, Argentina (*23*)

The Costa Rica meeting had special characteristics. Although treating the theme Planning and Organization of Library Services, the representative of UNESCO noted the exploratory aspect of the meeting with regard to the seminar which would be held some months later in Mendoza, and he asked that no study of the planning of library services be attempted but only that an awareness of the problem be achieved in preparing the groundwork for the future meeting.

In response to this request, the theme was covered in its most general aspects. The conclusions of Group 3, "Organization of Library Services," are united with those included in the theme:

0. Group 3 based its work on the final part of the preliminary paper by Professor Efraim Rojas Rojas, entitled "Current Situation of Library Services in Central American Universities."
1. The Group noted the negative consequences of disinvolvement of the university library from the educational process. Thus, the Group singles out the lack of organic plans that would permit not only changing the situation but also extending and developing library services in order to succeed in the functions assigned to university libraries.
2. The formulation of these organic plans require: a) precise knowledge of the human and material resources available; b) determining the needs of the university library, taking into account its functions as noted in the report of Group I; c) deciding the funding needed for these plans. All these constitute the planning of library services. . . .

The Conference on Education and Social and Economic Development in Latin America completed an analysis of demographic, economic, social, and educational conditions of the continent. This important document, which served as the basis for the discussion, insists on the need to integrate educational planning with economic and social planning (*24*).

For the first time a meeting of such importance accepts, in its *Conclusions and Recommendations*, the need for library planning, although this is seen in intimate relationship with educational planning as it is applied particularly to school library services. The portions of the report of the Santiago Conference which refer to this theme are the following:

> I. Structure and Administration of Educational Services. . . .
>
> 6. That the services of pedagogical research, school construction, production of textbooks and teaching materials, and school libraries be integrated into the educational systems. . . .
>
> VI. Libraries and Museums
>
> A. Libraries
>
> 1. That educational planning incorporate into its activities the qualitative and quantitative improvement of library services at all levels, including the training of personnel;
>
> 2. That with this objective, the following grouping of library services can be considered: a) public and school libraries, and b) university and special libraries and documentation centers;
>
> 3. That through the medium of national and regional seminars organic plans be prepared to assure the strengthening and extension by these services of the work begun by the school and respond in this way to the exigencies and needs for reading felt by those individuals who do not pursue a formal education. All the resources of library service should be made available to them including bookmobiles. . . .
>
> 5. That the Latin American Seminar on University Libraries, which will be convened by UNESCO during 1962 with the cooperation of the Argentine government, be asked to study library services in relation with the objectives of higher education and the requirements of social and economic planning, taking note of the cost and the priorities adequate for the funding of the services establish corresponding plans of action;
>
> 6. That the initiative of UNESCO be supported in aiding a Latin American country to plan library services at all levels; and
>
> 7. That a study be completed on the cost of library services in all its aspects with the object of facilitating planning of library development and its funding for short-term, mid-term, and long range plans.

The conference recommended, as seen above, the completion of a study as part of the Seminar of Mendoza on the planning of university library services. The importance of this decision lies in the fact that the projected meeting came to locate itself parallel with the meeting in Bogotá in 1961. That meeting was dedicated to school libraries; the former conference extended planning to include the other libraries of the educational establishment and higher education.

The Organization of American States convened the meeting of Miami in April of 1962. A working group on the planning of national library services discussed these problems during several days without approving resolutions or recommendations. It discussed a plan of action in order to attain a national plan for library services, and the steps to follow in the preparation of a *Manual of Procedures* and its table

of contents; and it projected an *Outline of Facts and Information Necessary for Planning National Library Services,* attempting informally to apply it to Venezuela. One of the conclusions reached by the participants of the group was as follows:

> The responsible organizations in the various countries ought to give priority to effective national planning of library services, and international organizations should lend major support to working out and carrying out the particular plans, giving preference to projects related to the national plan, especially those of such magnitude that they could not be realized with only national resources.

The year 1962 closed with the Regional Seminar on the Development of University Libraries in Latin America, organized by UNESCO, whose mission was to analyze the state of university libraries in South America and to propose a plan to be completed within 10 years after the meeting, taking into account the probable development of higher education during this period.

The seminar began by redefining the functions of university libraries, noting their deficiencies, and covered the necessary changes in libraries in view of the development foreseen in universities in the next few years, and, finally, a Working Group worked out a decennial plan for the development of the University Library of the National University of Cuyo, Argentina. This work did not go beyond being an imperfect essay because there wasn't enough information available. In the *Conclusions,* these reservations were stated as "the first experience in the collective formulation of such a plan which ought to serve as a guide and orientation for similar studies," and its importance stands out as a practical exercise. Finally, the seminar exhorted library schools to include planning in their courses of instruction:

> As a final point in these conclusions, the Director wishes to state that the principles of planning ought to be the object of constant professional attention, these principles should be continually present and should characterize the greater part of the effort of different working groups. Judging from the esteem and importance given this discipline and the lively interest of the participants in determining the results of planning, this discipline should receive preferential attention in library schools and by international organizations interested in the topic.

If from 1960 to 1962 library planning was each time appreciated with greater energy in the meetings held by Latin American librarians, it is in 1962 that planning was addressed with greatest feeling, to the point of occupying the first level of interest in congresses and seminars. The ideas which can be extracted from all these meetings and which conform to the thinking at this first stage are the following:

1. Latin American library science had made scant progress despite great effort.
2. This failure was due to proceeding in an irregular fashion without regard to well-matured plans.
3. In consequence, it is necessary to undertake planning of library services in order to improve library activities.

4. Library planning was conceived as intimately bound up with educational planning, and further with social and economic development of the various countries.
5. Library planning assumed the attainment of the following stages:
   a. Investigation of the actual conditions of librarianship in the country, studying all its quantitative, qualitative, administrative, economic, and cultural aspects.
   b. Working out a plan, preferably of a flexible nature, with consideration of its immediate, mid-range, and long-range stages.
   c. Application of the plan experimentally with the help of international organizations.
6. From the content of 5a, above, it can be deduced that library research inevitably sustains library planning.
7. Planning cannot be accomplished according to a particular formula but ought to be adapted to the social and economic realities of each country.
8. It is to be hoped that planning would extend throughout the nation and the region.

Consolidation, Development, and Expansion of the Idea of Planning Library Services

The stage of enrichment of the idea of planning library services started at the beginning of 1963. In the years that have passed since then, it is possible to note two periods: The first, between 1963 and 1967, is characterized by a constant search for a fundamental theory of planning and by the insistence that library planning is a specific aspect of educational planning. The second, which began in 1968 and continues to the present, planted the doubt that library planning was legitimately identified with, or better, that it could be immersed in educational planning. The theory of the second period conscientiously held that, more than the coincidences and similarities of educational and library planning utilizing the same method, the latter ought to try to find more autonomous forms of action and more original procedures. Two factors contributed to this conviction: the first is most evident and is determined by the fact that not all libraries are involved in the educational process; the second was provoked by the application of planning to bibliographic control and information retrieval, both of which have nothing to do, directly, with the educational process.

Another fact that characterizes this period is that it ought not to be considered an era exhausted by theoretical discussion without the practical grasp of concrete realizations. From then on the meetings and seminars were strengthened by the presentation of plans of real or possible application, leaving pure speculation to theoreticians who, although slowly, began to produce articles and books dedicated to this theme (25).

As a consequence of this departure from the theoretical plane to the practical, the long-range planning of librarianship, which was confined to the statement of principles and has rarely been attempted in Latin America, gave way to those con-

gresses and other meetings in which the short-term planning of library services met with accomplishments occurring in the countries where library practice was most developed in the methods and practical examples that planning in the broader sense lacked.

Finally, each time with greater insistence, a manual or treatise was demanded which would provide sufficient detail about the way toward practical application of the planning. The necessity for this was demonstrated by the Meeting of Experts in Miami Beach *(22)*. This manual was already being published in draft form and one of its coauthors was, precisely, a Latin American librarian (*26.*)

THE PERIOD FROM 1963 TO 1967

Because of the impossibility of analyzing all the meetings held in this period, much less reproducing, considering their length, the recommendations decided upon, those will be cited in which the problems of planning library services are treated in the most complete fashion or those in which the fundamental steps are given to gain affirmation. Others have been chosen to exemplify the types of meeting and of decisions that are characteristic of this 5-year period. The principal points treated in these meetings are given below, arranged by the themes of the meetings. This is not to say that there were no other meetings devoted to planning, but citing all in one list would be an impossible task and superfluous besides.

1. Study groups gathered by the Organization of American States and the Inter-American School of Librarianship, Medellín, 1963–1967 *(27)*
2. Chilean Librarians' Meeting, Santiago, Chile, 1964 *(28)*
3. Round Table on International Cooperation and the Encouragement of Libraries in Latin America, Washington, 1966 *(29)*
4. Mexican Meeting on Library Science, Bibliography, and Exchange, Jalapa, Vera Cruz, Mexico, 1965 *(30)*
5. Working Conference on the Function and Development of Academic and Public Libraries, Santiago del Estero, Argentina, 1965 *(31)*
6. Meeting of Experts on the Planning of Library Services in Latin America, Quito, 1966 *(32)*
7. Meeting of the Argentine National University Library Board, La Plata, 1967 *(33)*

THE PERIOD FROM 1968 TO THE PRESENT

This is the most fertile period in the study of and intentions for carrying out plans for library services planning in Latin America. Somewhat advancing the knowledge of the meetings analyzed, an increasing complexity in the debates is observed, and an enrichment of working papers and contributions.

Some of the meetings analyzed acquired a special significance and importance; these are numbers 8, 12, and 14.

8. Inter-American Seminar on the Planning of Library Services and Documentation, Madrid, 1968 *(34)*

9. Meeting of Experts on the Development of Academic Libraries in Central America, Antigua, Guatemala, 1968 (*35*)
10. Meeting of Experts on the Promotion of Books in Latin America, Bogotá, 1969 (*36*)
11. National Seminar of University Libraries, Bucaramanga, Colombia, 1969 (*37*)
12. Seminar on Planning National Structures of Scientific and Technical Information, Madrid, 1970 (*38*)
13. Meeting on Modern Techniques of Documentation, Santiago, Chile, 1971 (*39*)
14. Meeting of the Working Group on the Development of Library Services and Scientific and Technical Information in the Countries Signatory to the Andrés Bello Convention, Caracas, 1971 (*40*)
15. Inter-American Seminar on the Integration of the Information Services of Archives, Libraries and Documentation Centers in Latin America and the Caribbean, Washington, D.C., 1972 (*41*)
16. Second Meeting of the Working Group for the Development of Library Service and Scientific and Technical Information in the Countries Signatory to the Andrés Bello Convention, Bogotá–Rionegro–Medellín, 1972 (*42*)

Finally it is necessary to mention, in view of the influence they would have on the tasks of planning, the LILIBU, CATACEN, and MARCAL projects, under the auspices of the Organization of American States:

17. Meeting of the Experts on the LILIBU–CATACEN (REPLICA) Projects, Rionegro, Colombia, 1973 (*43*)

These projects treat of lists of books for university libraries (LILIBU), centralized cataloging (CATACEN), and the Library of Congress Machine-Readable Cataloging applied to Latin America (MARCAL). The latter two, particularly if completed, should be taken into account in all Latin American planning.

Synthesis of Recommendations on Planning Contained in the Meetings and Seminars Analyzed

The following synthesis of recommendations is divided according to the two chronological periods of development, 1963–1967 and 1968 to the present.

The Period from 1963 to 1967

I. The Situation of Libraries and Information Services
   1. The condition of libraries and information centers is generally critical.
   2. Libraries:
      a. National libraries are merely depository collections.
      b. Public libraries are notoriously insufficient and badly organized; there are no branches nor are they formed into networks; they have no connection with school libraries nor are they aimed toward the community at large.
      c. Academic libraries rarely intervene in the educational process and have for the most part been treated with great indifference by the authorities of education; their bookstocks are poor and inadequate.

d. University libraries are those with the largest collections and the most capable personnel, which assures better organization; their budgets are limited and they cannot keep their collections up to date.
e. Special libraries are few, generally well supported, and the property of private institutions.

3. Information services:
a. In beginning are in a better state.
b. Their action is limited.
c. Their situation is less critical than that of libraries (*29,32*).

II. Planning in General
1. The development of libraries is an integral part of educational development.
2. National planning of library service is strictly related to economic, social, cultural, and educational development.
3. The national organizations responsible should give priority to national planning of library services.
4. The absence or limitations of services of information should be a special preoccupation of those responsible for library planning and a strict relationship should be established between them and libraries.
5. International organizations and foundations should give greater support to the elaboration and initiation of the tasks of planning (*28,29,31–33*).

III. Interdisciplinary Character
In order to make the levels of development effective, specialists should be provided in distinct fields such as education, sociology, etc. (*29,32,33*).

IV. The Bases of Planning
1. In order to accomplish planning, the following is necessary:
a. To study the situation of the library system in order to establish what human and material resources are available, the populace of the area, and the other socioeconomic elements involved in the development of the library system.
b. To complete studies that will permit the determination of the habits and levels of readers and thus the actual and potential needs of the community.
c. To utilize to the maximum the resources available.
d. To find formulas of adequate financial support.
e. To establish a policy for the construction of library buildings.
f. To establish a pilot library that will serve as a place for experimentation and the training of personnel.
g. To prepare adequate legislation that will assure the beneficial progress of planning.
h. To wage a campaign of explanation of principles among those who inspired the planning, and thus make known the resources and services of libraries (*28,29,31–33*).

V. Organizations for Planning
1. A national organization should be established which will have responsibility for planning.
2. The following will be the functions of this organization:
a. To conclude the studies of a socio-educative and bibliothecal character in order to permit the structuring of a service that will take into account the cultural levels of the populace and will meet the needs of economic and social development.

b. To establish extension services of libraries as an integral part of the educational system.
c. To assure adequate kinds of reading material and the utilization of cultural media for all the inhabitants of a region whatever their geographical distribution.
d. To select and acquire bibliographic material to contribute to the establishment and progress of cultural media.
e. To encourage, in whatever manner is effective, the habit of reading among the populace.
f. To determine the most effective and economical rules for technical processes.
g. To organize a system of interlibrary loan.
h. To utilize the mass media to popularize the use of library services.
i. To create and promote courses for the continuing education of librarians.
j. To create and sustain its own library, which will become an operative center for the conduct and function of the plan (*30–33*).

VI. Research

The establishment of the groundwork of planning supposes knowledge of actual library and information services in a country, which can only be obtained by constant research. For this purpose a close relationship was counseled between the organizations concerned with planning and the centers of library research (*33*).

VII. Training of Personnel

1. The number of Latin American librarians has been lessened because of the exigencies of the environment, and in consequence, greater effort ought to be made to train a number of librarians sufficient to cover the existing deficit.
2. The training of librarians is weak in addition to being scant, and the schools ought to revise and improve their plans and programs of studies.
3. To assure that personnel who carry out plans are capable, a course on planning should be included in library school curricula (*28,31,32,39*).

VIII. Legislation

1. Adequate library legislation does not exist.
2. Latin American countries ought to write or revise library laws. These should be worked out with the collaboration of librarians, educators, schools, and associations of librarians (*30,32,33*).

IX. Projects

1. Plan for the development of school and public libraries (*28*).
2. Project for a national library service law (*30*).
3. Project for library legislation (*32*).

The Period from 1968 to the Present

I. The Condition of Libraries and/or Information Services

1. Spanish American countries do not provide effective services for reading and for information. This has caused a crisis in library services and in documentation and has furthered the deterioration of the concept that the two ought to be treated as isolated identities.

2. So far as libraries are concerned:
   a. National libraries have not reached as satisfactory a level and function, if at all, as public libraries.
   b. Public and school libraries constitute the most serious problem because of their scant number, bad geographic distribution, poor support, and bad organization.
   c. University libraries and special libraries are the best endowed but lack the coordination that would permit good use of their resources.
3. Information services are found to be in a deficient state.
4. Library legislation is antiquated.
5. Statistics are neither complete nor reliable.
6. Within a general plan of development, there do not exist, generally, national plans or organic regional plans for the development of integrated documentation services.
7. Neither library nor information nor documentation services have been evaluated (*34,41,42*).

II. Planning in General
1. The planning of library services and of documentation is part of the educational, scientific, and cultural planning within the general plan for the development of a country or a region.
2. Governments of Spanish-speaking countries ought to adopt and to give priority to those political, juridical and administrative, financial and economic decisions that will assure the better functioning of the national structures of scientific and technical information.
3. Latin American countries should create a national organization at the highest level of governmental policy for the planning, coordination, and promotion of the services of information and documentation.
4. Latin American countries should incorporate into their national plans the development of networks or systems of information, which should be put into the context of Latin American regional integration.
5. The national structures of libraries and information centers will have as their fundamental objective contributing to the development of the well-being of the people, to facilitate access to information, and to further the improvement of the process of information transfer in scientific and technical fields. These structures should be compatible within the countries of the language area and should be coordinated on a regional and international level.
6. International organizations ought to provide major support to the tasks of library planning (*34,35,38–42*).

III. Information
1. Documentation forms part of the national heritage, but it is also an international resource to which every person has the right of access. This right to know, the right of access to information, is an inherent right of everyone. The memory of humanity belongs equally to everyone, and governments are obligated to work toward its preservation, enrichment, and dissemination. Toward this end, adequate institutions should be created that permit effective access to reading materials and information sources for everyone.
2. The planning of a global infrastructure of information and documentation should create two systems which, although interrelated, have distinct functions and objectives: one for public and school libraries and the other for scientific and technical information.

3. CEPAL should include in its studies an investigation of the socioeconomic indicators of development, particularly those arising from the structures of information and documentation.
4. Spanish-speaking countries should give support to UNISIST and bring to conclusion a pilot project in the application of the system among countries signatory to the Andrés Bello convention (*34,35,38–41*).

IV. Integration
1. To provide access for everyone to reading materials and to documentation sources, centralized or coordinated services should be established for libraries and documentation centers and for any other kind of information-providing institution that may arise in the future.
2. The governments ought to take the administrative, political, and financial steps necessary to permit the integration of the services of archives, libraries, and centers of information, for which they should formulate plans that will conserve the appearance and character of the institutions (*34,38,40,41*).

V. Interdisciplinary Character
1. Planning should be within the responsibility of specialists in libraries, documentation, information science, and communication, and in consultation with scientists, economists, sociologists, educators, statisticians, and others as may be necessary.
2. Archivists, librarians, and specialists in information should bring about increased communication with other professional organizations (*38,41, 42*).

VI. Basis of Planning
1. Each country should formulate an integrated national plan of services of information, which should be exhaustive, realistic, and flexible. The plan should take the following into consideration:
   a. Official archives and private ones of public interest.
   b. Libraries of every kind.
   c. Documentation and information centers.
2. Each integrated national plan for information services should establish the following priorities:
   a. Education and training of personnel.
   b. Enrichment of collections.
   c. Training of library users.
   d. Acquisition of equipment.
   e. Integration and normalization of technical processes and public services.
   f. Utilization of information services at an international level.
3. In order to accomplish this plan, the following is necessary:
   a. To create an awareness of the value of library and information services.
   b. To define and develop a program of scientific and technical information.
   c. To define the goals that distinct types of libraries, information services, and documentation centers ought to reach.
   d. To create a national organization for the plan.
   e. To determine the priorities within the plan and its limits, total or partial, that each type of library and information service and their geographic areas ought to occupy.

f. To unify the structure of library and information services with a view to integrating them to work in conjunction as much on a national level as on a regional one.
g. To estimate the existing and necessary human resources.
h. To conclude studies of a statistical character and of economic analysis that will permit knowledge of how investments should be made in these services and to determine their future financing.
i. To complete studies of library users.
j. To impel the intervention of library associations in the tasks of planning and to establish the cooperation of other specialists.
k. To compile, analyze, and publish systematically the statistics applicable to planning.
l. To pass and enforce legislation.
m. To evaluate periodically the tasks of planning.

4. There should be established minimum standards for school libraries and for public libraries; organizational plans for scientific and technical information systems; norms of professional education; principles of library and scientific and technical information service legislation; and statistical methodology as applied to library and information services. Studies meant to accomplish this normalization can be entrusted to the various countries of Latin America and to Spain.
5. In cases in which the planning is on a regional or subregional level, each country should hold some organization responsible for linking and coordinating all activities related to library and information services, and at the same time this organization should be the focal point of UNISIST (*34, 35, 37–42*).

VII. Methodology

It is necessary to study the methodology of planning in all its aspects. The following are important points to consider: the lack of, and need for, statistics and economic analyses, rules, minimum requirements for the training of personnel, unification of techniques, and the coordination and harmonization of exterior help (*34,35,37*).

VIII. Investigation

1. Planning is a continuous and systematized process of study, from the point of view of library science, of the problems of education at all levels, continuing education, information, and research.
2. It is necessary that research include the field of library science in order to provide theoretical fundamentals in its instruction and to provide the organizations concerned in planning with the necessary instruments for their information (*34,35,42*).

IX. Bibliography

Since the expense of producing current bibliographic records, subject and general, constitutes a serious obstacle in the knowledge and understanding of the people and deprives library and information services of an element essential for their tasks, it is appropriate to study in coordination with Spain a means of providing a compatible model and to analyze the possibilities of publishing an integrated bibliography of works in the Spanish language (*40*).

X. Terminology

An opportunity is believed to exist to prepare a basic vocabulary of planning, which, by establishing a common terminology, will facilitate the

transmission of ideas and improve communication among all the specialists in Latin America (*40*).

XI. Professional Education
   1. The education available for professional librarians is not satisfactory, despite the efforts of library schools, for the following reasons:
      a. Bad geographic distribution.
      b. The existence of schools outside a university setting.
      c. Antiquated curricula and programs of study divorced from reality.
      d. Paucity of matriculated students.
      e. Scant and, at times, unprepared instructional staff.
      f. Poor libraries and equipment in the schools.
      g. Lack of incentives that would attract the young.
   2. The disciplines of library science, documentation, and information science should be integrated into the program of instruction.
   3. The OAS, the OEI, and UNESCO should give the highest priority to programs of professional education (*38,40,41*).

XII. Working Group
   1. A Latin American and Caribbean Working Group should be created for the purpose of preparing a document that contains the elements and bases for the formulation of a national program of information services.
   2. The creation of a Group of Archivists, Librarians, and Information Scientists should be urged in each country in order to maintain active watch over the implementation and progress of the planning (*41*).

Conclusions

The preceding analysis permits an appraisal, although general in nature, of the importance and strength which the idea of planning has been accorded in Latin America, as well as the greater complexity which has transformed the idea in successive congresses, seminars, meetings, and conferences where it has been under review.

Doubtlessly, the decisions taken in all these meetings have to be considered in the light of library literature in the form of books or periodical articles on this theme, which appear constantly. The fact that the most fertile writers on planning in Latin America should at the same time be the instigators of many of the meetings which have been held on the continent permits a great consistency in Latin American thinking. Various obstacles have been put in the path of realizing all the recommendations:

1. The existence in Latin America of a structure of librarianship that will have to be reshaped in large part.
2. The lack of interest in library problems on the part of the governments of Latin American countries, on the one hand, and of specialists in other disciplines (sociologists, educators, statisticians, etc.) on the other, whose collaboration is indispensable in order to move the planning forward.
3. The poor education of professional Latin American librarians is much in evidence in many meetings and accounts for the lack of accomplishment in this work.

4. The difficulty of formulating a methodology in the work of planning librarianship.
5. The scarcity of funds assigned to these organizations.

Nevertheless, on reviewing what has preceded us, one gains the impression that there has been considerable progress in the rigor of thinking of those librarians who have confronted this problem. It appears that the question today is not, as yesterday, knowing what to do, but rather how and with what.

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Translated from the Spanish by Jay E. Daily

PLANNING AND PLANS FOR NATIONAL LIBRARY AND INFORMATION SERVICES

Introduction: The Potential Utility of This Survey and the Nature of the Audience to Whom It Is Addressed

An examination and survey of the national library and information service planning process as it has occurred in a variety of political, geographic, economic, historical, and cultural settings in recent years is warranted on several grounds. First, it merits scrutiny because national library and information service planning is in itself a relatively novel activity. As an area of concern for national legislators and administrators, policy makers, and policy implementers, it is, for the most part, less than 10 years old. As a "subdiscipline" within the domain of applied library and information science, the actual planning of full-fledged, comprehensive national library and information service(s) (LIS) is a pursuit which has heavily involved librarians/information scientists for only an equally brief period. The serious study of the national LIS planning process per se and the study of the products of that process has only just begun.

Hitherto the basic data and the necessary background materials were lacking for such rigorous engagements. Before appropriate guidelines for national action could be recommended, before the basic principles could be derived, before the formulation of a generally agreed upon schema for overarching analyses, reviews, or evaluations could be successfully essayed, it was necessary for sufficient time to have elapsed to permit the completion of a number of "in-depth" scholarly longitudinal studies and the emergence of appropriate methodological guidelines for analysis. Only then could a clear picture of the variant national LIS planning processes, the implementation procedures, and the operational features of these national systems be discerned and evaluated.

Until the past few years, too, a species of vicious circle was apparently in operation. The novelty and complexity of the subject, the lack of suitable guides, combined with a paucity of readily available, recent, and authoritative surveys of the topic served to encumber and thwart the progress of the individuals and groups who were immersed and enmeshed in the difficult task of planning to bring order to the various existing LIS within their respective countries. In turn, the lack of available "in-progress" or completed reports on such planning activities hampered the construction of comparative and in-depth scholarly works on which survey-type treatments, such as the present one, could be based.

More recently, however, a growing number of information scientists have begun to achieve some success in their efforts to invest this fledgling subrealm with all the trappings and the aura of the more mature sciences. They have been pursuing the topic with all of the rigor that can be mustered by scouring the entire gamut of scientific and social science theorizing and methodologies. And now, the passage of time; the evolution and the attempted implementation of numerous national LIS

plans in a great number of particular countries; the publication, during the past 3 years, of authoritative accounts of these LIS planning ventures; the analyses of the processes and the resultant plans by respected scholars; and the appearance of several notable surveys and reviews render the construction of an overview such as the present one feasible. It is currently possible to identify certain potentially useful planning precedents and guidelines that might be followed, according to the various national settings, by countries newly engaged in such activities.

In sum, it is now possible to provide the reader with relatively objective information concerning such topics as:

1. The range and complexity of the problems likely to be encountered in the LIS planning process at the national level and the variety of mechanisms that appear to facilitate the formulation of national LIS plans.
2. The variety of alternative objectives, planning procedures, implementation strategies, and operational arrangements available.
3. The variety of information needs which national LIS plans are designed to satisfy.
4. The various factors which should probably be taken into account in the planning process.
5. The identification of the bases for government decision and policy making regarding information services and the preconditions necessary for the making of such policies.
6. The various assumptions on which the planning process and the resultant plans may be founded.
7. The various ways in which the LIS planning process may be coordinated with other national planning activities in science, education, industry, social development, or overall national development.
8. Clues and guidelines for the selection of appropriate planning procedures in view of the planning context.
9. The present status and role of "information professionals" in the formulation of various recent national LIS planning enterprises.
10. The principles or "lessons" which may thus far be derived from the experiences of the many national LIS planning ventures.
11. Some of the various criteria by which the quality and/or the success of national LIS planning efforts may be judged.

With these direction pointers at hand, it is hoped that experts, both information specialists and those outside the field of library and information science—such as legislative leaders, particularly the planners and the administrators of future local, national, and international LIS systems and networks—might benefit from the present overview. Perhaps, through obtaining some useful insights, they will be enabled both to avoid some of the worst pitfalls and to seize upon the most advantageous alternatives at hand.

This survey of the current "state of the art" of national LIS planning and review of the status of a variety of types of national LIS plans is intended to serve a threefold purpose. Hopefully, it will contribute to the objective of building a more precise methodology for, and of providing additional "substance" to, the would-be new socio-science and subdiscipline. Hopefully, too, it will assist, directly or indi-

rectly, in expediting the improvement of the information services available to the ultimate users or consumers of information in the various countries which are either about to embark on national LIS planning enterprises or are already so engaged.

The attainment of the aforementioned threefold purpose is attempted, in part, through the building upon and the updating of existing pioneer authoritative studies in this new field. The notable recent general treatments by Foster Mohrhardt and Carlos Penna (*1*),* by Andrew Aines and Melvin Day (*2*), by Robert Vosper (*3*), and by Vasile Tărăboi (*4*) all comprise significant contributions to the discipline. Equally important contributions are to be found in the studies and documentation produced in connection with and following the 1974 UNESCO-sponsored Intergovernmental Conference on the Planning of National Documentation, Library and Archives Infrastructures (Paris), and the documentation and studies emanating from UNESCO's UNISIST Program relating to the UNISIST effort to establish national focal points for international scientific and technological cooperation. Two UNISIST publications in particular, *Guidelines on the Planning of National Scientific and Technological Information Systems,* authored by Carl Keren (*5*), and *Using and Improving Information Systems for Development: Some Practical Implications for Policy Makers,* authored by J. P. Poliniere (*6*), are especially noteworthy. In addition, several OECD, Organization of American States, and International Federation of Library Associations studies, written from the international standpoint, add significantly to the background materials available on the topic. Also written at the international level, but emanating from a different division within UNESCO than the above-mentioned UNESCO publications (namely, the Mass Communications Division), is the landmark work, completed in 1975, by E. L. Sommerlad on *National Communications Systems: Some Policy Issues and Options* (*7*). In delineating the policy issues at stake in connection with the establishment of national communication systems, it brings into clear focus the intimate connection between present-day communication systems and LIS.

Besides the foregoing items which, in aggregate, may assist the reader in obtaining a detailed view of the state of the art of national information services/systems planning *in general* (and the international ramifications of such planning), numerous other publications which provide details concerning current national LIS planning activities in particular countries have recently been published. Their respective contributions to the field are indicated in the sections of this study which deal with the LIS planning activities within certain individual countries. The bibliographical details of each are to be found at the end of the section to which it is relevant.

A sizable portion of the information concerning the most recent national LIS planning developments, found on the following pages, was derived from records of personal interviews with over a hundred individuals and from documents obtained by the writer during the course of a year (1974–1975) of sabbatical leave, in 14 countries in North America, Western Europe, and the Middle East.

* The References for this section appear on page 341. Other general works on the topic are listed in the General Bibliography at the end of the article.

This survey must be regarded as but an *interim* document, for it delineates the state of the art of national information services planning and plans at the time of writing. Obviously, in a field of investigation as new as this one, rapid advances should be anticipated. An extensive, authoritative, and updated account may be expected in the near future as a result of a recommendation made at the aforementioned Intergovernmental Conference. The recommendation requested that "UNESCO commission a state of the art review of planning activity in the field of national planning for documentation, information services, libraries and archives infrastructures." It is also worth noting that UNESCO was simultaneously requested to "collect and publish details of established national information systems, including a historical description of the planning stages of these systems." If and when they are published, the foregoing UNESCO documents should not only supercede the present survey but the sources used herein as well. Hopefully, too, the periodic updating of these possibly forthcoming UNESCO publications will eventually also be possible.

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The Delimitation of the Scope of the Survey

Essentially, this survey seeks to describe the degree or the extent of the "progress" being made, officially or otherwise, in a variety of countries, in the direction of the planning or of the actualization of specific plans for a particular species of national LIS, as well as for the facilities, systems, and networks which render possible the

provision of that order of service. The survey has as its frame of reference integrated LIS to the individual user and to particular groups of users. The ideal national LIS against which progress in national planning efforts is to be measured comprises a model, the nature of which is embodied in the definition found in the following paragraph.

The "ideal" national LIS is a single, nationwide and national-level, comprehensive, organized, coordinated, rationalized, articulated, and integrated service designed to: operate within a given nation-state in the form of an aggregated or overall, but not necessarily unitary or centralized, coherent system and network; serve as the national node in an eventual worldwide LIS system and network; provide "*all* of the 'right' information, and *only* the 'right' information, to *all* of the 'right' persons, and *only* the 'right' persons, at the 'right' time and place and in the 'right' form, at a cost which is 'right' for both society and the individuals concerned"; and serve the national interest as well as mankind through assisting in national development and through sustaining, extending, and contributing to both the "quality of life" and "national well-being."

A "national library and information system," for the purposes of this study, and as adapted from J. P. Poliniere (*1*),* comprises a nationwide and national-level, overall infrastructure or set of organically interrelated institutions, facilities, and personnel, which, when combined with a coordinated network, is organized to provide its users with information resources and educational, consulting, and advisory information services appropriate to their changing needs, interests, and abilities.

For the purpose of clarifying the present use of the term "planning," a distinction adapted from R. E. Kemper (*2*) is made herein between "planning" and "forecasting." Both planning and forecasting involve the future. Forecasting is taken to mean the prediction of the most probable course of future actions, events, or conditions which do not ordinarily involve predetermined courses of human action. In forecasting, the element of predetermined personal or organizational causation is minimal or absent. Planning, on the other hand, is necessary because we cannot accurately forecast. It involves predetermined courses of human action based either on particular contingencies or the normal course of events. The element of personal or organizational causation is ever-present. Planning involves potential changes in the probabilities surrounding certain situations as a result of the nonchance factors introduced by man. It deals with the presumable or more or less certain future effects of prior and/or current human decisions. The question, then, that faces the long-range planner is: "What should we do or decide to do today to be ready for a partly uncertain tomorrow?" Planning, accordingly, is a dynamic process of: committing resources systematically and with the best possible knowledge of the future; organizing systematically the effort needed to utilize these resources; and measuring the results of planning decisions against expectations, through organized systematic feedback.

A distinction is also made herein between "library services" and "information services," with the intention that the term "LIS" convey the aggregate meaning of

* The References for this section appear on page 345.

both "library" and "information" services. It is assumed that the reader is conversant with the term "library services." The term "information services" is used to connote/denote the type of information processing/analysis/synthesis and information resource services provided by special libraries, information analysis centers, information indexing and abstracting facilities, archives, museums, information consultants, computer scientists, educational technologists, and computer-assisted learning specialists. This broad connotation of the term LIS, which includes within its purview not only major portions of the fields of computer technology, communications/telecommunications, and educational technology, but also many aspects of education/instruction/training as well, is considerably wider than that found in the previous authoritative studies in the field. They tend to regard these areas of informational activity as complementary and/or peripheral to LIS per se, whereas this study conceives of them as part of the "central core" of the topic.

Although distinctions are, at several points, also raised between "national LIS planning," on the one hand; and, on the other, "national central services planning," "national control services planning," "national library planning," "national library and information systems planning," and "national library and information network planning," it is assumed that the reader is familiar with these nuances and that the context in which these terms appear will provide sufficiently clear indication as to their intended meaning as to render unnecessary further elaboration at this point.

Not all national LIS planning activities or national LIS plans are dealt with herein. Only those which, in this author's view, embody, at least potentially and minimally, certain features which appear to lend themselves to further development in the direction of the model or ideal national LIS denoted in the foregoing definition are deemed worthy of consideration. The study limits its treatment to the delineation of significant and representative types of efforts exerted in the past few years which exhibit virtually all, if not all, of a particular combination of characteristics. Unless otherwise indicated, each of the component characteristics must furthermore be either manifestly or potentially present to at least the minimum degree or threshold-level set forth below. It should be noted that in the case of a few of the characteristics, the minimal levels are also the presumed ideal levels.

A. *National Plans and Planning*—Only those planning activities and "blueprints" which deal with services to be offered at the *national level*, for the nation as a whole, and are to be available to the public and/or the national government in question, are described herein. To be deemed "national-level" plans or planning enterprises, they must additionally:
   1. Be essentially "nationwide" in geographic coverage or scope.
   2. Be potentially a single, overall, articulated service, capable of serving as a node in an international information system.
   3. Include virtually all relevant regional/district/state/provincial/lander/prefectual, etc., and local plans and planning activities insofar as they may be conceived of as actual or potential components of the ideal national LIS as defined above. (A nationwide group of cooperating local and/or state/provincial LIS entities whose activities are overlapping, redundant, or even, in part, competing, but are nevertheless articulated, could minimally comprise a national LIS. There may be more than one overall plan envisaged

per nation, but it would be almost impossible for more than one such plan to be implemented simultaneously.)

4. Involve at least one national governmental agency, either existing or new, in at least one stage of the planning process, in the implementation of the plan, or in the operation of the resulting service-system, with the governmental involvement consisting of more than the mere facilitation and/or financial support of the planning itself, or of the implementation or operational phases of the envisioned services. (There is no requirement that national LIS plans undergo governmental scrutiny or have governmental approval, or that governmental decisions for or against their implementation be contemplated, in order to permit the treatment of such plans herein. Previous studies have tended to include only official or semiofficial plans, the implementation of which appeared likely, if not certain. This survey not only includes the work of planners who have no official status but also takes into account planning designs without regard to the probability of their implementation.)

B. *Library and Information Services*—Only those national schemes and planning enterprises wherein the existing and/or proposed or intended national services to be offered encompass a very broad range of library and information/data processing and documentation activities are reviewed here:

1. They must include *the major portion* of the various services involved in the information/communication chain—from information or knowledge creation to information use. (Information processing pursuits, such as bookbinding, graphic arts, radio announcing, journalism, etc., although they all comprise types of information services, do not, according to the view taken here, in themselves, or even in aggregate, constitute a range of services sufficiently broad as to warrant inclusion here, unless accompanied by numerous other library and information services as they are commonly conceived. Thus this study will not treat planning activities of national governmental agencies which are public relations-propaganda or news media agencies, or printing or information distribution arms.)
2. They must include, at minimum, services involving *most forms* of recorded information/data/knowledge, necessarily including virtually all forms of printed materials but not necessarily including all types of recorded nonprint information or various types of "live" unrecorded spoken and/or visual human messages and/or resources of information.
3. They must include, at minimum, virtually all types and sources of *primary* information (i.e., the actual contents of documents, original or otherwise, files, recordings, and raw, numerical, or other data) but not necessarily types of *secondary* information (i.e., information about information, such as bibliographies, catalogs, abstracts, and indexes).
4. They must include subject matter from most discipline/knowledge fields, necessarily including virtually all science and technology areas (but not necessarily including information concerning ongoing and/or contemplated research endeavors, and not usually including military, secret, confidential, proprietary, personal, or private information).

C. *Channels*—The envisioned services must at least potentially involve the inclusion of the various types/forms of communication/telecommunication and/or mass media, both those which "broadcast" the identical messages to all who attend to them, and those which transmit messages to and from particular individuals and/or groups, for whom the transmitted messages may be selectively "individualized." National communication/telecommunication/telepro-

cessing services, systems, and networks per se will not be dealt with here, excepting insofar as they are related to other national library and information services planning.

D. *Institutional Arrangements*—The anticipated services must at least potentially include almost all the formal organizational/institutional/structural arrangements and configurations which function at the national level in the information service field. It should be noted that included in this group are the organizational arrangements implied or listed where information services are defined above. Virtually the entire national information infrastructure must be encompassed by one or more at least partially interlinked systems.

E. *Other Limitations*—Basically, this study covers a narrower time span and a more recent one than that of the other major published surveys of the field. It deals almost exclusively with planning activities and plans initiated or promulgated in the period 1970 to mid-1976, whereas the Aines and Day (*3*) and the Mohrhardt and Penna (*4*) analyses, for example, tend to treat developments in the 1964–1974 period. In the case of plans which are in the process of being implemented, emphasis is given, in this study, to current and future stages of the planned activities, rather than to what was previously accomplished. Historical notes and references to past developmental and implementation efforts are included solely for purposes of background and comprehensibility.

REFERENCES: SCOPE OF THE SURVEY

1. J. P. Poliniere, "Using and Improving Information Systems for Development: Some Practical Implications for Policy Makers" (Draft), SC/74/WS/53, UNESCO/UNISIST, Paris, 1974, 45 pp.
2. R. E. Kemper, "Library Planning: The Challenge of Change," in *Advances in Librarianship* (Melvin J. Voigt, ed.), Academic, New York, 1970, Vol. 1, pp. 207–239.
3. Andrew A. Aines and Melvin S. Day, "National Planning of Information Services," in *Annual Review of Information Science and Technology* (Carlos A. Cuadra and Ann W. Luke, eds.), American Society for Information Science, Washington, D.C., 1975, Vol. 10, pp. 3–42.
4. Foster E. Mohrhardt and Carlos V. Penna, "National Planning for Library and Information Services," in *Advances in Librarianship* (Melvin J. Voigt, ed.), Vol. 5: *National Planning for Library and Information Services*, Academic, New York, 1975, pp. 61–106.

The Concept of and the Rationale for Planning National Library and Information Services: A Survey Based on an Analysis of the Assumptions on Which Planning and Decision Making Regarding Library and Information Services Appear to Be Founded

CONCEPT AND RATIONALE

The past few years of the 1970s have been marked by an almost exponential increase in national LIS planning activities. Equally evident is the tremendous upsurge in the number of national LIS plans which are either currently in the process of being implemented or have already been brought to fruition. The current and un-

precedented high level of interest in the field should not, in one sense, be surprising, as virtually every nation is still confronted by the problem of how it can best develop an LIS infrastructure that will engender the satisfaction of its educational or scholarly, industrial or commercial, recreational or entertainment demands, as well as other information and knowledge needs, in an affordable and effective manner.

This rapid increase in the number of extant national LIS planning enterprises appears to be directly related to three major current worldwide developments which are themselves closely interrelated. Probably most prominent among the three is the sharp rise in global concern regarding a growing number of complex social problems. These tend to be so widespread in their ramifications as to render them manifestly not susceptible to solution except on a national or an international basis. Pollution, ecology, and energy problems stand out as examples. In turn, these problems have generated worldwide debate in government and outside of it regarding "the limits of growth and development" and the relationship of national development to "the quality of national life" and "national well-being." The debate has increasingly been accompanied by a spate of demands for the establishment of national development policies and programs designed to protect, expand upon, and improve the quality of national life. But the development of such policies, if they are to be implementable and effective, commonly requires considerable planning and decision making. Consequently, accompanying the rise in interest in the solution of development problems is a spurt in the popularity of policy making and planning ventures in all spheres and at all levels of governmental activities, even in the relatively unplanned milieux of the capitalist countries. These manifestations comprise the second factor which has greatly affected the rise in the number of recent national LIS enterprises. As a consequence of this rapid change in attitude, national LIS plans, official and unofficial, that were constructed as recently as the late 1960s in the United States and Canada and almost immediately rejected out-of-hand in their day (presumably because they attempted to suggest the then almost unthinkable notion of national LIS planning), are today, at least to an extent, both in the same countries and abroad, regarded with some awe and emulation as being highly foresightful. Examples in point are to found in the SATCOM report of 1969, in the United States, entitled *Scientific and Technical Communication—A Pressing National Problem and Recommendations for Its Solution* (*1*)* and the ill-fated Tyas Report, *Scientific and Technical Information in Canada* (*2*).

A third phenomenon to which the swift rise in the incidence of national LIS planning activities may in part be attributed is the emergence of an increasingly widespread acceptance of the premise that planning, as a form of decision making, to be maximally effective (whether for the citizen or the prime minister) is ever-more frequently dependent on the availability, even in the midst of the information deluge, of the significant and relevant information.

In addition to the assumed value of information in assisting in wise decision making and hence in protecting and expanding the quality of life, information bears another relationship to national well-being which carries considerable and potential

* The References for this section begin on page 358.

importance. Information has a unique quality as a resource and a commodity, the utility of which, in combination with its other values, is so pervasive as to result in the now common appellation given to the period of history ahead as "the information age."

Undeniably, information and knowledge are commodities and resources. Like other commodities and resources, they can be bought and sold, traded, and even stolen. Like water, they are a commodity which none of us can live without for long. Like other commodities, too, they can, in a sense, be "used" or "consumed" in the process of the attainment of goals—both individual and national. But, unlike most commodities and resources, they are both "products" and "services." More importantly, and paradoxically, while being usable and consumable, and sometimes "outdated," they are simultaneously nonconsumable and renewable, limitless, and cumulative. In an age when the depletion of nonrenewable resources is a concern to most nations, information and knowledge resources and services thus stand out as important exceptions to many of the economic dicta of the day. They are the only known "have your cake and eat it" commodities, the only extant geese whose golden eggs continue to pour forth even while their layers are being devoured. Hence, it is with good reason that information services are in some circles regarded almost as highly as energy in terms of their potential for providing increments to the Gross National Product. Consequently, many nations are examining their information resources with a view to their possible use as a form of "investment" which may soon "pay off" handsomely in terms of their salability both at home and abroad, without either their depletion or the depletion of other resources.

The value of and need for access to current and accurate information, as well as to retrospective and cumulative information, is especially evident in three major aspects of current existence: in educational endeavors, in economic affairs, and in scientific and technical matters. In educational and in training activities, in particular, information is and always has been the "stuff and staff of life," at the very heart of the enterprise. Without the availability of information services and resources —human, print, and nonprint—educational institutions cannot exist. An acceptance of this fact of educational life is daily rendered ever more urgent because education is everywhere becoming a "womb to tomb" affair. Keeping abreast of the developments in one's vocational and avocational pursuits is thus almost a cultural imperative. Nations have perforce, then, found it expedient, when constitutionally possible within their national social and cultural development plans, to include near-term and long-range planning of their educational enterprises. And in an attempt to provide a quality and flexibility to their educational systems that can help to render them capable of being responsive to future educational needs, they have sought to supply the existing and planned educational institutions with effective LIS and resources.

It is especially important to take note at this point of the fact that it is within the educational setting in most countries that the longest and strongest efforts have been exerted, and the most progress achieved, in providing users—students and teachers—with information services and resources appropriate to their group and

individual needs. Curriculum specialists and educational psychologists have increasingly been constrained to design learning materials with particular types of users in mind. They have also devised means for the evaluation of the success or otherwise of these efforts. Together with educational media and technology specialists, they have attempted the scientific investigation of the effects of various media when used under given conditions with various types of users/learners and with various sizes of learner groups. The systematic design, development, and packaging of information resources to meet user needs and the evaluation of the effectiveness of such materials have consequently recently become major preoccupations of those engaged in the educational profession. In their use of all of the various available and appropriate media, in their drawing from various types of information networks and systems, in their use of the systematic approach to the satisfaction of user needs, and in their attempt to use scientific techniques for the evaluation of the quality and effectiveness of their efforts, the members of the educational profession embody an almost unique resource of expertise in the provision of a wide variety of types of information services. Those within that profession who have devoted themselves to the preparation of validated, multimedia, tutorial, computer-assisted instruction materials stand, in a sense, at the apex of the providers of individualized, remote, randomly accessible, relevant information retrieval services to users.

In the foregoing context, educational institutions may be conceived of as highly important producers, storers, and distributors of information, as well as leading consumers of information and information services. The inclusion of their offerings in the data banks, the systems, and the networks of national LIS—and the satisfaction of their information needs via national LIS—is just beginning to be perceived as a vital area that will require being taken into account in any efforts at foresightful LIS planning. The fact that national planning for the effective sharing of the multimedia products of the new educational technology requires far more difficult and more complicated design efforts than LIS planning for print materials alone is also becoming apparent. For effective systems for the sharing of educational technology materials can presumably result only when the integrated technologies of communications/telecommunications and teleprocessing are part and parcel of the overall LIS planning venture.

The same strictures, in varying degrees, hold true regarding the need for extensive planning for the provision of effective information services on behalf of the economic interests and the scientific and technological sectors within each nation. Scientists, for example, require the formulation of science policies and information systems which will permit them to monitor the progress of national and international research and development ("R and D") activities in their respective fields. And in the view of many eminent scientists, satisfactory services of this order can only come about as a result of considerable planning at the national level.

Similarly, specialists involved in the social sciences, the arts, and the humanities, and in all of the other cultural aspects of national life, increasingly require appropriate information services and the planning, at the national level, of such services, in order that they, too, may maximize their contributions to the quality of national life and to the pursuit of truth.

The need for ever-more extensive and planned information services being experienced by personnel engaged in the various facets of national life noted above is closely paralleled by information needs within another aspect of daily living in every nation, namely, the operations of the communications media, including the mass media and entertainment services. Like the aforementioned aspects of social life, these services have an important bearing on national development and well-being. These communications media, in turn, are depended upon by the various information services for the dissemination of their products. This growing web of interrelationships is exemplified by the fact that in recent years various countries, particularly the "Third World" countries, have, with increasing frequency, found it expedient to use their communications services for a variety of national development purposes: formal and informal education and vocational training, rural development, health care, urban and regional development, technology transfer and industrialization, and national integration—heating "the melting pot" and "orchestrating cultural diversities."

Thus, in the welter of economic, social, and cultural imperatives, the imperative of adequate information and communication services is being viewed as a realm which must be considered for placement among other national priorities. And just as planning has become the order of the day in other areas affecting the quality of life, so, too, it has become the order of the day for library and information as well as communication services, locally, nationally, and internationally.

In consequence of all of the foregoing considerations, a good deal of agreement now seems to exist regarding the axiom that there is a vital positive relationship between the economic, social, and cultural development of a nation and the aggregate ability of the information/communication services of that nation to channel "*all* of the 'right' information, and *only* the 'right' information, to *all* of the 'right' persons, and *only* the 'right' persons, at the 'right' time and place, as well as in the 'right' form, at a cost which is 'right' for both the nation in question and the individuals concerned." The increasing acceptance of this notion has, in turn, resulted in the recognition on the part of numerous governments of the need for the development of national-level policies, plans, and operational programs employing appropriate technologies and organizational configurations in order to ensure the most effective exploitation of the nation's and of the world's information/communication resources, as a major and even urgent national responsibility.

The reasons compelling broad-based LIS planning become increasingly cogent with the passage of time. As each nation, willy-nilly, accepts and uses more and more of information technology, as the borders between the traditional subject fields begin to dissolve into interdisciplinary, problem-oriented fields, as the audiovisual media become increasingly important storers and carriers of information in all fields, and as the communications/telecommunications industries become inextricably related to the provision of effective information services, the cost of providing unnecessary, duplicated, and overlapping services becomes unbearable for even the richest nations.

The planning of comprehensive and sophisticated LIS systems and communication systems and networks at the national level commonly involves the enormously

complicated task of integrating already existing services into newly planned ones. Although the difficulty of this task may serve as a deterrent to such planning, an awareness of some of the debilitating effects of failure to plan, or failure to plan soon enough, is gradually beginning to permeate the consciousness of both the national professional associations and the inner circles of national government. It is virtually self-evident that unless national LIS activities are planned, services which are wasteful of ever-more precious means and manpower are likely to result. Equally apparent is the fact that the longer an unplanned situation prevails, the greater the difficulties likely to be encountered if and when the effort is subsequently made to integrate such unplanned services either into national schemes or international plans.

To sum up, then, within almost every nation important segments of the population have concluded that both the solution to the serious problems afflicting the world and the adequate protection of the quality of life can only occur through concerted and integrated planning activities, at very least at the national level. These self-same groups tend to hold that for national or other planning activities to be maximally effective, the prior, wise policy-making decisions and the selection of long-range objectives must be based on the efficient use of all of the available information/knowledge/communication services, resources, and technologies that can be afforded. And they hold, in turn, that these services must be planned, comprehensive, and coordinated. They believe, as well, that these services must be designed from the outset to comprise integral parts of the general national development infrastructure.

The forces which have given rise to pressures for national-level LIS planning ventures have given impetus to a complementary but perhaps somewhat weaker movement designed to ensure that the LIS planning activities are undertaken, at least in part, by the national government of the country in question. It is held that the level of integration and rationalization of existing services required to ensure both their gross and detailed articulation with newly planned services can occur only as a result of the planning initiatives of national governments. Only national governments have the economic and political resources requisite to the resolution of the myriad planning problems of a task of such breadth and magnitude.

Then too, the information needs of neither lay citizens nor government officials can be completely satisfied, even in the wealthiest, most powerful, and most technologically advanced nations, solely through even the most efficient use of national information resources. In varying degrees, information must be "imported" and "exported." And as the information import-export process has increasingly come to involve high technology communication systems, the need for national coordination and for a national focus for such international activities becomes evident. Hence, national LIS planners quite commonly have within their purviews the design of national governmental facilities which are to be capable of coordinating exchanges of information between their nation and other nations.

The foregoing pages have set forth many of the factors that have impelled nations toward the formulation of broad national library and information policies and of

national LIS plans. There can be no denying, however, that in many nations other factors, in addition to those conducive to national LIS planning, are at work. The countervailing forces that inhibit or even prevent national LIS planning cover the spectrum from widespread adverse attitudes held by important segments of the population, to inadequate leadership on the part of those who espouse such planning; from lack of consensus concerning the long-range objectives of "national" or even "rational" planning of LIS, and lack of understanding of the need for such planning, to fears of government controls and to loss of privacy, etc. In addition, competition among various technologies and levels of technology, together with the lack of standardization among these technologies, serve to hinder progress toward action in planning national LIS. As this topic is considered peripheral to the central core of this article, however, it will not be plumbed further here. But for readers who wish to pursue the matter, an excellent survey of the topic may be found in the Aines and Day article (*3*). Suffice it to say at this point that, to this author, the overwhelming net balance of forces, even in the nations hitherto least inclined to engage in social planning of any kind, currently appears to be on the side of those who espouse the cause of national LIS planning.

The foregoing delineation of the concept and the rationale for the planning of national LIS may serve as the basis for an analysis of the assumptions on which planning and decision making regarding national LIS appear to be founded.

ASSUMPTIONS

The planning of national LIS may be viewed, both by observers of and participants in the process, from several different standpoints. In each such perspective there lies embedded whole congeries of interrelated motivations, values, beliefs, and assumptions. Despite the fact that the premises and postulates that underlie the various national LIS planning perspectives may not always be completely logical or consistent, they may nonetheless be regarded, as a result of their interrelatedness, as being more or less coherent wholes or frames of reference. The intricate web of interrelatedness of these assumptions, taken together with their potentiality for being viewed in a holistic fashion, renders their listing, explication, and analysis in serial print order difficult and subject to oversimplification. Neither two- nor three-dimensional matrices nor cluster analysis techniques have, as yet, been developed for, and applied to, the task of sorting and analyzing, or even listing, hierarchically or otherwise, the relevant assumptions involved in the formulation of national LIS plans. In view of the lack of availability of the two foregoing techniques for such purposes, and as a step in the direction of their development, a preliminary, serial-ordered, partly hierarchical and partly classed listing of groups of assumptions is here essayed. It is hoped that such a list will be useful, too, in providing insights into the national LIS plans and planning efforts described in a subsequent section of this article.

The list purports to embody only the principal and/or the most frequently encountered assumptions which "came to the surface" in connection with the many

national LIS planning endeavors discussed in this article. Included along with them are comments relating to some of the crucial issues arising from the varying perspectives of which the assumptions comprise essential elements. Insofar as feasible, the "warp and woof" of the intricate relationships which pertain between or within the groups of assumptions are also brought out.

The list, together with the commentary, is set forth in the following discussion.

1. Because "plans" are, almost by definition, future oriented, national LIS plans are almost inevitably based on premises about the future. The first group of assumptions, then, deals with the availability and the role of information/communication services as concomitants of the general features of the society of the future—what the future is likely to be, what it ought to be, and what it should be made to be. More specifically, these assumptions tend to relate to the need for national concern with respect to both the nature and the direction of general national development (social, economic, political, cultural, educational, scientific) and the maintenance and improvement of the quality of life for all or part of the national population. Assumptions relating to the desirability for concern with regard to general national development, or merely to some part of it, such as development in education or in science, comprise a subgroup of the foregoing assumptions. Another subgroup is concerned with the desirability of the formulation of national policies and/or plans relating, again, either to general national development or merely to some part of it. In both subcategories, the concomitant assumptions concerning LIS planning will reflect the generality or specificity of the foregoing assumptions. For example, some LIS planners assume their task to be one involving the provision of information services in all areas of national development which affect the quality of life. Others presume their task to relate only to specific major areas, such as education or science. From either of these standpoints, other assumptions may come into play concerning the centrality, or otherwise, of information services in the specific or the general area in question.

Those who accept the variant versions of this general group of assumptions would presumably find little cause for alarm concerning a national LIS planning program which was of a broad-scale nature and/or closely related to general national development planning ventures or goals.

2. The presumed nature of the relationship which pertains between the LIS available, on the one hand, and, on the other, the quality of the resultant decision making and the actions taken by various information users, comprise a second major group of assumptions affecting national LIS planning. Within the same category are the assumptions which deal with the characteristics of the available LIS—their quality, variety, extensiveness, and their relative importance in society. A subcategory would relate to the segment or segments of the population to which the existing, and/or envisioned, LIS would be available. Some people, for example, would hold the premise that being "well informed" is a better basis for wise decision making than is a state of ignorance and, in turn, wise decision making results in a beneficial effect on the quality of life. The acceptance of these assumptions would presumably

lead national LIS planners to give high priority in their schemes to the improvement of the quality of the LIS available.

3. Another important set of assumptions, which, like the preceding two, revolves around the issue of the quality of national life, is one which is concerned with the level and quantity of technology desired to be available in the envisaged LIS and with the anticipated impact of that technology (together with the technology used in other aspects of life) on national development and on the quality of life in the nation. The assumption of the need for high technology may give rise to special concern in the technologically less-developed nations. For economic reasons, such as their desire to benefit from economies of scale, these nations might see overwhelming cost benefits accruing from the extension of international computer networking into their countries, so as to provide them with access to foreign data banks and/or computing power. The benefits of opportunities to provide themselves with needed information services with minimal capital investment in facilities and personnel training would presumably, however, be at least partly offset by the resultant information dependency.
4. Another group of assumptions, one which is closely related to all the foregoing ones, involves the desirability of having a national information "policy," particularly a policy concerning the goals of national LIS and the planning of national LIS. Underlying the assumption of the desirability of such a policy there may well be a postulate regarding the desirability of the national LIS to have as its goal the provision of *"all* of the 'right' information, and *only* the 'right' information . . . etc."
5. Especially closely tied both to the postulate noted immediately above and to the three listed directly below are assumptions regarding the rights, if any, of individuals and groups concerning the privacy of information related to them and concerning the ownership of and copyrights to information created by them.

The next three groups of assumptions (6, 7, and 8) are sufficiently closely associated as to warrant their joint statement. They include:

6. Assumptions regarding "the right to know" or "the right to be informed" on the part of the public, and regarding the right of governments, corporations, etc., to control, withhold, censor, or "filter" information.
7. Assumptions regarding the cost of national LIS planning and/or the implementation of such plans.
8. Assumptions concerning the scope of the national LIS plans/planning as regards the current availability/accessibility of LIS to various sectors of the population—governmental, professional, individual, etc.; and assumptions concerning the envisioned short- and long-term modifications of that accessibility resulting from new or newly organized/reorganized, extended/contracted, fragmented/articulated services.

The assumptions grouped primarily around the seventh basic set are obviously concerned with the worldwide, ever-rising cost of providing information services. They include assumptions as to whether the increase has been even more rapid than that which has befallen costs in other service areas. They deal with such issues as whether increased information service costs can and/or should be sustained. Sub-

sidiary assumptions, based, for example, on expediency and equity, might call into question the desirability of including, in LIS plans, practices involving the provision of subsidies, paid out of general tax revenues, for various information/communication services.

Apart from assumptions relating to whether a nation can afford to maintain or improve LIS, there are the more basic assumptions concerning the measurability, or otherwise, of the quality of the information services, in order that the assumed benefits of the information services may be equated with their costs and with the costs and benefits of other essential services. These assumptions, in turn, tend to bring into play still others. They include premises concerning the appropriate tactics to be employed in order to enhance the acceptability of the resultant plans by the relevant officials, administrative or elective. Included in this category would be assumptions regarding the need to employ, in both the planning process and in the plans themselves, national and international vogues and current "in" methodologies, supposedly required to determine the feasibility of the scheme and to assess its costs and benefits.

Assumptions grouped under the rubrics 6, 7, and 8 deal with the terms under which it is anticipated that information is to be made available to various users, in order to meet their needs, including their needs for the knowledge and the understanding required for them to participate, fully or otherwise, in their community and society. Such assumptions are, of course, and as indicated in connection with the second group of assumptions, intimately related to such questions as the extent to which assumed qualitative improvements in information services will bear fruit in terms of qualitatively improved human communication and the national well-being. Found in this category as well are assumptions which are specifically concerned with "who will get what information at what price?" and "who will pay for what one gets?"

The postulates grouped primarily around the eighth basic set contain assumptions which involve sensitive areas of human concern, as well as clashing value systems and assumption priority systems. For example, the presumption that a nation's information resources can be best exploited, and with maximum efficiency, by having the locus of LIS decision making private and local, might conflict with the assumption or ideal of the placement of great importance upon equal opportunities for access to information.

The next three groups of assumptions all relate, as did the eighth, to the scope of the national LIS planning efforts and of the resultant plans. They differ sufficiently to warrant separate treatment, however.

9. Assumptions regarding the scope of the plans relating to the desirability and potential capability of the envisioned facilities to provide individualized information services. These assumptions, in some respects, comprise a subset of the postulates set forth in the fourth group of assumptions noted above.
10. The set of assumptions and the subsets comprising the tenth group are for many countries no doubt the most controversial of the entire constellation. They encompass assumptions regarding the scope of the planning/plans in

terms of what are deemed the appropriate roles for various sectors of the nation, and for bodies outside it, in the planning of LIS, in the implementation of the plans, and in the operation of the resulting system(s). The assumptions concerning any one or more of these sectors could range from no participation to facilitation and/or support and/or regulation and/or control and/or cooperation and/or coordination and/or operation and/or ownership. The sectors in question are: the national government sector—only in its case is there a minimum level of participatory role required, as prescribed in the section stating the limitations of this study, below which discussion of a given LIS planning endeavor would be precluded here; the international/world organization(s) sector; the private sector; the librarian-information scientist sector; and other sectors.

Among this group are those which relate to such matters as the extent to which, in some countries, the mixture of private enterprise and public agencies in the LIS field may best marshal the available resources in order to best serve the interests of information users. Assumptions concerning the probable effects on LIS users of shifting the allocation of any information service function from the private to the public sector, or vice versa, are also included in this set. Similarly, assumptions regarding the quality of the existing or future patterns of government and other types of intervention in LIS in response to the needs or demands of information users would fall into this category, as would assumptions concerning the probable effects of extending or curtailing such interventions on a national basis. Included here as well are assumptions regarding the feasibility and economic viability of possible alternative patterns of intervention and their total probable effects on various segments of the population.

Yet another assumption in this category is that which deals with the desirability of/need for consideration to be given in national LIS planning to the possibility of the provision of a single, overall coordinated service, one involving only the integration of all national government-owned or operated LIS, or one involving the entire group of LIS available within the nation, in order to achieve the coordination of the totality of the information available.

In the case of the subset of assumptions relating to the role of the private sector, persons who desire that role to be minimal would appear to proceed on the assumption that the marketplace is inadequate for the "sorting out" of the existing overlapping and competing information services found within many countries. They would view the continued participation in national LIS on the part of the private sector as one which would result in the fragmentation of the national data base and in either permanently lost information and/or the nonefficient use of information (*4*). They would also assume an incapability on the part of private entrepreneurs, even IBM in cooperation with others, to successfully engage in the construction of a single national LIS.

The extent to which assumptions concerning the role of international organizations figure in the planning of national LIS varies greatly from country to country. The variance appears to correlate positively with the degree of their acceptance of postulates, stated in the form of recommendations, made at certain international

organization-sponsored conferences. One such recommendation (5) suggests that in each UNESCO member state:

> A governmental or government-chartered agency should exist at the national level to guide, stimulate, and co-ordinate the development of information resources and services in the perspective of national, regional, and international co-operation. These agencies should in particular give their support, or themselves adhere to, co-operative programmes of international scope, in consonance with the principles and goals of UNISIST.

Assumptions regarding the actual or anticipated role of librarians and other information scientists in the making and implementation of national LIS plans tend to reflect the professional status which librarians and other information scientists have in relation to other professional groups in the country in question. That status is reflected, in part, by the almost universal assumption that there is a very great lack of information scientists who are adequately prepared and experienced in the tasks of planning, implementing, or operating national LIS, and that one of the first tasks of the planners should be the construction of plans to remedy these assumed qualitative and quantitative deficiencies.

> 11. The assumptions in this group are concerned with the scope of the plans in terms of the intended: extent of the geographical coverage—national only, or national plus regional and/or provincial/state and/or local; degree of universality of the knowledge fields or subject discipline coverages to be provided—natural sciences (and technology) only, or natural sciences (and technology) plus social and/or behavioral sciences, humanities/arts, entertainment, recreation; variety of the types of activities and functions to be undertaken, such as information/knowledge storing, retrieving, analyzing, abstracting, displaying, using in education, etc.; status of the information to be included, such as recorded only, or recorded plus recordable information; media formats—print only, or print plus nonprint, and communications/telecommunications channels to be included; and systems and/or networks to be constituted, reconstituted, or dissolved.

Assumptions regarding the breadth of subject matter coverage of the envisaged national LIS are commonly of paramount concern to users and planners alike. A sizable portion of these assumptions involve the extent, if any, to which the anticipated services will, within various time spans, extend beyond scientific and technical information (STI) services. Many of these assumptions, and their acceptance or otherwise, have probably been influenced by the evolution which has taken place in the purview of the UNESCO–UNISIST Program, which, as planned, has recently been enlarged in scope from STI only to include the social and behavioral sciences, and which probably, again as planned, will soon be extended to include the humanities. In the light of the UNESCO–UNISIST experience, and the previous experiences of many nations, national LIS planners have come to assume, almost universally, that the natural sciences and technology area is the one for which governments will be most willing to provide the support necessary to initiate national information services.

Almost invariably, in the technologically advanced nations, national LIS planning is based upon an assumption of the continued rapid growth, at the national level, of the use of new and advanced technologies, particularly the use of various types of networks. It is further assumed in these countries that networking will continue to be increasingly dependent upon four technologies: telecommunications technology; computer technology; and, to a much lesser, at the moment, but to a growing degree, both microfilm technology and audiovisual/educational technology. It is assumed, for example, that the recent appearance of "publications" such as journals, handbooks, data compilations, and various reference materials in electronic (e.g., videotape) and/or computer output microfilm (COM) form presage full-text storage and distribution via networks. It is likewise assumed that "on-line" reading and browsing of the full texts of documents, and of the contents of audiovisual materials, via audiovisual terminals, will soon follow the already prevalent use of terminals for viewing abstracts and indexes transmitted by means of networks. The latter group of assumptions are, of course, but an extension of the postulates previously noted in the third category of assumptions.

The following group of assumptions (12, 13, and 14) concerns the anticipated institutional arrangements which are to provide the planned national LIS. They include:

12. Assumptions regarding the intended range of types of institutional structures (e.g., centralized or decentralized) which might be expected to eventuate and/or be incorporated in the plans.
13. Assumptions regarding the desirability of ensuring that the national LIS planning process, the implementation of the resultant plans, and the operation of the eventual LIS be systematic in nature, and assumptions regarding the anticipated permanence and flexibility of the envisioned institutions and their structures.
14. Assumptions regarding the relationships intended to pertain between the various existing and the planned LIS facilities.

Assumptions abound with regard to the desirability and feasibility of constructing national LIS plans wherein there is, for the planned institutional structure(s), a "built-in" flexibility and a responsiveness to changing conditions, as well as a capacity for self-modification, in order that the institution(s) may stand the test of time. Also numerous are assumptions regarding the utility of providing the ongoing processes of national LIS planning-implementation-operation with an apparatus for the continuous evaluation of the effectiveness of the LIS provided, in order that weaknesses and errors might be speedily rectified.

15. Finally, there is the set of assumptions which relates to the adequacy of the information available concerning existing national LIS, for the purpose of permitting national LIS planners to proceed effectively with their tasks. For example, assumptions about the need for the study of prior and current national LIS policy making and planning in the country in question and elsewhere are subsumed here. Similarly, assumptions concerning the potential utility of an LIS planning enterprise to serve as a model which might subsequently be employed elsewhere may also be said to fall under this rubric.

SUMMARY OF THE PURPOSES AND FUNCTIONS OF NATIONAL LIS PLANNING

The purposes attempt to ensure that in the national LIS planning process the following goals are met.

1. The greatest possible professional skill and economy of time and money will be employed.
2. The representation of appropriate professional personnel will be adequate.
3. The envisioned national LIS will have the desired attributes.
4. The envisioned national LIS will be affordable.
5. The attention of the national government and/or private organizations will be focused on national problems and prospects of information availability and use.

The functions attempt to provide recommendations concerning:

1. The organization, systematization, or modification/reorganization of the existing services.
2. The contraction/extension of the existing services.
3. The creation of new services.
4. The training of librarian-information scientists in the planning, implementation, and operation of national LIS.

SUMMARY OF THE PURPOSES AND FUNCTIONS OF THE PLANNED LIS

The purposes and functions of planned LIS are:

1. The maintenance and/or improvement of the quality of life and the achievement of national objectives for the betterment of society through the assistance of an improved quality and/or quantity and/or variety and/or availability of LIS.
2. The facilitation and/or improvement of the provision of "*all* of the 'right' information, and *only* the 'right' information . . . etc." in the attainment of the purposes and functions noted immediately above.
3. The promotion of the development of knowledge.
4. The ensuring of the availability of adequate information for wise decision making and policy making, by governments, private organizations, and citizen-individuals.
5. The focusing of the attention of the national government and/or private organizations on the problems and prospects of information availability and use.

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Brief Biographies of Leading Figures in the Planning of National LIS

Brief biographical notes are here provided only for those individuals who have themselves directly participated in actual national LIS planning endeavors, either at the national or international level.

NATIONAL-LEVEL PLANNERS

United States

There are at least three individuals who have played sufficiently important roles in the United States to warrant the inclusion of background notes relating to their contributions to the field, namely, Dr. Russell L. Ackoff, Dr. Andrew Aines, and Dr. Frederick Burkhardt.

Professor Ackoff, of the Wharton School of Communications at the University of Pennsylvania, in Philadelphia, has had many years of experience in the information/communications field. He may rightly claim the distinction of having obtained the financial support, over several years, of the U.S. Office of Science Information Service of the National Science Foundation for the construction of an "idealized design" of a national "Scientific Communication and Technology Transfer (SCATT) System" (*1, 2*).* As the major details of that notable proposed system are discussed in a subsequent section of this article, no further comments on it will be provided at this point.

Dr. Aines is currently a senior official of the U.S. Office of Science Information Service (National Science Foundation). He has had a long and distinguished career in the STI field, having served in such eminent posts as chairman of COSATI, U.S. representative in information matters to the OECD, and presidential advisor on information accessing. He has been the associate editor of the American Society of Information Science *Bulletin* since its inception. His regular "Infoscope" column in the *Bulletin* usually reports news concerning the latest developments in the national LIS field in the United States and abroad. In addition, he is the coauthor, along with

* The References for this section begin on page 363.

Melvin S. Day, of the authoritative article on "National Planning of Information Services" (*3*) in the 1975 volume of the *Annual Review of Information Science and Technology*. Dr. Aines is one of the authors of the recent landmark U.S. government-sponsored study *Toward a National Program for Library and Information Services: Goals for Action* (*4*), prepared by the U.S. National Commission on Libraries and Information Science in 1975. As that study, too, will be commented on in a subsequent section of this article, no further remarks about it will be provided at this point.

Suffice it to say regarding Dr. Burkhardt that he is the chairman of the U.S. National Commission on Libraries and Information Science and hence, in a sense, the chief instigator of the commission's aforementioned study.

United Kingdom

Although numerous eminent British authorities of national and even international renown have participated, and continue to partake, in the planning of national LIS in the United Kingdom, Dr. H. Hookway, the chief executive and deputy chairman of the British Library, without question and despite his "low-key" approach, has played the leading LIS policy-making and planning role on the British scene since the inception of the British Library. Dr. Hookway is a very distinguished, high-level civil servant. He has had experience not only in central government administration but also in diplomacy, international organizations, STI services, and scientific research planning, as well as library development. There seems to be almost unanimous agreement in the United Kingdom and abroad that only Hookway's adroit persuasiveness and other capabilities could possibly have succeeded in launching into effective operation the now flourishing British Library. Dr. Hookway is one of the eminent coauthors of the noted OECD publication *Information for a Changing Society: Some Policy Decisions* (*5*).

Canada

Canada has had the good fortune to have three "statesman"-caliber officials who have not only played prominent policy-making and planning roles in the LIS field in Canada but have also served as Canadian representatives in numerous governmental and nongovernmental international organizations dealing with LIS. They are Dr. Guy Sylvestre, Dr. Jack Brown, and Mr. Harry Campbell.

Dr. Sylvestre has served as Canada's national librarian (director general) during the entire period under review in this article. He not only has nationwide responsibility for LIS in Canada but his personal views have had a strong influence on the development of national LIS planning. He served as the head of delegation for the Canadian contingent at the 1974 Intergovernmental Conference on the Planning of National Documentation, Library and Archives Infrastructures convened by UNESCO. Several of his articles are cited in the list of references at the end of the section on Canada in this article.

Dr. Brown has been Canada's principal STI administrator and planner for many

years. He was formerly the director of the National Science Library (NSL) and is currently the director of the successor to the NSL, the Canadian Institute for Scientific and Technical Information (CISTI). He, too, has been prominent internationally, particularly in the LIS endeavors in which UNESCO–UNISIST have been active. Several of Dr. Brown's publications are cited in the section on Canada in this article.

Mr. Campbell, as head of the Toronto Public Library System, is undoubtedly Canada's leading public librarian. He is probably Canada's best-known librarian abroad, as a result of his services as a principal administrator in the library field at UNESCO and as a result of his recent stint as chairman of the International Federation of Library Associations. He has also recently collaborated with the preeminent Swedish expert in international LIS affairs, Dr. B. V. Tell, in the formulation of guidelines for national LIS infrastructures. His influence is sufficiently strong as to almost require his blessing for any important nationwide Canadian LIS policy-making and planning ventures.

Sweden

Like Canada, Sweden has three librarian-information scientists of world renown who have played important roles in national LIS planning activities within their own country as well as elsewhere. They are Dr. Stephan Schwarz, and Professors Bjorn V. Tell and Kjell Samuelson.

Dr. Schwarz is the director of the Royal Institute of Technology Library, Stockholm. In that capacity he has important responsibilities in STI planning activities in Sweden and in Scandinavia. He is the editor of the state-of-the-art volume *Proceedings of the Seminar Held in Stockholm, Nov. 26–28, 1974, on the Interactive Library—Computerized Processes in Library and Information Networks* (*6*), published in 1975.

Professor Tell, director of libraries of the University of Lund and former director of the Royal Institute of Technology Library, holds a front-rank position among the world's librarian-information scientists. His counsel or participation has been a prominent feature of almost every Swedish, Scandinavian, OECD, UNESCO, and UNISIST national or international LIS planning activity undertaken in the past decade. He is the author of numerous publications, including an article in the aforementioned Schwarz volume. The article is entitled "Government Policies for Library Network Development—with Special Emphasis on UNISIST and OECD Recommendations" (*7*).

Professor Samuelson is head of the Department of Information Processing-Computer Science, jointly administered by the Royal Institute of Technology and the University of Stockholm. Like Professor Tell, Samuelson has had innumerable national and international LIS engagements, particularly in the field of computerized networks. He, too, is the author of numerous publications in the LIS field, including an article in the foregoing Schwarz volume, entitled "International Information Networks for Global and Regional Resource Sharing" (*8*).

Israel

Two Israeli information scientists, Dr. Carl Keren and Mr. A. Lebowitz, have won recognition for their work in both national and international LIS projects.

Dr. Keren is the director of the Israel National Center for Scientific and Technological Information. He is the country's leading STI–LIS administrator and planner and until recently, when Israel's participation in UNESCO was brought to a virtual standstill, was one of that organization's principal consultants on national STI–LIS matters. He is not only the author of the UNESCO–UNISIST 1974 publication "Guidelines on the Planning of National Scientific and Technological Information Systems" (*9*) but he has also served as a UNESCO consultant, at the request of the Colombian and Chilean governments in the initial stages of the development of their STI systems.

Mr. Lebowitz is the director of the Central Library of the University Ben-Gurion of the Negev, in Beer-Sheva, Israel. He also teaches a course on computerized information systems at the Hebrew University in Jerusalem. As head of a university library, he has taken a prominent role in the formation of information networks in Israel. He has been especially active in the UN Food and Agriculture Organization's establishment of its AGRIS information system.

U.S.S.R.

Two individuals in the U.S.S.R. stand out in the planning of their nation's LIS, namely, Engineer Nickolai B. Arutiunov and Professor Aleksandr I. Mikhailov.

Engineer Arutiunov, the director of the Information Directorate of the State Committee, is probably the Soviet Union's leading information scientist. As the agency which he directs is responsible for national STI coordination, planning, policies, and control, he wields enormous power.

Professor Mikhailov is the former director of the single best-known Soviet LIS: VINITI, the All-Union Institute of STI. Mikhailov's position thus involved the administration of the U.S.S.R.'s leading operational institution in its STI system. As VINITI's director, he was in charge not only of national plans that embrace information services for science, technology, and education but also of the planning of VINITI's own Integrated Information System (VIIS), now called ASSISTENT (Automated Reference Information System for Science and Technology), undoubtedly the world's most ambitious officially endorsed and in the process of being implemented LIS scheme. Some of its details are described in a subsequent section of this article.

INTERNATIONAL-LEVEL PLANNERS

Apart from the numerous international civil servants, principally at UNESCO, who have made major contributions to national LIS planning and to the actual undertaking of such planning, in countries throughout the world, a number of prominent LIS professionals have contributed to advancements in national LIS

planning in countries other than their own. Brief mention has already been made, in passing, of some of the latter international-level contributors when their LIS planning activities within their respective nations were noted in the preceding section. Hence, only those noninternational civil servant personnel whose contributions have not already been treated will be dealt with here. Among them are Professor Harold Borko of the United States, Professor Helmut Arntz of West Germany, Engineer Vasile Tărăboi of Romania, and M. Jacques d'Olier of France.

Professor Borko teaches at the School of Library and Information Science at the University of California, Los Angeles. Prior to taking up his teaching assignment, he was an information system officer at the Systems Development Corporation in Santa Monica, California. He has had several engagements as a consultant for UNESCO, including service as its appointee as an advisor to the Brazilian government when that government sought a review of its plans for an STI system.

Professor Arntz, although now officially retired from university teaching at Bonn and elsewhere, has long been a dominant figure in documentation circles in Western Europe. He recently completed a 3-year term of office as president of the International Federation for Documentation (FID) and has been a frequent West German representative or consultant at international LIS gatherings. He is the author of the basic document *Planning of National Overall Documentation, Library and Archives Infrastructures* (*10*), prepared for attendees at the 1974 UNESCO intergovernmental conference on that topic.

Engineer Tărăboi is an associate professor as well as an official of the Office for Organizational Problems in Science Production and Labor, in Bucharest, Romania. He is a former UNESCO official and is the author of the very insightful 1973 publication *Organization, Functioning and Activities of National Documentary Information Systems in the Scientific, Technical and Economic Fields* (*11*).

M. Jacques d'Olier, the director of France's principal national STI agency, the Centre de Documentation du Centre National de la Recherche Scientifique, has played a leading role in national STI and LIS planning in France and has served as the French representative on several international bodies dealing with national LIS matters. M. d'Olier is also the coauthor, along with B. Delmas, the eminent archivist, of the important 1975 UNESCO study on *Planning National Infrastructures for Documentation, Libraries and Archives: Outline of a General Policy* (*12*).

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Some Representative Examples of Principal Types of National LIS Plans

Recent and current significant national LIS planning activities in a selected, and to some extent representative, group of countries are briefly described and discussed in this section. As already indicated, in each of the countries treated, the national LIS planning enterprises discussed exhibit, at least minimally, the particular combination of characteristics previously set forth herein.

For the most part, the countries dealt with are ones which are already endowed with relatively advanced information technologies. They also tend to comprise nations wherein numerous LIS, including some at the national level, already exist. The treatment given in this section to the selected national LIS planning enterprises commonly involves a discussion of the proposed further development of existing services, their organization or reorganization, and the filling in of gaps in their services, rather than a description of the initial phases of these planning

efforts. Present arrangements are described only insofar as necessary to indicate the base upon which the planned services are to be founded, or to make currently planned developments comprehensible by describing their antecedents. In each case, the various elements that are intended to constitute the component parts of the national LIS system(s) and network(s) are indicated. These elements—past, present, and future—commonly include, among others, the national legislative, regulatory, and/or operating agencies; national corporations; and other national organizations, such as professional and trade associations (those of both information users and of information suppliers).

The accounts concerning the LIS planning schemes in the countries in question are grouped according to certain political, economic-technological development, and geographic location criteria. The three main categories into which the countries are divided are: the technologically developed, Western-style democracies; the Communist nations; and the less-developed technologically, "Third World" countries.

A list of References (and Additional Sources, where applicable) is appended to each of the accounts of national LIS planning activities. In addition, the Bibliography at the end of the article includes items which provide details for documents relating to national LIS planning developments in several countries not dealt with in this study. It should be noted that in some instances the planning ventures described in these other sources do not fall within the particular purview of national LIS as defined herein. The foregoing comment also holds true with regard to a few of the items listed in the references found at the end of each of the subsections dealing with the various individual countries.

Despite the recognized limitations of so doing, the items in the various lists of references to be found in this study have been restricted almost entirely to those couched in English, French, or German. Only where few or no other sources were available, as in the case of the list of references dealing with Brazil, were items in other languages included.

At the time of the composition of the list of references, access to the already considerable bulk of recorded specialized information dealing with the planning of national LIS and with the resultant plans was still almost entirely by means of the printed word. This author's audio-taped conversations and interviews with many of the key figures involved in the planning ventures described herein were conducted with a promise of anonymity and privacy which the hearing of the voices in question might betray. Hence very few of the listed references comprise non-print items.

THE TECHNOLOGICALLY DEVELOPED, WESTERN-STYLE DEMOCRACIES

United States

The citizens of the United States today undoubtedly have readily available to them the most diversified and in many respects the most extensive aggregation of

LIS—local, state, regional, national, and international—in the entire world. U.S. leadership in the provision of the many kinds of LIS generally available is no doubt due in some measure to the diversity of the planners, developers, and operators of the LIS in question. As what happens with respect to information/communication services in the United States inevitably has a tremendous effect on what happens elsewhere, both nationally and internationally, these facets of American life would be sufficient in themselves to attract the attention of LIS planners both at home and abroad. There are, in addition, still other aspects of LIS in the United States which add considerably to the high level of interest evidenced in American LIS developments, particularly attempts at LIS planning activities occurring at the national level. Many of these factors serve to exacerbate the possibilities of broad-scale LIS planning and consequently adversely affect further progress in that direction.

As is the case with other nations, the state and character of national LIS planning activities in the United States are reflections of certain peculiar gross and specific aspects of the national milieu. Progress in LIS planning, for example, is greatly affected by the polarization of attitudes which has occurred vis-à-vis government planning of any sort, other than military planning. Like environmental planning, health planning, and energy planning, national LIS planning, insofar as its occurrence is possible, takes place in a nation that is of two minds on such matters. National LIS planning, in effect, goes on amidst a continuing "to plan or not to plan" debate among some of the leading figures in the national LIS field. To complicate matters, there is by no means an official, clear, comprehensive, and consistent statement of U.S. information policy (*1*).* Instead, there are many disparate policy-like official statements, such as the Privacy Act of 1975.

Polarized attitudes regarding national planning of any sort do not, however, constitute the only major barrier to national LIS planning. The "crazy-quilt" organization of information services and the pattern of interdependencies of the information programs of governmental agencies, departments, committees, and commissions, on the one hand, and, on the other, the numerous types of private sector organizations, make the formulation of official LIS plans, or even the level of agreement necessary to produce such plans, extremely difficult to attain. Insofar as various types of private organizations, such as newspaper chains and TV stations, participate in the formulation and execution of public information responsibilities, and insofar as the decisions of various government agencies, such as the Federal Communications Commission (FCC), continue to have serious ramifications for information enterprises in the private sector, national LIS planning activities will continue to be fraught with extreme difficulty.

LIS planning at all levels in the United States is also greatly hampered by the relatively low priority commonly accorded to information services in general and to the satisfaction of information needs via governmental initiatives and interventions. A recent report to the U.S. Senate Subcommittee on the National Science Foundation, prepared by two eminent information scientists, Chartrand and Chalk (*2*), is indicative of the lowly status of STI services in the priorities of the federal government. The report declares that:

* The References for this section begin on page 387.

> . . . the lack of top-level support of existing STINFO [Scientific and Technical Information] programs is resulting in a dangerous weakening of an already minimal service capability, with the capacities of the existing documentation and analytical services being outstripped by the increased quantities of STINFO.

Then too, the historical separation in the United States of policies and services in the library and information field and in the communications/telecommunications area, and hence the separation of planning activities in these fields, further exacerbates national LIS planning problems insofar as information and communications services are becoming increasingly and inseparably linked. This separation is reflected in practice in the different governmental jurisdictions under which these activities fall. Information services fall under several federal, state, and local jurisdictions, as well as under executive or legislative controls; whereas communications/telecommunications services, although falling largely under the jurisdiction of the executive branch of the federal government, do so under the control of quite different agencies within that branch from those under which the information services fall. Moreover, within the communications/telecommunications field alone, there is a further major subdivision of authority. The primary responsibility for the coordination of telecommunications policy matters rests with the Office of Telecommunications Policy (OTP) of the Executive Office of the President. The OTP also manages the government portion of the radio spectrum involved in telecommunications, whereas the FCC is the regulator of the private portion of that spectrum. In addition, although there is no consistent information policy, there is an implicit and relatively consistent telecommunications policy, one which favors the competitive entry of many private and only a few public agencies into the information/data communications networks, and one which is also marked by a minimum of both regulatory controls and standardization of equipment. It is virtually only by coincidence, therefore, that the policy and the practices followed by the federal communications/telecommunications agencies are in harmony with those followed by national government information services agencies, such as the Library of Congress. Efforts at coordinated and/or integrated planning of both areas consequently involve almost nightmare-like and protracted negotiations.

The process of national LIS planning in the United States is encumbered and made complicated not only by the above-noted impediments but also by technological considerations and constraints. Stemming from the state of American economic and technological development, national LIS planners in the United States, to be realistic, must simultaneously address themselves to such interrelated facets of information/communication services as:

1. The relative economic advantages of electronic forms of information transmission over printing and distributing information by mail or other forms of personal delivery.
2. The need to use automated methods for coping with the continued enormous growth in both "live" and recorded print and nonprint information resources.
3. The need to provide LIS to an increasingly more differentiated, larger, and more widely distributed group of users, whose information needs are in the process of rapid and continuous change.

4. The increasing concern on the part of both users and suppliers of information services of the cost-benefit considerations and trade-offs involved in alternative situations, such as on-line searching versus manual searching.

Despite some quite powerful forces, such as those exerted by the U.S. National Commission of Library and Information Science (NCLIS) and its cohorts, which have sought to encourage the United States to move toward national LIS planning, there is, as yet, no officially approved comprehensive or integrated national LIS plan. Instead there is the continued existence of what has been termed "a non-system of systems" or "an anti-system." There are even extant plans afoot designed to ensure the continuation of this state of affairs (*3, 4*). As the recent NCLIS study (*5*) cogently put it:

> At present there is no national program of library and information service for the development of Federal, state and local library, and other information activities in the United States. As a result, existing programs are generally unrelated to one another and continue to develop throughout the country in uncoordinated ways. In some cases, this tends to lead to incompatible systems and counterproductive activities.

Nor are there any major officially approved extant plans which involve attempts to design a national information system which envisages the full integration of all STI services. Indeed, there is no approved plan even for an all-encompassing information system in any given scientific discipline. One of the presumable reasons for the latter hiatus or void, according to Dr. L. Burchinal, the head of the Office of Science Information Service (OSIS) of the National Science Foundation (NSF), is that "the majority of users would find such a system ideologically undesirable" (*4*).

The foregoing combination of factors has resulted in the generation of some programs and plans which only by a far stretch of the imagination can be conceived of as being adequate to meet the needs of the situation. One such official "program," having seemingly been contrived to please everyone, is quite innocuous. This program, by the admission of one of its principal authors, is not, in fact, a national plan but rather merely a procedure for the facilitation of voluntary cooperation (*3*). Hence, even though it does in many respects comply with the minimal requirements for a national LIS plan stated earlier in this article, no further elaboration of it is provided here. Another extant plan, in this instance an unofficial one, having been so constructed as to ignore many of the contextual constraints inherent in LIS planning in the United States, is so innovative, idealistic, and/or elitist as to render it almost impervious to practical implementation.

Several efforts made during the past decade to initiate broad national information schemes have failed, including both the ill-fated COSATI plan of 1971 (*6*) and the more recent effort to establish FEDNET by the General Services Administration and the Department of Agriculture (*7*). Their demise must be assumed, in view of the fact that they are no longer being actively promoted even by their authors.

Each such successive failure probably increases the likelihood of failure for the next effort.

Among the existing unofficial plans, only two, to the knowledge of the writer, not only satisfy the criteria for inclusion herein but have also gained some national attention among LIS professionals. These two planning enterprises are described and analyzed in some detail. Before beginning to do so, however, it might be well to draw to the reader's attention the fact that the absence of a full-scale, integrated and official, national plan on the American LIS scene is by no means entirely due to the lack of vision on the part of either LIS personnel or key government officials involved in decision making regarding informational matters. Indeed, in at least one instance, the highest officer in the land, America's only school-teacher president, Lyndon Johnson, demonstrated remarkable perceptivity concerning the increasing functional interdependence of information, communication, and educational services. As early as November 1967, on the occasion of his signing of the Public Broadcasting Act (*8*), Johnson issued a clarion call for the free dissemination and use of knowledge as a vital ingredient of national and global progress. He declared his belief that:

> . . . the time has come to stake another claim in the name of all the people, stake a claim based upon the combined resources of communications. I believe the time has come to enlist the computer and the satellite, as well as television and radio and to enlist them in the cause of education. . . . I think we must consider new ways to build a great network for knowledge—not just a broadcast system, but one that employs every means of sending and of storing information that the individual can use. Think of the lives that this would change. . . . Eventually, this Electronic Knowledge Bank could be as valuable as the Federal Reserve Bank . . . such a system could involve other nations, too—it could involve a partnership to share knowledge and thus to enrich all mankind.

Of the two major national LIS plans to be treated in the pages which follow, the NCLIS National Program and the so-called Ackoff or SCATT plan, the latter is much less well known and far less comprehensive in scope, but much more revolutionary and innovative in conception. The potential impact upon the scientific research community of the implementation of the Ackoff proposal would in all likelihood be manyfold that of the NCLIS Program.

Though commonly referred to as the Ackoff plan, the scheme is by no means the brainchild of Professor Russell Ackoff of the University of Pennsylvania alone. Professor James C. Emery has long been associated with the project, as have a number of other specialists in the research team at that institution. The SCATT group also includes several advisory bodies, such as an industrial group, a government and NSF group, and a University of Pennsylvania group.

Its creators make no apology for stating that the plan is "an attempt to produce an idealized design of a national Scientific Communication and Technology Transfer (SCATT) System" (*9*). As such, it is not a forecast, but a hypothetical formulation. Presumably, the underlying purpose of the design is the production of an

organizing and mobilizing idea, one which will in turn result in the attainment of the more specific objectives of the scheme. The hope of its designers is that those for whom the system is to be constructed will eventually recognize that the ideal is potentially quite realizable.

SCATT is apparently based on several assumptions which relate to the pace of change anticipated in American society. It is assumed, for example, that there will be no fundamental changes in the near future of either a social or an environmental nature. It is also assumed that there will be no basic alteration in the relationship of governments and private industry via-à-vis the provision of information services.

Ackoff and Emery (*9*) enumerate three basic objectives for their scheme:

a. To provide scientists, technologists, and other users of scientific and technical information with identification of and access to relevant and useful recorded information.
b. To minimize the time, cost, and effort required to use these services.
c. To minimize the amount of irrelevant and useless recorded scientific and technological information to which users of such information are exposed, and to condense that which they do receive as much as possible without sacrificing its content.

From these objectives it may be inferred that there is still another assumption on which the scheme is based, viz., that at least for the scientists for whom SCATT is being designed, the main information problem is not a lack of relevant information, but an overabundance of partly relevant and partly irrelevant information. According to Ackoff et al., the problem is not one of storage and retrieval but one of "filtration."

It is claimed that as an idealized system, SCATT is constrained in only two ways:

a. It may employ only those technologies that are currently known to be feasible. However, the technologies which it does incorporate need not be generally available at the present time.
b. The system must be *viable;* that is, capable of being operated and sustaining itself [i.e., self-supporting] (*9*).

In making a claim for the SCATT plan as a viable one, its authors do not seek to deny the possibility that individual features of the scheme, if taken independently, might not be feasible. They contend only that the system as a whole would be feasible.

Although, as its name implies, the plan deals—as a result of the concerns and interests of its financial sponsor, OSIS—only with STI, it is deemed applicable to information/communication services in all fields. Its authors state that it is their hope to see it applied eventually even to the humanities, as only minor modifications would be required to remove any practical constraints in the application of the plan to other fields. They also contend that "there is nothing basically national in the needs which the design addresses, and it is sufficiently flexible to admit interaction with other national systems in an international network."

The SCATT plan has many novel features. One of these relates to a built-in

dynamic and participatory design feature. The system is arranged "to involve as many people as possible in the design effort," with the resulting system hopefully "capable of learning from its own experience and adapting to internal and external changes." Another innovative feature is the inclusion of experimental facets in the SCATT development process. Ackoff et al. declare that "where we do not have answers we have tried to incorporate into the system the capability of finding them experimentally." The plan is intended to be "subject to continuous change in the light of information, knowledge and understanding." It is the latter feature of the plan which its authors contend distinguishes it from "utopian" plans, as utopian plans, in their view, are immutable. Yet another novel aspect of the plan's formulation is explained by its creators thusly:

> The preparation of an idealized design of a system is a critical first step in planning it. This turns planning from the retrospective point-of-view of correcting current deficiences piecemeal, to a prospective and holistic point-of-view: planning to obtain what is wanted rather than to get rid of what is not. . . . This design . . . would become the basis for a subsequent planning effort to select or invent ways of approximating the ideal as closely as possible.

Although many national LIS planners lay claim to the uniqueness of their respective plans in terms of their concern for the user, the SCATT plan is indeed novel in its attempt to provide the user with "maximum control over the service he receives," thereby enabling him "to evaluate the system's performance, and to make his evaluations affect that performance."

The SCATT plan is also almost unique in that it seeks to deal with all forms of recorded information, including certain types of recorded "oral" communications. Authors and other sources of information are to be enabled to communicate their thoughts or findings to the planned system "either orally" or "in writing," or both. The communications in question might be either "public" or "private." Private communications initiated by their authors/producers are not discussed in the plan as it is assumed "that they would be continued much as now except for use of new communication technology such as the picture phone and facsimile transmission." In the case of public oral communications, such as the reading of papers at scientific conferences, etc., and in other forms of public face-to-face or image-and-voice to image-and-voice interactions, the plan provides for the recording of the proceedings on audio- or videotapes, with copies of the tapes to be made rapidly available through the SCATT system. Each such tape, however, would be required to be accompanied by a printed abstract and a numerically coded classification of its contents. It should be noted that no provision is made in the scheme for the construction of the abstract or the coding of the contents of such materials in other than the conventional print format. In the case of public printed communications, authors who wished to submit manuscripts for publication in scientific journals would similarly be required to provide abstracts and numerical codes to indicate the nature of the content of their documents.

A striking feature of the foregoing classification scheme is that it, too, is to be "capable of learning and adapting," of being systematically improved on the basis

of experience obtained from its use. It is noteworthy that the criterion for the measurement of the "adequacy" of the proposed classification scheme is to be its capability of enabling users to determine accurately, via the scheme, whether specific items are relevant to their respective interests.

The SCATT system includes several structural and institutional components which vary considerably in their importance within the system. Of these components, the National SCATT Center is expected to play the leading role, with the Local SCATT Centers, the professional societies/associations, "conferences," the Patent Office, and certain publishing houses comprising the other constituent entities.

The National SCATT Center would have numerous functions. First, it would be a receiver of inputs from a variety of sources. From publishers it would receive communications, primarily in the form of reproducible documents and tapes, together with their coded classifications and abstracts. It would receive, directly from authors and compilers, accumulated numerical data sets (referred to as "disembodied" data sets in the plan) for their entry in a National Register. Such data sets would have to be submitted in the form specified by the National Center, with the author having to bear the cost of their entry into the register. The National Center would also receive copies of approved patents from the Patent Office. Conferences would send it enquiries, and replies to enquiries. Local SCATT Centers would send it interest profiles (concerning which more will be said anon) for individual and institutional users of the system, as well as profiles of the individual Local Centers. In addition, it would receive orders for bibliographies from several sources. From professional societies it would receive review and activity reports. In addition, requests for information would be received from individual users.

The National SCATT Center would store these input contributions and maintain several National Registers in connection with them, such as a National Register of new publications and one for the aforementioned sets of disembodied data. The National Registers would also contain the publication details concerning the various listed items, together with their abstracts and classification codes. In the case of books, the table of contents would additionally be entered in the register. The cost of the entry of all such materials in the National Register, with the exception of the data sets, would be borne by the publisher.

The National Center would, moreover, construct and store profiles, reproduce and distribute copies of STI items, and engage in R and D activities concerning the objectives and operation of the entire system. In addition, it would employ a number of resident subject-matter specialists, termed "NSF Fellows," appointed and paid by the NSF. One of their tasks would be the construction of annual reviews of new documentation and developments in their respective fields of competence. These reviews would then be made available to users either directly by subscription or by special order, or through the Local Centers. The NSF Fellows would additionally be engaged in the provision of a special type of information service. This service would be provided by each of the Fellows for a minimum of three hours per day, during which he/she would be accessible by a "real time" interactive com-

munications medium in order to receive and to respond to enquiries from system users. To assist in their consultative work, each Fellow would have available to him a register of experts in the field(s) of his expertise, to whom he could refer if necessary or to whom he could refer enquirers. System users throughout the nation would be provided with lists of NSF Fellows currently available for consultation.

The National SCATT Center would have within its R and D Unit a Conference Research Department whose proposed functions would comprise one of the more controversial features of the SCATT plan. The feature in question would involve what the authors of the plan regard as a built-in method by which the system would attempt the improvement of the quality of information derivable by attendees of conferences, symposia, and the like. The department would have the responsibility for the coordination of certain experiments which would be engaged in by conference groups. These groups, during their meetings, would systematically seek to develop and use a variety of new types of conference arrangements and conference evaluation procedures. The department would also be charged with the task of rapid distribution of information regarding such experimentation to conference organizers for their guidance.

Besides the outputs indicated above, the National Center's output would include: enquiries to, and responses to enquiries from conferences; profile queries; the contents of registers, documents, data sets, annual reviews, and bibliographies to Local SCATT Centers; annual reviews to professional societies; and information or suggested sources to users.

The Local SCATT Centers, which could be either publicly or privately owned (and those privately owned could be "for profit" or "not for profit" entities), would receive inputs from publishers in the form of reproducible publications. From the National Center they would receive profile queries, the contents of registers, documents, data sets, bibliographies, and annual reviews; from the professional associations, reviews and activity reports; and from users, profile inputs and orders for abstracts, documents, and bibliographies. Using the information thus received, the Local Centers would, like the National Center, engage in storage, registration, profiling, reproduction, and local R and D activities. As a result of the foregoing functions, they would then be enabled to output: profiles and orders for bibliographies to the National Center; and profile queries, abstracts, documents, and bibliographies to users.

Both the Local Centers and the National Center would be required to apply at least 5% of their expenditures in support of R and D activities designed to improve and extend their services. In these activities users and their needs would be the principal focus of the research. Users would be informed of system changes affecting their use of the system or the usefulness of the system to them as a result of such revisions to the system.

Professional societies would receive annual reviews from the National Center and would distribute other reviews to the National Center, the Local Centers, and directly to users. They would also be expected to maintain a current record, updated at least annually, of "who is doing what research where, and what new technology

has come into use, where," in the association's field of interest. Copies of these activity reports would be deposited with the National Center.

Professional societies would also be encouraged by the National Center to support "Society Fellows," whose task would be the preparation of reviews in fields other than their own, from which their own fields could benefit. Thus, as a result of the work of these and the NSF Fellows, "discipline" and "interdisciplinary" reviews would be available to users of the system. In addition, reviews across different levels of science and technology would be prepared by Society Fellows, including basic research-level, applied research-level, and development-level reviews.

Conferences, the Patent Office, and publishers, under the SCATT plan, would all serve intermediary functions as between information sources or producers, such as authors and compilers, and information users. Conferences would serve, as they do now, as the venues for the presentation and reception of contributions by users, by direct oral or written (printed) communication. Such contributions would be required to be accompanied by appropriate abstracts and classification codes. Conferences would also distribute copies of tapes and proceedings to publishers. They would additionally send to and receive from the National SCATT Center information concerning the aforementioned experimentation being engaged in by themselves and other conference groups, designed to improve the benefits of conference attendance. The SCATT plan also seeks to extend the benefits currently provided by conferences to members of the scientific community in yet another way. It is hoped that the accessibility of the now sacrosanct invisible colleges would be increased through the provision of means whereby the junior associates of senior scientists could more readily than at present attend conferences in the company of their senior associates.

The Patent Office would, as it does now, receive patent applications from producers/sources, file them, and approve or reject them. Approved patents would be transmitted to the National SCATT Center.

Publishers who wished to be associated with the SCATT plan would be required to be duly accredited or licensed by the National Center in order for their output to be included in the National Register. Such publishers would be required to comply with certain National Center standards of quality relating to the coding, abstracting, and refereeing of their output. Ackoff and Emery (*9*) have commented, apropos the latter feature of the plan, that "publishers would be regulated in the public interest such as TV stations are supposed to be now." Duly accredited publishers would receive manuscripts and the accompanying abstracts and classification codes from their authors. They would accept them, reject them, or request changes in them. They would also send them to referees for adjudication and receive adjudicated manuscripts from referees. They would then publish the documents in regular subscription format or on special request from users. In addition, they would reproduce them for distribution to Local SCATT Centers and the National Center.

The referees retained by the publishers would apparently be required to check not only the content of the manuscript but also the abstracts and coding for their completeness and correctness. They would, moreover, be required to prepare an

additional abstract for each manuscript. The text of each published article would thus be preceded by both the author's abstract and one that was prepared at the behest of the publisher.

Another unusual feature of the SCATT plan is that which deals with the means whereby "quality controls" are to be placed on would-be authors/producers of STI publications. Such authors/producers would be required to have a "redundancy check" performed, at their own expense, via the Local SCATT Center, on their proposed contributions/communications before they would be considered both for publication by accredited publishers and for distribution by publishers or by the National and/or Local Centers. The check would involve verification of the author's classification of his manuscript. In addition, it would include the extraction from the files of the abstracts of all documents bearing the same classification codes as those chosen by the author for the manuscript in question. These abstracts would then be made available to the author, in order to permit the comparison of their contents with that of his purportedly new manuscript. In his own abstract the author would be required to include a statement of what was new in his article. With his manuscript he would then submit to the publisher a copy of the list of documents he had checked and the certification of the validity of the coding of his article by a Local SCATT Center. Each such article submitted would be additionally required to include a bibliography of a number of recent articles bearing the same code number as that borne by the new article.

In order to further enforce quality controls, all issues of registered periodicals (i.e., those produced by accredited publishers) containing any uninvited articles would be divided into three clearly designated parts. The first part would contain invited papers. These papers would involve no fee payment to the publisher on the part of the author(s). The second part would contain uninvited but refereed and edited papers. They would involve a fee payment by the author(s) to the publisher to cover the cost of these processes. (An article rejected by one publisher and sent for consideration by another would require payment of an additional fee.) For the third category, the uninvited and unrefereed papers, a charge to cover the cost of the publication would be levied.

At the opposite end of the STI communication chain from that of the authors and publishers would be the "consumers" of their products, the users of the SCATT system. In attempting to satisfy their information needs by obtaining access to the documents and tapes in the National Register and/or the register of their chosen SCATT Centers, the system's users would normally contact those Local SCATT Centers. For most enquiries, including those of an ad hoc nature, the users would interact with the system at the Local Centers via a simple interactive language available for the specifications of their needs. The resultant interaction would involve an additional key element in the system, the interest profiles of individual users. Such profiles would be prepared as a result of an analysis of each individual's interests, with those interests being entered in the Profile Register of his/her chosen Local Center. Entries in the Profile Register would involve the utilization of the same numerical classification codes as those referred to earlier. Records concerning

individuals in the Profile Register would be regarded as classified information, and would be available to others only on the basis of the prior permission of the individual in question.

The selected materials, in the form of the relevant documents themselves or merely their abstracts, sent to the user on the basis of his/her interest file would be chosen from computer lists, microfiche, and machine-readable files, with each form of output to the user being appropriately priced. The user could also designate in advance the exclusion from the list those items he did not wish to receive, such as uninvited and nonrefereed contributions. The user would be expected to provide feedback to the system concerning the relevance of the listed items to his/her continually changing interests.

Of the many clearly controversial features of the SCATT plan, perhaps the most controversial is that which requires the levying of charges for all information services provided by the system. Such charges, it is claimed, would be levied in a manner that would make it possible for users to determine the cost-benefits being derived from each type of service. However, few details are provided concerning the means by which the users could, in fact, ascertain such cost-benefits.

There are a number of serious criticisms to which various financial aspects of the SCATT plan are susceptible. One relates to the somewhat dubious assumption that it is always possible to determine both the costs and benefits, and the relationship between these factors. Another relates to the notion that the fees collected would necessarily have to cover costs. Currently public libraries and public educational institutions are seldom expected to cover costs with revenue from users. Public funds provided to such institutions are regarded as a good form of investment of public money in terms of the long-term benefits to be derived for all of society. No explanation is given as to why the same principle might not be applied to the STI services to be provided by SCATT. A third criticism derives from the fact that authors and publishers would lose control of the further reproduction of documents or tapes, once copies were placed in the hands of users. Such users apparently could then reproduce the documents obtained from the system at will, without violation of copyright. The SCATT plan may also be criticized because there is no discussion in the published SCATT document (9) of the manner in which the scheme would be initiated, how the cost of bringing it into existence would be arrived at, and by whom such costs would be borne.

Several further comments concerning features of the SCATT plan warrant inclusion here. The first few pertain to both the monetary aspects of the plan and the feasibility of one or more of its parts. The present writer finds it difficult to conceive of authors being willing to devote the necessary effort and money entailed in the various aspects of the redundancy check. It would also appear that the addition of refereeing costs to the other charges involved would result in total publication costs being prohibitive, especially if, as stated in the plan, there were a federal tax on unsolicited advertisements appearing along with refereed articles in STI journals. It is also inconceivable to the present author that those who compile sets of data that might be of interest or useful to others would be prepared to bear the costs of entering such data sets into the National Register.

The other criticisms relate to the overall utility of the plan. With the exception of the preparation of annual reviews, the plan sidesteps many of the organizational problems involved at the "use" end of the information/communication chain, such as the organization of scientific knowledge in terms of its understandability for particular users. There is, for example, no apparent provision in the system, even in the annual reviews, for the preparation of popularized versions of the contents of any of the items in the system. Then too, for all its merits, the system is an elitist one, a system designed and operated for advanced scientists, rather than for students at various levels of education or for the general public. No realistic special provision is made for access to the system by public school systems or public libraries. The one nonelitist feature of the proposed system, and a dubious one at that, relates to the functioning of an Educational Unit within the National Center. This unit would apparently make available to "any level of user" courses, displays, and descriptive material on the use of the system. The value of the provision of the latter service to teachers and students in secondary and elementary schools would appear to be highly questionable, however, as knowledge of how the system operates would be of little use to either student or teacher unless he/she had true access to the contents of the documents contained in the system, that is, he/she could afford the charges involved and could understand the contents in question, in view of the high level at which they would be geared.

The authors of the SCATT plan are not, of course, unaware of some of its deficiencies and are actively soliciting suggestions for its further revision from interested parties. It is interesting to note, in passing, that OSIS is financing the next phase of the planning of SCATT at the very time when the former's head is decrying any and all efforts to engage in national LIS planning in the United States, especially planning for STI services (*4*).

We must now turn our attention to an activity which has evolved into the most comprehensive and most prodigious national LIS planning effort thus far undertaken in the Western Hemisphere—the National Program for Library and Information Services of the U.S. National Commission on Library and Information Science (NCLIS). In several respects this program also stands forth as one of the Western world's most innovative schemes, although the innovative features in question are of quite a different order than those noted concerning the SCATT plan.

As the plan is the work of NCLIS, a note concerning the commission itself might be helpful in providing some insight into the National Program and the context in which it was constructed. NCLIS is a relatively new creation, having been established, under Public Law 91–345, as a permanent, independent, policy-advisory federal agency by the U.S. Congress in mid-1970. In setting it up, Congress declared that:

> . . . library and information services adequate to meet the needs of the people of the U.S. are essential to achieve national goals and to utilize most effectively the nation's educational resources.

NCLIS was bestowed with the following comprehensive charges and powers:

1. Advise the President and the Congress on the implementation of national policy by such statements, presentations, and reports as it deems appropriate.
2. Conduct studies, surveys, and analyses of the library and informational needs of the nation, including the special library and informational needs of rural areas and of economically, socially, or culturally deprived persons, and the means by which these needs may be met through information centers, through the libraries of elementary and secondary schools and institutions of higher education, and through public, research, special, and other types of libraries.
3. Appraise the adequacies and deficiencies of current library and information resources and services and evaluate the effectiveness of current library and information science programs.
4. Develop overall plans for meeting national library and informational needs and for the coordination of activities at the federal, state, and local levels, taking into consideration all of the library and informational resources of the nation to meet those needs.
5. Be authorized to advise federal, state, local, and private agencies regarding library and information sciences.
6. Promote research and development activities which will extend and improve the nation's library and information-handling capability as essential links in the national communications network.

Several features of the above statement bear sufficient significance to merit special comment. First, LIS are designated as being linked to information handling and information processing. The terms of reference for NCLIS are deliberately conceived of as being broader than the mere information storage, cataloging, classification, and circulation activities commonly involved in the conventional library sense of those terms. Hence, if it so chooses, and it has indeed so chosen, NCLIS could view virtually the entire information/communication chain of processes as potentially within its domain. The reference to a "national communications network" more than substantiates that potentiality. Second, the description of LIS "as essential links in the national communications network" effectively enforces upon NCLIS as one of its prime areas of concern, communication networks and processes. Third, the reference to the role of information services in the achievement of "national goals" and the need to utilize the nation's "educational resources" provides NCLIS with a firm mandate to deal with all fields of knowledge. Fourth, the responsibility of advising on policies regarding the *effective use* of "educational resources" presumably requires the commission to deal seriously with educational nonprint media resources as well as with the print media. As educational resources are primarily meant to be used by students, chiefly in educational institutions, NCLIS could, if it so chooses, concern itself with the improvement of the use of these materials in schools, or at least in school libraries and school media centers, insofar as such matters come under federal jurisdiction.

The omission of a specifically noted mandate for NCLIS in the area of the facilitation of scientific research and STI dissemination within its general terms of reference is puzzling. It is also noteworthy that NCLIS was given no authority over other federal agencies with LIS functions and resources, although it was obviously anticipated that such entities would cooperate with NCLIS.

As noted by Burkhardt (*10*), NCLIS is a coordinating and planning body, not an operating agency. Its membership, according to Public Law 91–345, consists of:

> . . . the Librarian of Congress *ex officio* and fourteen appointed members, five of whom shall be professional librarians or information specialists, and at least one in addition who shall be knowledgeable with respect to the technological aspects of library and information science.

Burkhardt has also indicated that the commission, at its inaugural session in September of 1971, quickly decided on a working philosophy, namely, that its efforts should be "user oriented," and that it should accordingly make a serious attempt to discover the needs of all types of users and potential users and to investigate appropriate means by which the rich knowledge resources of the country could be made available to them. One of its first resolutions was an affirmation of the ideal of equal access to information for all, or, as the commission's statement put it, "equality of access to information is as important as equality of education."

In recognition of the democratic and pluralistic context in which its work was to be undertaken, the commission developed its planning philosophy into a procedural formula. Again according to Burkhardt, it incorporated the notion that national LIS planning in the United States:

> . . . begins and ends with the people, the users and potential users, who are also those who will pay the cost through their taxes. Planning starts with a thorough investigation of the needs of a diversified people living under a federated system of autonomous states and local jurisdictions. The planning must address itself to the needs and capabilities of both public and private institutions, both profit making and non-profit organizations. To gain acceptance the plan must be inclusive in its range—geographically and socially. It cannot be a program for scientific and technical information alone, or for managers and policy makers, or academic scholars—though it must include all these and give them reasonable priorities. It must conceive of information in the broadest sense—ranging from books to data tapes, from research manuscripts to recreational material, and both print and non-print material. It must conceive of libraries in the most sophisticated sense—as essential components of our cultural and spiritual life as well as purveyors of information, and as responding to the private needs of individuals as well as to the needs of large-scale research.

There can be no question of NCLIS's diligence in studying and striving to assist in the fulfillment of the nation's LIS needs. Following the first session it rapidly began to schedule numerous hearings and meetings all across the nation in order to determine both the needs of specific groups of users and the general state of LIS affairs in the United States. By the spring of 1973, after a year and a half of hearings and meetings with representatives of federal and state agencies concerned with library and information activities, professional societies, and various other private information enterprises, the commission decided to direct its activities to the preparation of a document outlining a comprehensive National Program for LIS. It thereupon appointed a committee which drafted a short preliminary paper con-

taining the general framework of a proposed "coherent program," as well as an indication as to how it might operate. The draft was widely circulated among the LIS community, particularly among leaders of professional library groups and information scientists, in order to solicit further suggestions, new data, and criticisms.

On the basis of the reactions received, and along with additional work concurrently engaged in by the commission, a revised and fuller draft was even more widely distributed in October 1973, and a new feedback cycle initiated. The new draft was also published in several professional journals. According to Burkhardt, over 500 letters were subsequently received from individuals and relevant organizations. Sessions were also held with representatives of the different types of library groups—school, public, state, and academic research libraries. The commission's paper was additionally commented upon by numerous types of specific user groups—the ethnic minorities, the poor, the geographically remote, the handicapped, and others having special and often urgent needs to which the National Program was asked to address itself. Moreover, national and regional meetings were held with representatives of the existing multistate networks in order to discuss the networking aspects of the proposed program. NCLIS also meanwhile contracted with appropriate experts for 28 papers dealing with aspects of the program which required specificity and technical specialization. One of the most important of these studies is designed to explore alternative locations within the federal government structure for the proposed new federal agency which was to carry the overall responsibility for the National Program. Another study was made of the various existing systems and networks and the degree to which they were compatible with each other.

Burkhardt claims that:

> As a result of these very deliberate efforts to elicit suggestions and criticisms it became clear that there was a general consensus of both grass-roots and professional opinion that the Commission was on the right track in seeking a program that was comprehensive and coherent, and that was addressed to the needs of the nation as a whole.

Much of the document was once more revised as a result of these further reactions, and new sections were added. Objectives that were previously only implicit were now made explicit. In part because the revision process involved the constant testing of the ideas of the planning committee against "the concrete experience of specific types of users," the program was greatly improved, and in the process an apparently valuable educational experience was obtained for everyone concerned. The wide publicity given to the various drafts of the eventual document was also deemed to be advantageous in the commission's efforts to secure the political support necessary for the eventual adoption of the program.

The resultant document, published in June of 1975 under the title *Towards a National Program for Library and Information Services: Goals for Action* (5), is deemed by its authors to be an interim one, describing a "dynamic, long range plan," one which "will undergo constant scrutiny and revision." Suggestions and

constructive criticisms are being solicited from interested parties in connection with an anticipated edition planned for publication within 2 years of the issuance of the present 1975 version.

The NCLIS program is partly a national LIS plan and partly a proposed national government LIS policy. In a sense, it is a "plan for a plan." It sets forth the commission's goals for action and the basic needs and rationale of the program. It also surveys the current situation of various types and levels of LIS. The concerns of the generators and publishers of information are reviewed and existing network and cooperative arrangements are examined. There follows the NCLIS recommendations. They deal with the objectives of the National Program; the proposed responsibilities of the federal government, the states, and the private sector in relation to it and to each other; the basic features of the legislation proposed for the initiation of the program; and the method of funding the program. The document also includes a major section describing the concept of the proposed nationwide network.

An attempt is made here to provide only an outline of the National Program as it is now delineated in the NCLIS document. In perusing the outline it should be borne in mind that the National Program has as yet no official status. It is but a set of conclusions and a group of policy recommendations for governmental action. As Burkhardt puts it (*10*), "Its realization depends upon the Congress and ultimately upon the support it receives from the U.S. citizenry."

The Introduction to the National Program document (*5*) declares:

> If our nation is to achieve the most effective use of national information resources and the largest return for funds invested in them, common goals, objectives, methods and standards are needed now for the coordinated development of information facilities. Unless a coordinated program is established on a nationwide level, expenditures, facilities, and efforts will be unnecessarily duplicated, and inter-connection will become increasingly difficult. . . .

It goes on to state that:

> The Commission believes the time has come to develop a nationwide program which would weld together to-day's collection of disparate parts into a nationwide system of library and information services.

The National Program is then declared to be based on the following five major assumptions:

> First, that the total library and information resource in the United States is a national resource which should be developed, strengthened, organized and made available to the maximum degree possible in the public interest. This national resource represents the cumulated and growing record of much of our nation's and indeed, much of the world's total cultural experience, intellectual, social, technological, and spiritual.
>
> Second, that all the people of the United States have the right, according to their individual needs, to realistic and convenient access to this national resource for their personal enrichment and achievement and thereby for the progress of society.

> Third, that with the help of new technology and with national resolve, the disparate and discrete collections of recorded information in the United States can become, in due course, an integrated nationwide network.
>
> Fourth, that the rights and interests of authors, publishers, and other providers of information be recognized in the National Program in ways which maintain their economic and competitive viability.
>
> Fifth, that legislation devised for the coherent development of library and information services will not undermine constitutionally protected rights of personal privacy and intellectual freedom and will preserve local, state, and regional autonomy.

The purpose of the entire program is the attainment of the commission's stated ideal (*5*):

> To eventually provide every individual in the United States with equal opportunity of access to that part of the total information resource which will satisfy the individual's educational, working, cultural and leisure-time needs and interests, regardless of the individual's location, social or physical condition or level of intellectual achievement.

Eight specific objectives were developed to assist in the achievement of the ideal. They are summarized below, together with some indication of the commission's rationale associated thereto:

1. To ensure that all local communities are provided with basic, adequate LIS. Anent this objective, the commission declares that it is convinced that only when local resources—both material and human—have been strengthened can these vital links with the people be effective.
2. To provide adequate special services to special user constituencies—the blind and physically handicapped, the poor, the illiterate, the geographically remote, and the ethnic minorities.
3. To strengthen existing statewide resources and systems and to assist the states to form intrastate networks compatible with each other and with the nationwide network projected by the program.
4. To ensure basic and continuing education of personnel essential to the implementation of a National Program. The National Program requires a new approach to the education of library personnel at all levels.
5. To coordinate existing federal library and information programs. The proposed National Program will rely heavily on participation from the Library of Congress, the National Library of Medicine, the National Agricultural Library, and the other federal libraries already in operation.
6. To encourage the private sector as an active partner in the development of a National Program. The publishing industry, professional societies, and special and private libraries all have valuable resources and perform services that must be taken into account in planning the national LIS.
7. To establish a locus of federal responsibility charged with implementing the national network and coordinating the National Program under the policy guidance of NCLIS. Whatever central authority is eventually established to direct the National Program, local autonomy and the maximum degree possible of local self-determination should be one of the program's major tenets.
8. To plan, develop, and implement a nationwide network of LIS.

The last stated objective is seen by the commission as the principal means by which it proposes to bring the present random and uncoordinated LIS into a coherent system. What is envisioned, to quote Burkhardt (*10*), "is a single, unified system encompassing state networks, multi-state networks, and the specialized networks in the public and private sectors."

The report (*5*) boldly asserts that:

> Such a program must have incentives strong enough to encourage maximum cooperation and participation, not only by states and local governments, but by interested public and private agencies as well.

Then, to allay fears of government controls, the report notes that:

> Although the Federal Government would have the responsibility for aiding in the development of compatible state and multistate networks, furthering common practices, performing relevant research and development, increasing coordination between the private and public sectors . . . the Federal Government would neither directly control nor operate nationwide networks, and, in particular, it would exercise no control whatsoever over the information content exchanged over the network.

The network would only in part be a federally owned mechanism. Moreover, no library or information center would be compelled to join the network, as it would be a participatory cooperative venture. Affiliation with it would be expected to occur through formal agreements and contractual relationships among groups of libraries and other information facilities. The federal government would be expected to provide the new forms of computer and telecommunications facilities necessary to support the interstate portions of the network's activities. Burkhardt (*10*) notes that the latter function would be crucial to the network's success because:

> One of the most important services of a national network would be to enable the user to communicate rapidly, inexpensively, and effectively with the facility at which the desired material is located. A future telecommunications system used for a nation-wide information network would eventually need to integrate teletype, audio, digital, and video signals into a single system. This integrated media concept is an important aspect of the design of a modern communications system for information exchange.

The federal government would additionally be expected to support the development and offering of the centralized services required to coordinate the system. These would include, according to Burkhardt:

> . . . a national bibliographic control center, a national periodical bank (or regional banks, if these should be more efficient), a national audio-visual repository, and others. Certain existing national services, such as the National Library of Medicine's Medlars and Medline systems, or the several Library of Congress bibliographic services, would be incorporated in the National Program, and research for and development of others that are needed would be initiated by the Federal government.

Because the Library of Congress is assigned a key role within the network, one involving a considerable extension of its current functions, NCLIS recommends that it be designated as the National Library. Other major federal responsibilities involved in the nationwide network include: the setting of standards, the building of resource collections, and support for LIS research and development.

Other essential ingredients of the national network are the public libraries, which according to NCLIS (*5*) are "the backbone of the library system in America." School libraries and school media centers, too, are deemed to comprise basic elements of the proposed network. The commission (*5*) states that:

> . . . it is important to strengthen the school library and school media centers, so that they can meet existing standards and function effectively as integral components of the school environment. Access to the broad resources of a nationwide network would provide added value by increasing the child's opportunity for independent study and adding to his ability to become a literate, well informed citizen, capable of lifelong learning in a rapidly changing world.

Both the network and the other aspects of the National Program are designed to ensure federal direction of the entire system, in part in order to render it compatible with other national programs and with developing international and global programs. In the latter connection, the commission members indicate their belief that national planning must go on in the context of, and be constantly accompanied by, participation in international planning and in cooperative international information exchanges.

The commission does not neglect to give serious consideration to the problems associated with financial aspects of the network and the total National Program. Essentially it calls for a revision of the current philosophy of federal and state funding for LIS, whereby a reallocation of funding responsibilities would render possible the development of the cooperative projects and network systems called for in the National Program.

In the view of the writer, the NCLIS National Program comprises a tremendous step forward in national LIS planning in the United States. The efforts of the commission to take into account the full array of information/communication technologies and the entire gamut of potential services for a fully integrated LIS program is highly commendable. More than lip service is paid to these features of the program in statements such as (*5*):

> . . . the potential of the new technologies [i.e., computers, micrographics, telecommunications, and audiovisual media] must be utilized to the fullest extent possible. . . .
>
> National planning for information technology is essential for several reasons. First, information technology is costly, and a long-range commitment from the Federal Government is required for sharing costs, contributing to research and development, and ensuring the stability of the program. Second, information technology is complex, and a common sense of technical direction at the national level is imperative, if all relevant agencies are to coordinate their activities

> effectively. Third, information technology is specialized, and its implementation would depend upon the technical education of the people who will work with it. And, finally, information technology breaks down former barriers to access.

The attempts of NCLIS to broach the needs and problems of the United States in LIS matters, despite its obvious merits, nevertheless warrants a few minor criticisms. There is, for example, an almost imperceptible and no doubt unintentional inconsistency within the program concerning the provision of a full range of information services, and the need for the utilization of advanced technology to that end. This stricture applies to the nonprint educational media and the mass media aspects of the program as well as to the entertainment-recreation-providing aspects of LIS. The inconsistency in question can perhaps be best illustrated by an example of a statement in the program (*5*) wherein mention of these aspects of LIS might well have been included but was not, viz.:

> . . . authors, publishers and librarians [are] the principal participants in the production and dissemination of the intellectual and technical knowledge which powers our national development and nurtures our educational system. They are the component parts of a national knowledge resource that must be strengthened, integrated and sustained for all of the people in the U.S. to use as needed in the course of their personal and economic pursuits.

Such minor errors of omission stem perhaps from the commission's subconscious lack of consistency in conceiving of the nonprint media and the broadcast media as being just as integral to information services as are conventional print library services. The fact that no nonprint media professional is a regular member of the commission also helps to explain such omissions. However, NCLIS is not to be faulted because those who determined its composition did not conceive of the presence of nonprint media specialists among its members as being equally as imperative as the presence of librarians. It is to the commission's credit that it recognized its own deficiencies in this respect and procured the services of such a specialist as a consultant.

An overview of the NCLIS Program also reveals two serious omissions in the range of services envisioned for prospective national LIS users. There is, unfortunately, no mention of an ongoing research registry service, nor is there any mention of registries of live human specialist resources.

In the period immediately preceding the publication of the current version of its program, and in the period since its publication, NCLIS has devoted a considerable portion of its energies to the preparation of documentation essential to the passage of legislation required to implement the National Program, including the creation of a new, federal, overall agency and the provision of funding for its operation. Documentation is also being prepared to provide estimates of the costs of the program. In addition, a schedule for its implementation is being drawn up. The drafting of the proposed legislation is to be completed during 1976.

Despite its many outstanding qualities and its very few weaknesses, the prospects for the full implementation of the NCLIS Program appear to be far from good.

The probable opposition of the great bulk of the scientific "establishment," which presumably would prefer to maintain the kind of status quo arrangements suggested by spokesmen such as Dr. Burchinal, might in itself be sufficient to stultify the NCLIS concept. The equally probable opposition of private sector interests in the publication, communication/telecommunication, and entertainment industries, etc., might be anticipated. It is unlikely that their opposition will be forestalled by NCLIS's call for their cooperation. The hard-pressed tax-paying public may also be difficult to convince of the program's value. In that event, congressmen are unlikely to provide the requisite support to the new idea and the new ideal in national LIS. The NCLIS Program might be rejected, too, as a result of the efforts of a coalition of all or some of the foregoing groups. It might, additionally, fall by the wayside for still a different reason. The writer agrees with Licklider's (*11*) contention that:

> In the present state of the nation and the world, I do not truly expect any massive response to a plea—even from a highly competent, widely respected, and quite powerful organization—for massive funding on a five- or ten-year basis for the purpose of turning a paper plan into a library-information network. Paper plans are no longer convincing. In the library-information field enough of them have accumulated to neutralize one another. Moreover, if they are detailed enough to be definitive, they are too long to read and if read, too complex to understand.

The author also largely subscribes to Licklider's view that there is a possibility for forestalling the rejection of a good "paper" plan, such as the NCLIS National Program, through the additional

> . . . development of a comprehensive computer-program model of a proposed library-information network—an interactive, multilevel simulation with a data base, a control language, graphical displays, and so on—would greatly clarify many of the problems. . . .

Viewing the national LIS planning scene as a whole, it would be difficult to conclude that the centripetal forces at work in the United States are stronger than those of a centrifugal nature, even though the phenomenon of central national LIS planning may be increasingly evident elsewhere in the world. Aines and Day (*12*) probably best characterized the situation when they asserted that:

> The prognosis for success of the United States in organizing itself for national planning over the next ten years is mixed.

Another way in which the prevailing state of affairs vis-à-vis national LIS planning in the United States may be epitomized is that of "a house divided." It would merely confuse the issues involved in the continuing debate to attempt, as some observers and critics have done, to inject into the debate comparative situations existing elsewhere. It matters little whether the already highly planned existing LIS system in the U.S.S.R. is already qualitatively better than that of the existing nonsystem of the United States, for it would, in any event, be impossible to prove, or disprove, that the

quality in question was partly or primarily the result of either the planning processes involved or the nature of the resultant plans, or lack thereof. Moreover, there are as yet neither suitable measures of the quality or the quantity of the human and material resources being deployed in any given national system, or nonsystem, nor suitable measures for the determination of the gross level of satisfaction of user needs resulting from the employment of a national LIS system, or nonsystem, planned or unplanned. What should matter, instead, is whether or not the citizens of the United States might have reason to hope for the availability of sustained or improved information services if an effective, comprehensive, and integrated national information/communication service system were brought into being.

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United Kingdom

Britain,* at the end of the 1960s, determined to initiate a radical reorganization, unification, and modernization of its nationally owned library services. Almost at the same time, a reorganization and modernization of the locally or regionally owned, but largely nationally financed, LIS was also being effected. During the ensuing period to the present, information scientists, librarians, and others involved in national LIS planning in the Western democracies have increasingly focused their attention on national LIS developments in Britain. Their attention has largely been confined to the events which led, despite serious complications, to the successful establishment of the British Library, and then to the planning and other operational features of that organism. From the onset of and during almost the entire course of these recent events, the developments surrounding the British Library have been somewhat fraught with anxiety and controversy. They have comprised a process regarded with equanimity by few, a process that has been viewed by some participants and interested observers with keen anticipation and by others with concern and misgiving, if not alarm.

The spate of rapt attention has not been engendered without just cause. Indeed, the reasons for avid watchfulness concerning the progress or the lack thereof on the part of the British Library and its planning enterprises are almost as manifold, complex, and cogent as the reasons for the establishment of the library itself. One chief source of intense interest is that the British Library experience comprises an excellent case study, a living microcosmic laboratory, of all of the interacting forces at work which are either conducive to or are inhibiting of the inception, development, and operation of well-planned, effective national LIS in many countries of the world. For many observers, the establishment of the British Library and its subsequent development and planning activities constitute an important experiment in determining the potentialities of planning of LIS at the national level in mature, modern, mixed-economy-type democracies. For some such observers the outcome of the experiment is awaited with almost bated breath, as the events in Britain are viewed as portents for good or evil for the future of LIS and LIS planning in Britain and elsewhere among the democracies. For other observers, despite their proclaimed "wait-and-see" attitude, the British Library experience would perhaps serve as a model, depending on the outcome, to be emulated elsewhere or to be avoided at all costs.

The almost experimental-representative, sample-case study aspect of the British Library experience also compels high interest, especially externally, because Britain

* It should be noted that the United Kingdom (U.K.) is comprised of Great Britain and Northern Ireland and that Great Britain, in turn, consists of England, Wales, and Scotland. In matters of education and library services, both Northern Ireland and Scotland are virtually independent of England and Wales. Both have their own educational and library systems, but these systems receive much of their financial backing from the national government. The LIS and institutions dealt with in this survey relate primarily to the LIS in England and Wales. No detailed attempt is made herein to describe the complicated relationships existing between these LIS and those in Scotland and Northern Ireland.

is a rather tradition bound nation wherein LIS have customarily grown piecemeal and Topsy-like. And on the basis of little or no advance planning until very recently, Britain somehow managed to build what has been, and still is, recognized as one of the world's most comprehensive LIS systems, in terms of the provision of a variety of LIS to the public and to two principal levels of government. Furthermore, these services had long been provided, as already noted, by a mixture of privately owned, locally owned but largely nationally financed, and nationally owned institutions. Depending on one's point of view, the prevailing and resultant system or quasi-system was either very advanced and efficient or very advanced but nonetheless an "unholy muddle." The restructuring of these institutions and services in order to bring greater order to the system has involved not only numerous departures from the customary absence of advance planning but also official, governmentally organized, coordinative or integrative activities.

Another reason for the extreme interest in the U.K. LIS planning enterprise is that, taken as a whole, it is without doubt the most notable one extant in terms of both its complexity and the long history and variety of existing institutions and services which it was and is designed to reshape and replace. It also stands foremost as regards the extended and professional care taken in its design and implementation. The latter facet of the British experience has in itself become a focus of controversy, relating, in particular, to the actual degree, the carefulness, and the extensiveness of that planning. Aines and Day (*1*),* for example, claim that: "Instead of elaborate national planning, the thrust of the British has been towards consolidation and improvement of their information programs and processes." For some other observers, the very considerable discussion which occurred prior to and following the establishment of the British Library did not constitute "planning," and for them, the success or failure of the venture depends on their view of the desirability or otherwise of "real" planning. If the British Library's efforts are crowned with success, it will be accounted as due to the elaborate and effective planning that made the services possible, or alternatively, to the "fact" that minimal planning was engaged in and that "good old British pragmatism," spur-of-the-moment decision making, and "muddling through" had triumphed once again. If, alternatively, the British Library and all its works are adjudged failures, then that failure will doubtless be attributed to the inadequacies of the planning efforts made, or alternatively, to overelaborate and overzealous planning, contrary to British tradition, engaged in by the staff of the library.

There are those, as well, whose continued strong interest in the national LIS planning activities in Britain rests upon their search for further evidence to buttress their foredrawn conclusion that planning national LIS is better than not planning LIS; or, that not planning national LIS is either better or cheaper (or both) than planning them; or, that there is no visible difference in the quality of national LIS

* The References for this section appear on page 404.

as a result of planning or of nonplanning. These observers all presumably eagerly await the day when they can say "I told you so!"

Closely related to the latter aspect of the controversy, and hence to the extended interest in the British LIS planning developments, is the speculation which is occurring as to whether Britain will be enabled to retain her generally agreed upon leading position among the democracies in her provision of advanced information services. Observers who espouse the cause of national LIS planning contend that only because Britain has finally accepted the need for large-scale and detailed planning has she been enabled thus far to maintain her leadership position and to ensure its future, despite Britain's current economic and other vicissitudes. For these observers, even if Britain is forced to relinquish her position of leadership, it will be due to causes other than the lack of planning. Their opponents, of course, are prepared to attribute any future decline in leadership to the extensive advance planning that has already been undertaken.

Another facet of the abiding interest stems from the typically English uncertainty and ambiguity existing as to whether, as a result of the establishment of the British Library, a single source or focus of LIS planning and activity does, should, or soon will exist in practice in the United Kingdom. Beyond question, legally, no such focus currently exists. There is no parallel statutory or other provision for the chief executive of the British Library to be responsible for the eventual coordination of national LIS, as in the case of the national librarian of Canada. Indeed, the present chief executive, Dr. Hookway (*2*), has taken great pains to allay fears of possible current or future attempts at centralized control on the part of the British Library. He has left no doubt that in his current view many LIS activities can be better conducted in response to local needs, if they are locally controlled, than if they are required to operate within the constraints imposed by a central plan. Furthermore, in realization of the qualms existing concerning the eventual structure of the library, Hookway has sought to defuse the issue by attempting to raise a clear distinction between the nonhierarchical structure which he seeks for the British Library system, with the British Library at its "hub" or center, on the one hand, and, on the other, an hierarchical structure wherein the library would be found at the apex. He holds that if the library, in its functioning, were the apex of an hierarchical structure/system/network, it would probably be "remote, difficult of access and somewhat divorced from the operational and policy problems" of lower entities in the hierarchy. He contrasts this relative inflexibility and insensitivity with the sensitivity and potentially rapid response capabilities of a hub in reacting to stresses and strains within the system.

Hookway has additionally sought to scotch the notion that the library has any pretensions, despite temptations to do so, to:

> . . . try to produce a detailed, comprehensive and systematic plan for the closely articulated development of all these [library and information] services to meet national goals for social, economic, cultural, and industrial advancement.

He holds that such a plan would be of little use in Britain and that:

> . . . its implementation would face the planners with complex multi-dimensional problems of a kind all too familiar to social scientists where forecasting and other planning techniques are notoriously inadequate.

But the fears and suspicions persist, despite all protestations to the contrary, for some interested observers hold that with a ready-made central instrument such as the British Library at hand, British pragmatism will ineluctably sooner or later pressure the government into opting for an end to "muddling through" and an end to the existing admixture of institutions in the area of national LIS.

Moreover, in Britain, as elsewhere, one of the bones of contention is the successful influx, even unto the upper echelons of the administration of the British Library, of nonlibrarian information and computer scientists, as well as professional administrator-management personnel. Not unexpectedly, there are those among the professional librarians who eagerly await opportunities to attribute any shortcomings in the British Library's planning ventures or its resultant operational programs to the nonlibrarians at or near the helm. Their viewpoint is understandable, for unquestionably, the establishment of the library was largely the result of long and concerted pressure exerted toward that general end by the British librarians. They had long before clearly realized that despite their years of voluntary cooperative activity and despite their operation of a variety of official and unofficial agencies and intricate schemes, especially in the area of interlibrary loans, designed to make the British library systems more efficient, serious weaknesses remained. It was chiefly they who had anticipated the inability of the existing British libraries to meet the ever-wider range of educational, recreational, scholarly, industrial, and other increasingly sophisticated and hence expensive needs of LIS users—a condition not unlike that in many other countries. It was also principally the librarians who had determined that these defects and lacunae could only be remedied through action by the national government. From that standpoint, the inception of the British Library was the culmination of a movement initiated by librarians, who are now quite properly concerned regarding their future role and the role of their professional associations in shaping the policies, procedures, and operational program of the new institution. Librarians in other countries share this concern, and hence maintain an abiding and strong interest in the ensuing developments.

So much, then, for the various factors which have combined to engender the flood of attention to the recent developments in the area of national LIS in Britain. We must now turn our gaze to the actual nature of those developments and their present outcomes.

The rapid development of the various types of LIS in the United Kingdom over the past decade has tended to follow two main parallel paths, paths which have become increasingly interlinked during the course of time. One of the principal lines of action taken was the reorganization of the public library system. The other was the creation of the British Library. Coordinated planning for both of these steps

became possible only after 1964, when, with the exception of the special libraries maintained by other national government departments and the House of Commons Library, public policy responsibilities in relation to all nonprivate libraries, such as the public, school, and university and national libraries, became concentrated in the national Department of Education and Science. The principal national government responsibility in LIS matters has rested with that department since that time. It is also the major source of funding for LIS, both national and local, although, to a much lesser extent, the Department of Trade and Industry also supports certain national LIS.

In the case of the reorganization of the public library system, because such libraries were originally the creations of local governments, it was essential that the remodeling plans permit the involvement of local authorities. In addition, there was to be taken into account in the planning the generally agreed upon notion that there were far too many local authorities seeking to provide library services to make possible efficient comprehensive services at a reasonable cost to users. Hence the crucial planning issues that had to be settled included the development of a fitting legislative structure, a shared basis for national/local financing, and appropriate institutional arrangements in the form of a small number of geographically large local administrative units.

The Local Government Act of 1972 (*3*) provided for the creation of such units, with much larger total resources available to them than hitherto. The new local units now comprise sufficiently large administrative entities as to be enabled to deploy specialist staff more economically and more effectively than previously and to be enabled, as well, to afford the use of available technology in the form of computers, audiovisual equipment, telex, copying machines, and other library aids.

In addition, at the time of the passage of the act, account was taken of the complex interrelationship which it was deemed should exist between LIS objectives and the goals of other entities involved in the national development infrastructure, especially the educational system. Consequently, an important feature of the act is that geographically, library authorities are coterminous with the local authorities for education, health, and social services. As Hookway (*2*) aptly points out, there were several advantages to this arrangement:

> It thus becomes much easier to develop a whole range of cost effective support services for these sectors. For example, services for schools can include the provision of loan collections for books, centralised facilities for book ordering and processing and multimedia collections. When the location of public library service points is under consideration, the fact that the education and library services are coterminous makes it much easier to establish dual purpose libraries serving both the general public and the pupils of a particular school.

Hookway claims, too, that several additional benefits are already being derived from the reorganization of the public library services. He states, for example, that:

> The increased resources available to the new authorities also make it possible for them to provide more extensive and effective services to local industry, commercial

> organisations and so forth. The authorities are also able to deploy much greater resources for the support and stimulation of local cultural activities by providing space and equipment for exhibitions, meetings, lectures, concerts, plays, films and audio-visual presentations of various kinds.

Despite the improvements in the local public and school library arrangements resulting from the passage of the Local Government Act of 1972, it was foreseen that the public and school library services would still not be self-sufficient, and that they would have to rely on other LIS to supply a portion of their needs, particularly their needs for foreign material and material for in-depth or advanced studies, as well as STI material. These resources would still have to be obtained elsewhere. Hence, in part, the establishment of the British Library to help round out the picture.

Besides the foregoing cogent reason for its establishment, the British Library was apparently brought into being in order to reduce or eliminate other inadequacies of the existing LIS, that is, the wastefulness, at the national level, of the former arrangements, especially those for reference lending and bibliographical services, and the complexity of the techniques which were employed to make available needed materials not held in local collections, by means of interlibrary loans and the use of regional catalogs. In brief, then, the principal reasons for the establishment of the British Library were to increase the efficiency of the existing local and regional services and by so doing, to assist in the development of an effective national LIS.

In view of the many perplexing elements in the situation, as alluded to on the preceding pages of this section, the process by which the British Library was brought into being warrants special consideration here. In 1967 a National Library Committee, chaired by F. S. Dainton, was charged with the task of determining an appropriate and unified framework for the national library services. Thus began what was to become a long-term exercise in national LIS planning and implementation which still continues in Britain to this day. The Dainton Committee collected suggestions, data, and criticism from a wide spectrum of information specialists as well as users of information services. It even extended its enquiries abroad. Its report (*4*), issued in 1969, was in turn submitted to extended discussion and evaluation by a broad range of information scientists, government officials, and scholars.

Following the Dainton Report, a White Paper entitled "The British Library" (*5*) was distributed at the beginning of 1971. It described in a general but concise form the organizational plan that was to be followed in the establishment of the new structure. As set forth therein, the purpose of the proposed British Library was "to provide the best possible library services for the United Kingdom." It was to achieve that purpose by "preserving and making available for reference at least one copy of every book and periodical of domestic origin and as many overseas publications as possible." Its objective was also to be attained by the provision of efficient central lending, cataloging, and other bibliographical and photocopying services in support of other libraries and information systems in the country. It

was, moreover, specifically directed to do so "in close cooperation with central libraries overseas."

Following the passage of the British Library Act by Parliament in 1971, whereby the government enacted its decision to set up the new national library, much further planning occurred, designed to implement the pattern of development and the organizational structure set forth in the act. This planning finally led to the establishment of the British Library in July 1973.

To ensure the proper transformation of the very complex former system of services and institutions into what was hoped would be a considerably more compact, efficient, and service-oriented system, the new national service was to operate under the control of a board appointed by the secretary of state for education and science. The board was to be responsible for general planning and administration of the library. Its membership was to include the top-level administrators of the British Library. Dr. Hookway, the library's chief executive, is also deputy chairman of the board. Another important element within the British Library structure is an extensive system of advisory committees which is in the process of being established to help ensure the library's responsiveness to the needs of its various users.

Dr. Hookway has delineated (*2*) what he holds to be the national conception of both the basic objectives on which British national LIS policy and planning responsibilities have been and should continue to be focused, and the range of national issues around which national-level planning activities are formulated. He holds that, in order to assure the rational evolution, in a reasonable period of time, of a "flexible and responsive national system," British national LIS planning must be limited to a few vital issues, issues that relate mainly to: the provision of appropriate legislative, institutional, and financial structures; the development of standards of all kinds; and personnel needs. His view of the principal information policy objective to be attained is that it should:

> . . . try to ensure that, within the resources available, the libraries and information services of the country taken as a whole aim to collect and store all information likely to be needed, to provide access to it as rapidly as necessary and to arrange its supply in the most useful form where it may be most effectively employed.

He has constantly sought to restrict the planning activities and the operations of the British Library to those which he and his staff deem to fall within the limitations of the foregoing objectives, issues, and responsibilities.

In terms of the subject matter areas which fall within its scope and hence within its planning purview, the library has an extremely broad mandate, derived from the Library Act. The act specifies that the library is to be managed as a national center for reference, study, and bibliographical and other LIS in relation to scientific matters as well as the arts, humanities, and the social/behavioral sciences. Consequently, by statute, the area of functioning of the library must cover virtually all subject fields in addition to almost a full range of LIS.

The mandate of the library is equally comprehensive as regards the variety of media, materials, and resources for whose handling it is responsible. The British

Library Act specifies that the library is to consist of a comprehensive collection of books, manuscripts, periodicals, films, and other recorded matter, whether printed or otherwise. The library is thus concerned with the entire gamut of nonprint materials. And, as Hookway had indicated (*2*), "the government in determining the level of resources to be made available to the Library has to bear in mind this broad remit."

The structure which has emerged from this new library concept is indicated in Figure 1. For our present purposes, it is the R and D Department that is of principal interest, as it is chiefly within that department that much of the British Library's planning functions are concentrated and coordinated. The department derives its very significant powers from its assigned task of carrying out the broad R and D functions originally vested in the British Library Board by Parliament. Hookway (*2*) lays especial emphasis on this statutory power of the board and hence of the R and D Department. He has declared that it is within the competence of the board, so far as its members think it expedient for the achievement of the objectives of the Library Act and generally for contributing to the efficient management of *other* libraries and information services, to engage in and sponsor research and to contribute to the expenses of library or other authorities which provide library facilities, whether for members of the public or otherwise.

Recent modifications of the library's organizational pattern—which involved the transfer, from the Department of Education and Science to the R and D Department, of the former Office for Scientific and Technical Information (OSTI), in particular—have helped to provide the library with a strong R and D and hence planning arm. Also, the inclusion of the humanities and the arts as well as the field of information science, within the purview of the R and D Department, have added greatly to the length and breadth of that arm.

Under a broad interpretation of its powers, the department has already undertaken not only the planning but also the development and operation of a number of highly innovative programs and projects, some of which are of considerable size. Much of its work is somewhat akin to that of the U.S. Commission on Libraries and Information Science. Another one of its functions involves a novel combination of engagements which bear considerable resemblance to a task being partly and separately undertaken in the United States by the Smithsonian Science Information Exchange (SSIE) and by the Office of Science Information Service of the National Science Foundation, in their respective approaches to the national coordination of STI services through R and D. But the R and D Department's project extends well beyond either of its two U.S. counterparts. For example, in addition to identifying ongoing research, which the SSIE does, the R and D Department seeks to identify significant gaps in knowledge and research projects. In particular, it attempts to reveal gaps in the knowledge required for effective decision making on the part of personnel responsible for the determination of national information policies, LIS, systems, and networks. It has been endowed with a sizable portion of the funding required to begin to fill these lacunae.

It is also noteworthy that the R and D Department has frequently departed from the practice of engaging in LIS research using solely its own personnel. It has

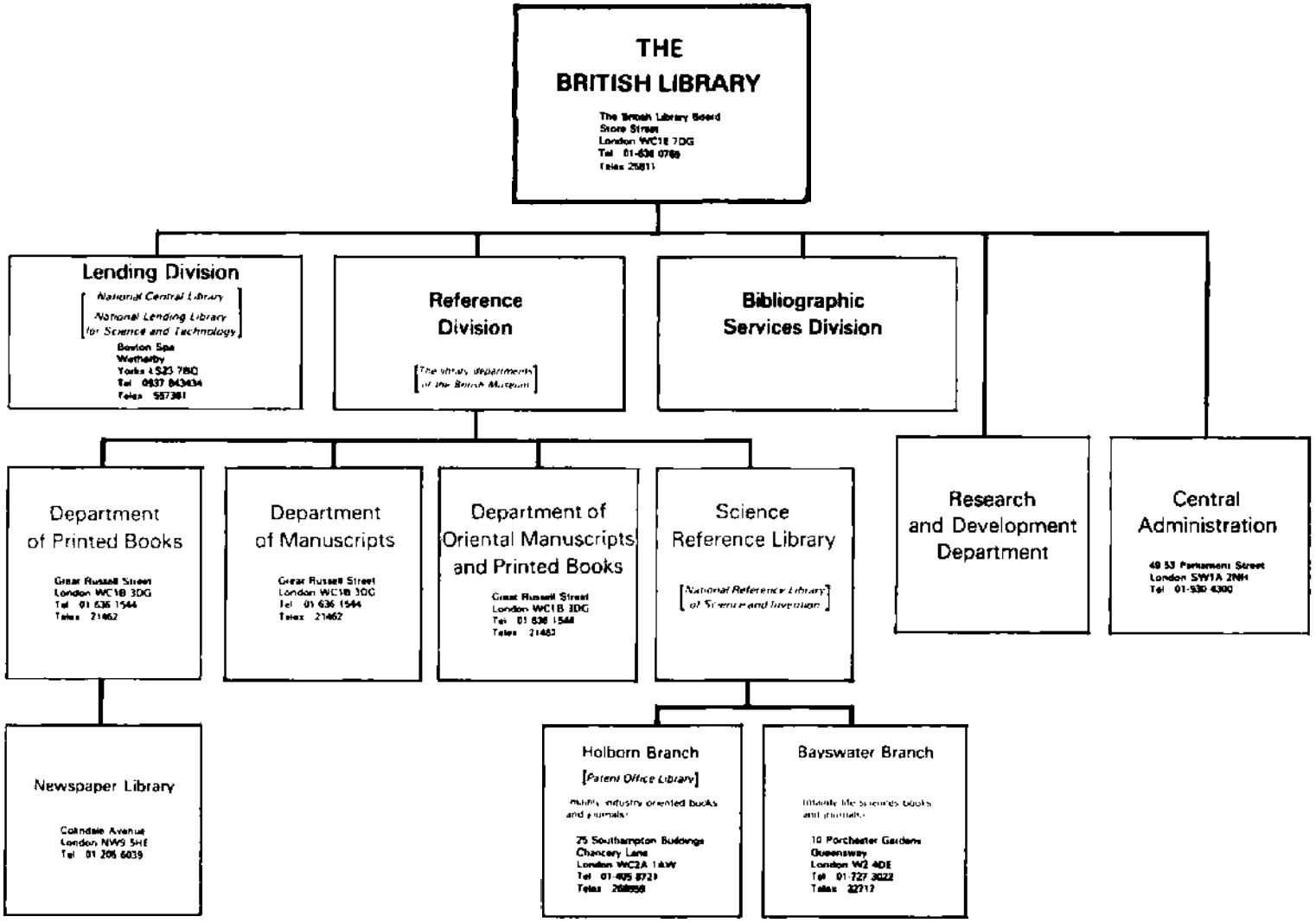

FIGURE 1. *Structure of The British Library. Square brackets indicate superseded titles. The Research and Development Department consists of: the former OSTI at Elizabeth House, York Road, London SE1 7PH; and the Systems Development Branch at Africa House, Kingsway, London WC2B 6DB.*

given particular emphasis in its planning to the sponsorship of external research. And in both its own and sponsored research and planning activities, it has sought to give high priority to the discovery of procedures whereby the provision of "the right information to all who need it" can be accomplished in as cost-effective a manner as possible, without losing any of the present benefits. An example of a result of this type of research effort is the computerization of the production of the British National Bibliography (BNB), which in turn now makes possible the use of the BNB as direct catalog input to the British Library. Another example is the department's funding of experimentation dealing with the various ways in which information may be "packaged" for economical and efficient teleprocessing. Moreover, in order to take full advantage of any benefits that might accrue from the computerization of various LIS, the department has sponsored a series of traveling workshops which were designed to acquaint LIS personnel with the uses of dynamic, interactive, on-line computer terminals for information retrieval purposes, such as accessing the U.S. data base MEDLARS, which is available in the United Kingdom via MEDLINE.

The department has been an important factor in the promotion of planning and R and D involving LIS in the area of nonprint resources. Its activities in the latter connection will be elaborated upon somewhat in a subsequent paragraph.

Through the extensive activities of its R and D Department, the British Library has already attained major involvements in LIS planning at the local and regional levels. The considerable extent of these involvements is due largely but not solely to the fact that the British Library now is the main source of financial support for research in library and information science in the country and that it also has the capacity to finance improvements in the management of other libraries. Its excellent position to engage in planning at the local and regional levels also stems from its ability to provide central services for other libraries and from its role as the principal developer and operator of computer-based bibliographic and other automated information services in the United Kingdom. To an extent, too, if need be, the British Library can take advantage of its legal powers to serve as the agent of the national government in the promotion of the development of cost-effective local LIS, in order that the whole national system may be better enabled to serve its clientele.

Planning functions within the library extend beyond the activities of the R and D Department into several other divisions of the library. The Reference Division, for example, in which is concentrated one of the world's most comprehensive collections of books, maps, manuscripts, music scores, and patents, has had its future activities so planned as to make it capable of supplying all the basic central reference services around which other British libraries can develop their own LIS and collections.

The library's Lending Division has been carefully planned to improve and extend the already very voluminous interlibrary loan system and network existing within the country. By planning to increasingly undertake the main burden of interlibrary lending itself, the division is seeking to make it possible for the individual local libraries to modify their acquisition and collection policies and procedures in accordance with their own new priorities. Consequently, from the viewpoint of the

user and the nation, the whole information service process, not merely the interlibrary loan process, may become more economical, more efficient, and more expeditious.

In order that the individual libraries and other agencies might function with optimal efficiency, and in line with the library's effort to become a major influence in the development of national LIS, systems, and networks, the Bibliographic Services Division has as its planning objective the establishment of an effective and economical national bibliographical network. It is seeking to supply appropriate routes for data communication and transfer between national bibliographic data banks and the LIS community. Its central services have accordingly been planned to lead to the rapid extension of computer-based networks within the country. Then too, because one of the inhibiting factors to more effective national LIS and LIS planning in the United Kingdom is the relatively high cost of telecommunications and teleprocessing, this division has deliberately planned its networks and rates so as to ensure the greatest possible local use of the centrally generated and operated system, while maintaining an efficient control "to avoid the creation of many competing quasi- or para-national files" (*2*). The planning activities of the division, as a result of these actions, have made possible an economical means for the production of a comprehensive catalog of the new acquisitions of all government-supported libraries in the country. In addition, an analysis of the costs and the problems involved in the conversion of the existing manually produced catalogs of previous acquisitions to the collections of all the public libraries is in the process of being completed. When and if affordable, a planned conversion will presumably take place, and will doubtless have considerable impact on acquisition policies.

The British Library had undertaken the mandate and responsibility devolved upon it by the Library Act for dealing with the audiovisual media with all due seriousness of purpose. Almost from the moment of its official inception, it began a careful examination of a recommendation to the government (*6*) made in 1971 by the National Council for Educational Technology, which pointedly stated that:

> We regard the adequate bibliographic control of non-book material as so important that we believe that it should become a national responsibility. . . . This would . . . ensure that proper attention is paid to the need for the cataloguing of print and non-print documents to be fully coordinated in a situation when a particular educational or scholarly requirement may often necessitate reference to both types of document.

Members of the R and D staff of the library, as well as the Bibliographic Services Division, have since 1973 engaged in a close relationship with the Council on Educational Technology in order to implement that recommendation. The British Library and the council have in a sense joined hands in order to attempt to provide the British public with the best affordable LIS with regard to both print and nonprint materials. A measure of the success of their joint planning efforts thus far may be glimpsed by mentioning a few exemplars. Using the British MARC format, the British Library designed necessary software for the computerized production of the British National Film Catalogue. It has also begun to take steps, with the

assistance of the council and other relevant groups, in the direction of the coordination of the various existing media libraries and archives by devising a special new single format which is intended to facilitate the computerized cataloging in that format of all types of print and nonprint materials, as well as the production of a single catalog of these materials. Should the library subsequently find it desirable and financially possible, it could thereby readily become the national print and nonprint materials LIS (though legislation would probably have to be enacted to provide for the legal deposit of nonprint materials in the British Library or elsewhere).

Also worthy of note is the fact that the R and D Department has begun the setting up of a series of lists of nonprint resources—not merely resources of an audiovisual nature but human specialist resources as well—and is seeking to make these resource lists and catalogs available throughout the country.

To round out its planning activities, the British Library staff devotes a sizable portion of its energies to the planning of improvements in the international exchange of information. Its design functions are directed toward the attainment of the maximum practical level of international standardization of records and bibliographical formats, so that resources can be shared internationally with a minimum of difficulty. To assist in such planning, a Standards Office has been set up to serve as a national focus for discussion on the internal and external standards to be adopted.

The alacrity with which the planners and administrators of the British Library have undertaken the full measure of their assigned tasks in the numerous foregoing respects and the vision that they have displayed in relation to those mandated undertakings have not always been matched by their willingness to venture beyond the boundaries of conventional librarianship in some other respects. Little or no exploration, for example, seems to have occurred as yet of the potentialities of coordinated, joint, or integrated information services between them and their counterparts in the educational system (such as the Open University), in the British Broadcasting Corporation, or in the Post Office (which serves as the common carrier of nonbroadcast telecommunications). Perhaps it is largely a matter of time and the lack of wherewithal. The BBC and the Post Office, however, have both had long-established cooperative relations with such institutions as the Open University, and have jointly assisted in the provision of a variety of individualized and group information services, including multimedia materials, to students of all educational levels throughout the United Kingdom. Individual libraries in the United Kingdom also contribute to these educational endeavors in a variety of ways, as do elements of the British Library. These services, however, are not the result of integrated joint planning on the part of all of the institutions concerned. Similarly, the planning activities of the British Library do not appear to have embraced within their scope the development of LIS to individuals and groups, in cooperation with the hundreds of Citizens' Advice Bureaus which have sprung up in the past few years throughout the United Kingdom.

Compensating, perhaps, for its apparent lack of initiative in the foregoing respects, the British Library had undertaken an activist role in attempting to have the British

government accept the library as the locus for the formulation and implementation of a well-planned national information policy. The administrators of the British Library have sought to have it serve as a point of national focus on LIS problems, a locale where governmental policies regarding information services can be thrashed out and action taken on the basis of sound political, economic, and professional advice. The assumption of this role by the British Library is deemed by its administrators to be an appropriate means whereby an acceptance and recognition of the importance of the role of information and information services in the community and the nation may be attained. In its search for this recognition, the library has to look to the Ministry of Education and Science, which still retains the responsibility for the coordination of national LIS. The ministry, under that mandate, convenes an Interdepartmental Committee on Information Policy, for which the British Library provides the secretariat and the necessary coordinative machinery. Also, at the STI policy-making level, a new Interdepartmental Coordinating Committee for Scientific and Technical Information has been established to seek the harmonization of government policies in this field, including policies regarding the British Library in STI matters. That committee also maintains a guiding hand with respect to British STI policies in relation to international information exchanges.

Although the lion's share of attention to recent national LIS developments in Britain has rightly been given to the British Library, and to a much lesser extent to the public library system, still other national LIS exist which neither operate under the jurisdiction of the library nor have their activities, including their planning functions, coordinated by it. In view of their continued existence, they detract, to a degree, from the notion that the British Library already comprises the "hub" of the British LIS system. They do not, however, warrant more than cursory treatment here, as they are, for the most part, quite conventional in the nature of the limited services which they offer and in the planning ventures which they undertake. Probably the most important of these entities is the Department of Trade and Industry. It provides government support for industrial research and operates a network of "Industrial Liaison Centres" based on institutes of higher education, such as colleges of technology. These centers, in turn, seek to encourage and assist the local facilities in which they are housed in providing technical information services which are as up to date as possible.

National LIS of a still more restricted and conventional sort are supplied by the Ministry of Agriculture, Fisheries, and Food; the Department of the Environment; and the Library of the House of Commons. It is the three foregoing services that are viewed by some observers as those most likely to eventually fall within the orbit of the British Library. There does not, however, appear to be any open apprehension concerning this possibility within the country itself.

Presently, at least on the surface and quite possibly at other levels as well, the British Library would seem to have already obtained a remarkable degree of acceptance and support from the relevant professional organizations, from the institutions providing local and national LIS, and from local and national governments. Unquestionably, too, considerable progress has been made toward the articulation of the many existing LIS. Certainly, a relatively broad-based and compre-

hensive national LIS is rapidly coming into being in Britain. A comprehensive study of this landmark accomplishment involving a swift and amazing transformation of many long-established institutions in a very tradition-sensitive country remains to be constructed. When written, it will be difficult for the British Library to stand still long enough for it to be "biographed." In any event, the comment made several years ago by Mohrhardt and Penna (7) to the effect that an attempt to evaluate fully the services of the British Library and its "sister" LIS at this time would be "presumptuous and unwise" is still largely apropos. But even though its efficiency and acceptance by all concerned may remain in question, its relative compactness and its firm user-service orientation can no longer be held in doubt. For the Western democracies at least, the design for the very flexibly planned British Library, the policies by which its numerous services were planned and are being planned, and its focal role in giving recognition to the importance of information services to the public and the government all appear to be worthy of emulation.

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Canada

The responsibility for the provision of LIS in Canada is shared among federal, provincial, and local authorities. Elementary and secondary education, for example, fall under the jurisdiction of the provincial governments, most of which are very jealous of their prerogatives. It has consequently been virtually impossible for there to be successful planning endeavors in which the integration of the services of school libraries was involved. Even within the federal jurisdiction, there is, in practice, a multipartite division of responsibilities. In addition, as Canada is officially bilingual, the planning and decision-making processes are more than normally complex and time consuming. Moreover, Canadians are probably rightly accused of having a predilection for endless self-examination and procrastination, and of being firm believers in the assumption that if problems are permitted to simmer sufficiently long, they will dissolve of their own accord. The federal government has, nonetheless, both prior to and since 1970, taken a large measure of positive action in national information services planning. And although Canada was among the first, if not the first, nation to have formulated a clear science information policy and to have taken steps to implement it, her national information service planning efforts have, perforce, been largely piecemeal and compartmentalized. They have also, with some exceptions, not been consciously directed toward the emergence of a single, well-integrated, comprehensive national service. Rather, they have usually been directed toward the coordination, in varying degrees, of several overlapping services and have proceeded on at least three, and at times four, almost parallel fronts.

Planning for information processing services, other than transmission services, in relation to information content in all subject areas other than science and technology is dealt with as part of "library" planning. Science and technology information service planning is treated as part of "science" planning. And the planning of the transmission of information is commonly separately dealt with, either as broadcast media transmission planning or as general communications/telecommunications planning, including teleprocessing (computer communications) and satellite communications planning. Despite this diversity of planning endeavors, as will be described in the following pages, the planning of the various Canadian national LIS may, nevertheless, be conceived of as being incipiently integrative in nature.

Administratively, the federal agency with the primary responsibility for the planning of national-level LIS in Canada and the sole responsibility for coordinating the services of all national government libraries is the National Library. The national librarian, currently G. Sylvestre, is officially designated as the person in charge of such activities. When the National Library planners, in 1970, completed a proposed plan for the library's national LIS, the national librarian made some of the details of the plan available and also stated his personal view of the status and future role of the National Library in national LIS planning (*1, 2*).* To all appearances, the conception of both has not been substantially altered since that time. The plan

* The References for this section begin on page 419.

called for the extension and strengthening of the library's planning apparatus and for the computerization of certain national LIS through the development of a national library network and system and a computerized data bank linked by computer terminals. In his commentary on the plan, the national librarian noted the enormous problems to be faced in devising such a vast automated service (which he, at that time, apparently conceived of as existing largely for the exchange of bibliographical information, rather than the information contained in the documents themselves). He noted, as well, the need not merely for careful planning but, prior to it, extensive studies, and during and following it, determined leadership. In the development of a national information network, he declared the role of the National Library to be that of coordinating both the federally owned libraries and libraries in general, at the national level. He also proclaimed it his duty, as national librarian, eventually to advise the federal government as to "the desirability of establishing a comprehensive policy which does not exist at the moment except in general terms." He further declared it to be "imperative" that the network of national libraries be made "as strong as possible, not only for the sake of the public service, but to make sure that it occupies the place it should in the global national library system." From the context in which the term "global national library system" here appears, it would seem that the national librarian used the word "system" loosely, and that what he was referring to was the total aggregation of LIS existing in the country, rather than a single, coherent, well-integrated system.

The national librarian is assisted in his policy-making and coordinative tasks by the Advisory Board of the library. It, in turn, has from time to time appointed certain committees to aid it in its work. One such group is the recently inaugurated Committee on Bibliographic Services for Canada (*3*). As a result of a rather uncommonly broad usage of the term "bibliography," as set forth in the terms of reference of that committee, the dimensions of its purview are almost as extensive as those of the National Library itself, viz.:

1. To determine the bibliographical needs in Canada, where bibliography is defined as the identification, description, and dissemination of recorded information.
2. To assign priorities for support of bibliographical activities defined above.
3. To make recommendations through the National Library Advisory Board to funding and controlling bodies for bibliographical activities which they might support.
4. To assist in the coordination of bibliographical activities in Canada.

The recency of the appointment of the Committee on Bibliographic Services renders it difficult to assess as yet the probable nature and extent of its impact on either national LIS or on the planning activities of the National Library. Its felicitous relationship with the National Library's Research Planning Board, to which reference is made in the following paragraph, will doubtless be crucial to the success of the library's entire planning operations.

In terms of subject-field coverage, the National Library has a very broad, almost all-encompassing mandate which requires it to assume direct responsibility for

federal initiatives for LIS in all fields of knowledge with the exception of science and technology. Even in the area of STI, however, the National Library has been given the indirect or ultimate responsibility for the coordination of STI libraries, as part of its coordinative function in relation to all types of nationally owned libraries. And, in order to successfully engage itself in its broad mission, particularly to actively undertake its planning roles, it has established a Research Planning Board to oversee the work of the library's Research and Planning Branch. The board and the branch, from their inception, have engaged in a variety of nationwide planning studies and cooperative projects with other agencies of the federal and provincial governments. But, as previously implied, they have not done so with a view to the actual integration and unification of the LIS. Rather, they have sought merely to facilitate the cooperation and coordination of these services. They have, for example, provided both guidance and leadership in the establishment of a standardized, uniform, machine-readable format for bibliographic and catalog records (*4*).

Also, through a constant replanning of its own structure, the library has been actively preparing itself for the planning of various additional and more cohesive national LIS *networks*. To that end it has appointed an assistant director for networks. The national librarian's "Annual Report" for 1974–75 (*5*) notes that:

> Development of network policies and plans will involve considerable liaison with libraries and library authorities across Canada. At present, the Research and Planning Branch is attempting to keep fully informed on provincial and regional library planning and to inform planning groups of the practical assistance which the National Library is able to provide.

The National Library of Canada is also directly involved in the planning of several international LIS. It is, for example, participating in the design and implementation of the CONSER Project (*5*), a scheme involving a "conversion of serials" records, from manually produced to machine-produced and machine-readable records relating to the thousands of serials found in collections in Canada and the United States. Both countries deem CONSER to be an important step in the planning and development of a much larger venture intended to result in a Union Catalog of machine-readable records for all types of information resources. It is hoped that the Union Catalog will provide a practical basis for cooperation among several existing and planned networks and automated library systems, and hence will, in itself, comprise an important national resource in both countries. The National Library has been content, in its involvement in the CONSER project, to have the lion's share of the actual machine processing undertaken in the United States; that is, the computer service of the Ohio College Library Center (OCLC) is placing the printed records in machine-readable form.

Parallel to the relatively broad range of national LIS policy formulation and planning activities engaged in by the National Library are the federal policy and planning initiatives in the field of STI services currently being undertaken by several agencies which are concerned with scientific matters. The principal federal agencies in question are the Ministry of Science and Technology, the Science Council, the Advisory Board for Scientific and Technical Information (ABSTI) of the

National Research Council (NRC), and the Canadian Institute for Scientific and Technical Information (CISTI). All these entities are directly or indirectly involved, in varying degrees and at various levels, in policy formulation and/or planning and/or operational functions of national LIS with respect to STI.

No attempt will be made within the compass of this article to sort out, in detail, what to insiders and outsiders alike is an almost incomprehensible maze of overlapping, duplicating, competing, and yet relatively cooperative national STI services and organisms. In brief, both the Ministry of Science and Technology and the Science Council advise the Federal Cabinet on matters of science policy and on the funding of scientific research and development within Canada. Neither includes operational or funding activities per se within its functions. Both are concerned with science policy planning and science policy implementation, including STI policy planning and implementation. Both the Science Council and the NRC are virtually independent Crown Corporations and both are nominally, and only for purposes of budgetary control and reporting, under the jurisdiction of the Ministry of Science and Technology. The NRC, which is in fact responsible neither to the Science Council nor the Ministry of Science and Technology, is both a research fund-granting agency and an operational research-conducting entity. The Research Council has within its structure two separate organisms which have specific responsibilities in the STI–LIS planning and operations, and, to a minor extent, policy-making areas. One of these is ABSTI and the other is CISTI.

To the extent that Canada may be said to have a national science policy and, within that, an STI policy, the latter policy is the product of the work of a plethora of agencies, and of the variant activities of many connected and disconnected LIS, systems, and institutions. Included among them, in addition to those noted above, are numerous private, local, and provincial institutions, such as the Arctic Institute, which operate outside the purview of the federal government. Some of these institutions have sprung up like Topsy, almost of their own accord. This wide jurisdictional dispersion of even her STI services seriously complicates the task of STI resource sharing in Canada and renders the process of integrating or coordinating these services most difficult.

Recognition of the foregoing impediments and other difficulties in the path of effective national STI services led, in the period immediately prior to 1970, to the preparation of several major studies on STI policy and planning (*6–8*), studies designed to determine the requirements for the establishment of both a highly mechanized STI system and an advanced computer/communications development program. One of these, conducted by the Organization for Economic Cooperation and Development (OECD) in 1969 (*9*), involved a critical review of Canadian STI, and greatly assisted not only in making Canadian scientific personnel aware of the needs and potentialities in the field but also in heightening their resolve and that of the government to provide improved STI services. Although these studies have resulted in numerous recommendations and in considerable parliamentary discussion, and have led to a notable degree of clarification of national STI policies (*10, 11*), little has been accomplished to simplify the provision of national STI–LIS or the structures by means of which these are supplied.

Yet, a single, national STI–LIS may well be in the process of being brought into existence. Much of the credit for this development, if it is in fact occurring, must be given to the efforts, though at times divided, of ABSTI and CISTI. For in practice it is upon these two NRC organs that the federal government has devolved the task of planning, building, and undertaking the operation of its segment of Canada's STI system. In so doing the government is seeking to establish a suitable STI complement to its other principal national print-oriented LIS/system, that provided by the National Library. In order to ensure that the service/systems are governed by common policies and standards, and that there is complete compatibility in their planning, development, and operation, the government has decided that the responsibility for ensuring these commonalities should lie in the hands of the national librarian. It has accordingly placed the development of the national STI system under his general direction. To render that direction possible, the government requires that the National Library be provided with "adequate representation" on ABSTI (*1*).

By a decision of Parliament in 1970, ABSTI was given responsibility for formulating general policies and for the preparation of long- and short-term plans for the building of the national STI system and network. It was additionally given the task of establishing priorities among its recommended policies. ABSTI's membership includes 20 national leaders in particular fields of science, industry, and higher education, as well as representatives of both processors and users of STI. It is supported by a full-time Executive Secretariat, and since 1972 it has maintained a 12-person, general Planning Group. Soon after its appointment the Planning Group made a number of broad recommendations (*12*) which have served to guide both it and ABSTI, as well as CISTI, since that time. The recommendations included, among others:

1. The development of greater cooperation among the main information-disseminating agencies in Canada.
2. The identification of user needs.
3. The utilization of specialized information centers as nodes within the national system and network.

The Planning Group and ABSTI rapidly discovered that there was widespread agreement on the need for acceleration in the development of a coordinated national LIS network for STI. This task of network development involves the further evolution and integration of two effective, albeit informal and amorphous, STI systems and networks already in existence in Canada. First, there is the national network of over 200 of Canada's major libraries which participate, through a variety of voluntary cooperative arrangements, in an interlibrary loan and photocopying service which makes their aggregate resources available nationally. And although this network is not limited in its subject-matter coverage to STI, and hence falls mainly within the scope of the National Library, it has STI as one of its principal resources. It includes, for example, the computer-based *Union List of Scientific Serials in Canadian Libraries*, which comprises a strong link among the files of scientific and technical journals held by these libraries. As pointed out by Dr.

Jack Brown (*12*), the current director of CISTI: "Here quite clearly, the decentralized concept of utilizing resources wherever they exist is in full force."

The second informal system upon which the national network is being built is the Canadian Selective Dissemination of Information (CAN/SDI) Program, presently operated by CISTI. It is a current awareness service wherein well over a thousand subscribers across the nation are alerted to the publication of new documents in their respective fields of scientific and technological research interests. In this highly decentralized system, hundreds of information specialists located in every well-populated center of Canada serve as intermediaries between the system/network and the ultimate users. According to plans for its further development, its nodes are to include both the information resources of the federal and provincial governments and those of the private sector whose owners are willing to link their systems with those of the government. The linkage mechanism will be the special referral service network already established for CISTI's CAN/SDI and Canadian On-Line Enquiry (CAN/OLE) Programs. In addition, it is anticipated that a number of dedicated subnetworks will also soon be incorporated into the system (*13*).

To coordinate and integrate these various networks and to expand them into a single national STI system, a subgroup of the Planning Group, entitled the Network Development and Implementation Group, has been brought into being. The latter group has been entrusted with a very important planning and implementation task. It entails the undertaking of a novel pilot research project (*14*) which has two chief objectives. One is the acquisition of much of the "hard" data required to further plan and model the eventual national STI system/network. The other is to determine the needs for STI and how best to respond to those needs. The pilot project involves the establishment of a local referral type of service called ASK (Access to Sources of Knowledge). It will provide a unique type of interface between users and suppliers and will be the mechanism to gather feedback for use in the nationwide STI network. The project, to be located in Toronto, is to be a joint federal–provincial operation in which it is expected that at least 14 federal information and other agencies will participate.

The chief of the Network Development and Implementation Group, Ms. Inez Gaffney, revealed something of the distinctive nature of the pilot project (*14*) when she stated:

> For many, information is the printed word. For our purposes, information is knowledge and need not be in recorded form. A source of scientific and technical information can be an individual or group as well as a collection of recorded knowledge. . . .
>
> The referral concept is based on a linking together into a co-operative the existing scientific and technical information services that operate under different jurisdictions, with an assortment of goals and objectives and that are geographically scattered. To establish such a co-operative all those individuals, organizations and groups, who wish to participate in a Canadian system, must have an opportunity to make their opinions and problems known. In many cases, organizations are interested and anxious to participate but are fearful of the impact of such a commitment on their own organization. Some mechanism to either substantiate or

> negate their skepticism, to identify and address issues was required. The pilot project, with its geographic limitations, provides an experimental field test where in an actual situation organizations gain some experience in what their problems might be should they decide to participate in a Canadian Source Co-operative whereby their services would be made accessible to any user in any part of Canada through a referral service network.

The ambitious and innovative STI planning ventures being launched by the ABSTI planning groups are being matched by equally substantial enterprises engaged in by CISTI. CISTI is the merged successor to two former NRC adjuncts, the National Science Library (NSL) and the NRC Technical Information Service. It was ensconced in its new $15-million quarters in October of 1974 (*13*), where it, incidentally, also houses the ABSTI groups.

CISTI is far more than a national STI library. Its director and staff, through careful planning over many years, have wrought it into an information transfer agency which works in relatively close harmony with all major Canadian libraries housing STI collections. Also, because the NSL/CISTI has long been an operational entity—whereas ABSTI and its committees are newer and generally nonoperational in nature—CISTI has increasingly become the single focal point for national STI services, including planning services, in the eyes of the LIS community. It is, as well, the Canadian center linking Canadian STI services to those in foreign countries.

A long tradition of cooperation and collaboration has existed between the NSL and the National Library in the long-range planning and development of information services and resources. As Dr. Brown pointed out (*12*) just prior to the inception of CISTI:

> . . . with the establishment of the National Library's responsibility for developing bibliographical standards, and with the increasing use by the National Science Library of mechanized techniques for processing information, the National Library and the National Science Library have established a variety of joint working groups or task forces to generate the establishment of compatible information handling systems regardless of the subject matter covered.

CISTI is maintaining this tradition, especially the sharing of technological facilities. It is, for example, providing the National Library with the "hardware" and some of the "software" items required for the computerization of the National Library's services.

There are, however, some exceptions to the above-noted cooperative arrangements. These exceptions were seldom brought about by the officials of the two federal agencies in question. Rather, they were largely the result of policies enforced by the political arm of the government. An example in point may be found in the decision of the Canadian Cabinet in 1970 that the NSL (now CISTI) carry the responsibility for the planning of a system designed to produce an annual list of federally funded research projects in the universities, covering the natural and social sciences and engineering (*15*). The NSL was directed to do so in cooperation with the Canada Council (a federal fund-granting agency in the fields of the arts,

humanities, and social sciences), rather than with the National Library. This action of the Cabinet created a precedent for CISTI's engagement in the planning and operation of a national information service which extends beyond the STI area, to the exclusion of the National Library. Apart from such exceptional arrangements, however, the record is clearly one of cooperative planning. But it should be noted that these collaborative efforts involve the work of two basically separate, overall LIS planning agencies.

One might question whether, in practice, the almost enforced and involuntary division of planning and operational efforts between ABSTI working groups and CISTI, on the one hand, and especially between CISTI and the National Library, on the other, results in the best LIS possible to the user communities which all three entities seek to serve. The gradual disappearance of the formerly distinguishable borderlines between the natural and the social sciences, the appearance of multi- or interdisciplinary fields, such as ecology, which combine content from both the social and the natural sciences, might be regarded as prima facie evidence of a need for an ever-greater articulation of the functions of these national organisms, particularly their planning adjuncts. Despite the possibility of greater effectiveness in serving the needs of their users through a coalescing of their planning efforts, and despite the confinement of the planning ventures to the level of action by joint committees, considerable progress is nonetheless clearly being made, at least in the print media area, in the development of plans for what could become a loosely organized, single, decentralized "global" national LIS/system/network, somewhat along the lines of what was referred to in the national librarian's 1970 statement of his views of the library's ultimate mandate.

This account of rapid progress in national LIS planning and development with respect to printed information resources, as a result of the combined efforts of ABSTI, CISTI, and the National Library, is unfortunately not paralleled in the case of national information services related to the nonprint media. It would appear that these agencies are not ready to pay much more than lip service to the need to fully integrate and articulate relevant nonprint materials into all appropriate aspects of their services. In the case of the National Library, this state of affairs pertains despite the fact that the original Library Act of 1952, which established the National Library, states that, for the purposes of the act, the word "book" designates:

> Library matter of every kind, nature and description and includes any document, paper, record, tape or other thing published by a publisher or one in which information is written, recorded, stored, or reproduced (9).

Also, the National Library Act of 1969 specifically grants the national librarian the right, subject to the approval of the Federal Cabinet, at least for the purposes of coordinating national governmental library services, to provide "modern information storage and retrieval services, including photocopying and microfilming services . . . and facsimile or other communication of information services" (*1*). Similarly, no limitation was placed on the formats of the information to be dealt with by CISTI. Yet in practice neither has fully exercised its rights in this regard. Although

both take advantage of the latest available technology for the transmission of information, neither seeks to collect, classify, store, retrieve, or otherwise process nonprint information on the scale with which it deals with print information. And the services which both currently tend to provide for nonprint items largely involve "secondary" information—information *about* nonprint information items—rather than the primary information content itself, in its nonprint format. Hence the task of planning and implementation for the full incorporation of nonprint items into the LIS of the National Library or CISTI, or of some other agency or agencies, still largely remains to be undertaken. In this limited sense, then, the task of planning and building an articulated and comprehensive national LIS is still in an embryonic stage.

The necessary comprehension of user needs in relation to nonprint materials is only gradually beginning to seep into the consciousness of LIS planners in both federal agencies. Impetus has been given to this acceptance by still another, not previously mentioned, adjunct of the NRC. Its Associate Committee on Instructional Technology recently saw fit to appoint a Subcommittee on the Sharing of Instructional Technology Materials. That subcommittee presented a report and recommendations (*16*) to the Associate Committee in 1975. The report, in turn, cited a 1973 report of the McGill University Centre for Learning and Development, which stated that:

> Thousands of items of [non-print] instructional materials relevant to higher education have been produced. These materials, scattered over North America, are potentially available but in actuality are not available until the consumer (e.g., teacher or student) knows of their existence and has a way of accessing and retrieving them.

The subcommittee, in consequence of this situation, went on to recommend that:

> The transportability of educational technology materials and techniques is so important to the excellence of education in Canada that an extensive effort should be made to resolve all aspects of the problems in a definitive manner. . . . It is recommended that a federal/provincial task force be established and funded to look into all aspects of the sharing of non-print materials with a view to establishing logical methods of . . . reproducing and distributing these materials for educational applications.

It remains to be seen what the outcome of this recommendation will be.

In Canada, as elsewhere, little attention has been given as yet to making other types of information resources not mentioned thus far—such as copies of archival materials, artifacts, realia, and even live specimens—available to would-be users of these materials. The exceptional type of service of this kind that is being offered in the United Kingdom by the British Post Office to certain students of the Open University is not being emulated in Canada, a much richer country than the United Kingdom. No noticeable effort has been made thus far in Canada to provide for the inclusion of the resources of her many excellent archive and museum collections in the

networks and systems planned by Canada's major national LIS. Presumably neither the LIS personnel nor the archival and museum professionals currently conceive of these resources as essential elements or integral parts of national LIS, global or otherwise.

The foregoing comments concerning the apparent absence of enthusiasm on the part of CISTI and National Library personnel with regard to the inclusion of all of the elements of the information/communication spectrum in the planning of their system-network configurations may, of course, be applied with equal force to LIS personnel in virtually every country. Conversely, and almost characteristically, in Canada and elsewhere, the communications/media institutions and personnel are considerably more advanced in their thinking regarding both the matter of articulation and the relationship between information services and general national development than are those in the LIS field proper. The envisioned role of the media in national LIS, as viewed by professional communications/media personnel in Canada and as indicated in the paragraphs which follow, provides ample verification of this perception.

There are two major federal communications/media agencies in Canada, each of which controls and/or conducts operations in a portion of the communications field. The Canadian Radio-Television and Telecommunications Commission is the controlling agency with regard to the Canadian Broadcasting Corporation and the independent radio and television stations and chains. Only incidental mention of the national information services of these "mass media" organizations will be made here, as the planning of their services and programs has seldom involved broad-scale planning of general LIS, either on their own behalf or as part of an interactive process which includes LIS planning personnel. The other principal agency, the Department of Communications, controls the nonbroadcast communications industries and institutions, such as the telephone, telegraph, cable (but not cable television), and communications satellite organizations operating on a transprovincial basis. The department, in addition to having control and operational functions, has the responsibility for national policy formulation and planning in the nonbroadcast field. Its planners have been permitted almost unlimited scope in their design efforts and, during the past 7 years, have regularly engaged in the planning of broadly based, differentiated or "individualized" information services to the user. They have also undertaken foundation-laying studies deemed prerequisite to both overall and specific project planning endeavors (*11, 17, 18*). They have, for example, not only examined the nature and goals of national information/communication services but have also sought to explore in depth the potential interrelationships of the full range of existing information/communication technologies, as well as those which will probably be available in the near future. They have done so, in part, in order to determine the current and potential impact and ramifications of these technologies on the quality of life and on general development in Canada and elsewhere.

The mere titles of the publications resulting from the efforts of the various task forces and special Department of Communications enquiry groups—"Instant

World" (*19*) and "Branching Out" (*20*)—are indicative of their broad perspectives. In "Instant World" there are to be found such statements as:

> The emerging technology of telecommunications offers the possibility of an eventual network affording universal access to the means of transmitting and receiving information in virtually any conceivable form. . . .
>
> This vision of a universal access library network is almost certainly not illusory, but its realization may take twenty years or more and may never be achieved unless plans are put in hand now for action to be taken relatively soon.

Equally illustrative of their breadth of vision is the view expressed that:

> Some of the products of new telecommunications technology—multi-channel cable systems, home video-cassettes—have within them at least the promise of transforming broadcasting, which is now a one-way medium that treats viewers as large passive homogeneous groups, into an interactive medium; more and more people will then be able to decide for themselves what they want to watch and when they want to watch it and, still more importantly, to originate programs themselves. Thus, the electronic mass-media will perhaps be transformed into more individualized kinds of media (*19*).

They have additionally sought to make clear the desirability of:

> . . . nation-wide computer systems in the public sector, designed to make available on a shared basis, computer and specialized data bank facilities to public institutions and to the general public (*20*).

To attain the foregoing it was suggested that the federal government take an active role in serving mainly "as a catalyst, encouraging and fostering a broad spectrum of imaginative policies and realistic measures which, in combination, would create a genuinely favorable environment" not merely for the future development of computer communications, but for "the achievement of major economic and social aims" (*11*).

To assist it in the achievement of its purposes, the Communications Department sought and obtained the establishment of an Interdepartmental Committee on Communications Policy which has broad policy-planning and program-coordinating responsibilities. The committee includes representation from the NRC and the National Library. It has taken care to consult with the provincial governments and the private sector in communication policy matters. A permanent chairman and secretariat for the committee are supplied by the Department of Communications.

One of the fruits of the establishment of the latter interdepartmental body is the flurry of current planning projects involving the use of a new satellite launched early in 1976. A coordinated design effort is occurring which is providing for the integrated linking, on an experimental basis, of a number of specific prospective information services including elements of the whole gamut of the information/communications chain, from information generation to information use. It em-

braces, for example, planning for the use of the satellite for educational purposes at least in those areas of Canada where the federal government has educational jurisdiction, that is, in the Northwest Territories.

Information service planners within the Department of Communications have sought, on occasion—via appropriate channels, including the minister of communications—to have their recommendations examined and acted upon by the Federal Cabinet. Additionally, they have made a particular effort to welcome inputs to their planning programs from both professional groups and the public. An example of their receptivity in this respect may be found in the ready acceptance by the secretariat of the Working Committee on Audio Visual Systems in Education, within the department's Education Technology Branch, of a recommendation (*21*) emanating from a symposium held by the Association for Media and Technology in Canada (March 1975), to the effect that:

> . . . a national clearinghouse for information on educational technology be established, and, if feasible, the National Library be approached to undertake and perform this task.

Subsequent to the holding of the foregoing symposium, the National Library issued a press release (*21*) indicating that it was about to embark on the development of a MARC program for nonprint media. This proposed action presumably was the National Library's response to the recommendation in question and to several other closely related recommendations of the symposium. The response is indicative of the awakening, albeit belatedly, of the library to its responsibilities in the nonprint field. The library's decision to develop a separate MARC program for nonprint materials rather than a single program for both print and nonprint resources, as is being attempted in the United Kingdom, bears out the earlier comment made herein concerning the library's lack of determination to attempt the full articulation of print and nonprint media in its LIS. The role of the Department of Communications in providing a channel which permitted the matter to be brought forward to the library is nevertheless significant.

The numerous information/communications planning activities within the Department of Communications, a few of which are in the process of being implemented, are, in a sense, indicative of the potentialities of integrated LIS planning by coordinated and cooperative groups of planners, not only from the communications field but also from the media-broadcasting area and from the worlds of education and health and industry. The involvement of librarian-information scientist planners from the National Library, CISTI, and ABSTI in such ventures is not equally evident. And although Department of Communications personnel, together with CISTI/ABSTI and National Library planners, have cooperated in the design of computerized library networks, few other examples of such extensive cooperation may be cited.

It is only fair to note, in passing, that the almost "visionary" stances of the Canadian Department of Communications information service planners is one that is far more readily possible for a planning group within the federal Communica-

tions Department which, for the most part, has little in the way of actual operating services of its own, than it is for planners within other major types of national information services available in Canada. Cost considerations which must be taken into account by such governmental agencies as the National Library, CISTI/ABSTI, and the Canadian Broadcasting Corporation are not ones that require high priority being given to them by Department of Communications personnel.

In addition to the foregoing possible elements within an eventual national LIS system, there is yet another potential ingredient, the new Canadian Institute for Research in Public Policy (*22*), which warrants mention here. This institute is a national-level management information and futures planning agency. Its clientele currently consists of its joint owners—the federal and provincial governments and an industrial consortium. Its almost unique character stems from the combination of informational tasks which it seeks to perform in the national interest. It is to engage in information analysis functions similar to those of other information analysis centers. But, unlike them, its analytic efforts are to span the whole range of public policy areas, rather than just one narrow area. Also, because it is designed to assist in the formulation of public policy regarding matters of urgent current and possible future concern, it somewhat resembles the Hudson Institute and the Rand Corporation in the United States, while its strong governmental ties and its futurist orientation render it similar to the Swedish Secretariat for Future Studies. In the performance of its assigned role it attempts, on the basis of various forms of relevant available information, to: pose cogent questions; make forecasts; suggest alternative objectives, programs, and policies; suggest the positive and negative implications to each alternative; and communicate its findings to decision makers in government and business, and eventually, to the public.

Although it is not yet fully functional, it has been somewhat subject to criticism by consumer and trade union interests. Because it has no representation on its board from labor or from the public at large, it has, on occasion, been claimed to be administered by an academic elite, for the benefit of the economic and political elite. In its 2-year history, it has apparently not as yet made contacts with the Canadian public, either in the form of seeking public participation in decision making concerning its research undertakings or in making available the results of those studies.

Ultimately, it is to comprise an action-oriented information service at the "information for wise decision-making" end of the information/communication continuum. The perception, within the institute, of its role as a link in the information/communication chain is not sufficiently clear, however, as to result in the consideration of the possibility of joint planning, or of formal functional and/or structural links, between it and the other elements of the chain, that is, the previously noted national LIS.

Despite the fact that technically it does not fall within the purview of this survey, and though it does not, in several important respects, stand as an exemplary model for the national LIS planning process per se in a democratic country, an LIS planning enterprise in one of Canada's provinces, Alberta, merits a brief note. There, what originally began as a conventional survey of the adequacy of provincial

library services and library functions, eventuated, in terms of its scope, in an exploration of the whole gamut of information needs and of the most appropriate means for meeting those needs (*23*). Its "integrated information services" and "input from the public, feedback to the public" approach stands as a landmark for such studies and, at least in terms of the range of information services dealt with, could well serve as a model, in the industrialized countries, for national planners.

To sum up, Canada cannot as yet be said to have, even in planned form, a single national LIS. But considerable progress is being made, even if in part unconsciously, toward that end. Some of the present administrators of Canada's principal, presently separate, national LIS, in line with the recommendations of the OECD review group, are seeking to ensure that the eventual "organized" system shall be based on the existing governmental LIS infrastructure and that that infrastructure shall work toward: the coordination of existing functions, the articulation of present services, the development of existing centers of excellence, and the guidance of information service institutions in the private sector in the direction of compatibility with the governmental LIS. They are seeking, too, within their means, to bridge the remaining LIS gaps. Canada also already has available, under ABSTI/CISTI auspices, on a coast-to-coast basis, a whole spectrum of very sophisticated, teleprocessed, computer-based national STI services. These could be coordinated or even articulated in the future. It has, as well, a National Library which similarly provides both extensive and sophisticated services. These federal government agencies carry on nationwide tasks covering many broad fields of knowledge and each deals with somewhat more than its principal stock in trade of print items. Additionally, each is in the midst of implementing short- and long-range plans for further extensions of its services. Then too, in many respects, the services of these two federal organs appear to be in the process of being articulated in relation to each other, and despite the fact that each still maintains its own planning group, there is close cooperation between their planning personnel. The services of libraries, information centers, computer centers, and communications facilities are being linked and coordinated. Numerous networks and subnetworks already abound; more are being created. Systems, as well as subsystems and meta-systems, have been built and are now being built. Some order is beginning to emerge.

There is another side to the coin, however. Apart from the liaison which occurs between the Department of Communications planners and ABSTI/CISTI via the Interdepartmental Committee on Communications Policy, little planning interaction is evident between these entities. There also appears to be no effective official requirement for them to coordinate or to integrate their planning or their services. And, despite the official role of the National Library as the national LIS coordinator, the relationship between the planners and policy makers of the Department of Communications' interdepartmental group and their counterparts in the National Library, however friendly, appears in practice to be even more tenuous.

Obviously, then, not all the trends are in the direction of the development of a single, centralized or decentralized, integrated and comprehensive Canadian national LIS, even though the principal ingredients for one are in the process of being rapidly developed. To the extent that such a nascent system and network is

coming into being, that development represents a significant difference from the state of affairs to be found in Canada's immediate neighbor to the south, the United States—for Canada's protosystem already bears little resemblance to the organized near chaos of the American "nonsystem of systems."

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Australia

There is one facet of recent national LIS planning activities which has to be taken into greater consideration in Australia than in most of the Western democracies. It is the lack of an adequate preexisting system of library cooperation, such as had already grown up elsewhere. On the other hand, as in most other countries, the national social, political, and economic climate in Australia largely determines the nature, pace, and success of its national LIS planning and implementation activities (*1*).*

During several years of Labour Party control of the federal government, there was a growing trend toward centralist-oriented functioning, including functioning in the field of education and to a lesser extent in the LIS area. Although no national library plan emerged and received governmental support, several serious efforts were underway for the inception of a body to engage in such planning when the Labour government was replaced by the present much more conservative group. One of the influential initiatives in the direction of national LIS planning prior to the change in government was that pressed by the Council of the National Library. Its Scientific and Technological Information Services Enquiry Committee (STISEC), following a 3-year study, issued a landmark report in May of 1973 (*2*). Its now oft-quoted recommendations were sufficiently exemplary to cause Mohrhardt and Penna (*3*) to commend them as "guidelines that should be considered by any country considering national planning in this field." They warrant summarization here:

* The References for this section begin on page 422.

> . . . there is immediate need in Australia for a greatly improved and more closely coordinated system to collect scientific and technological information and to disseminate it with a minimum of delay to those who need it. If this need is to be met, the Committee is convinced that a national authority must be established with the responsibility to complement and coordinate existing collections and services; it would have a particular responsibility to ensure the provision of these information services which ought to be but at present are not, available in Australia. The national authority should give maximum consideration to the introduction of those services and information handling methods which utilize modern computer and telecommunication techniques. It should act as a focus for international, as well as national, co-operation in the effective and efficient transfer of scientific and technological information.
>
> The sociological impact of scientific and technological advancement have highlighted the need for interdisciplinary collaboration. In addition, policy makers and management in industry have a need for information from a broad range of disciplines. The Committee has concluded that a firm relationship should be established and maintained between information services in science and technology and those in the social sciences and humanities.
>
> The national scientific and technological information system which the Committee recommends, therefore, should not be created in isolation, but as an integrated part of a total information system. This will allow Australia to develop most efficiently a range of information services which will be essential in sustaining its living standards and improving its growth rate and international standing in an increasingly complex and competitive world, and will allow due regard to be taken of all factors contributing to the quality of life of its people.

One of the specific recommendations of the STISEC report was the establishment of a "National Scientific Information Agency." Although its proposed functions were similar to those currently being undertaken by CISTI in Canada, it is obvious from the general tenor of the report that the agency was eventually to serve as an integral part of a "total information system." Its proposed location within the National Library would doubtless have enhanced that possibility, as well as the probability of the implementation of the other recommendations of the report. Unfortunately, however, the economic recession of 1974–1976, together with the change in the political party in power, has apparently brought a temporary pause, if not a long-term halt to the further development of the STISEC scheme.

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Sweden

As a result of its relatively centralized form of government, its uniform educational system and cultural characteristics, its high degree of industrialization, and its high labor costs, Sweden provides a good exemplar of a country well suited to the early establishment of an integrated and automated national LIS. But in Sweden, as in Canada, there are several existing types of national-level LIS which are as yet, in varying degrees, independent of one another. As in Canada, too, there appear to be incipient forces at work which are tending to bring about increasing degrees of coordinated or joint planning for the offering of integrated services on the part of these entities. Evidence of the strength of such forces may be found in the fact that the concept of "The Interactive Library" (*1*),* which would require the existence of well-integrated information services for its implementation, has been under careful scrutiny for several years in LIS circles in Sweden and has received considerable approbation in terms of its application in many of the existing services. And although the concept was originally intended to refer only to the application of computerized processes in networks relating to print materials, its ramifications with regard to information in other forms have been quite well understood (*2*), if not applied, from the outset.

The acceptance of the need for the planning of national LIS in Sweden, like that in numerous other countries, apparently first arose from pressures by the scientific and technological community. These pressures resulted in the establishment, in 1968, of the Swedish Council for Scientific Information and Documentation (SINFDOK) (*3*). Apart from patent and invention information services, construction industry information, and a few other minor scientific information service areas which do not fall within its purview, SINFDOK is responsible for planning, coordinating, and operating information services at the national level in all scientific subject areas. Within the subject areas with which it deals, it confines itself primarily to building and monitoring of information retrieval types of service, which

* The References for this section appear on page 426.

permit the users access to various data banks and information systems. In addition, it serves as a principal information science research-granting agency. Since its inception it has provided the Swedish STI community with a strong continuing voice in national information affairs.

In some respects, SINFDOK serves as Sweden's focus for regional and international cooperation, both in STI and other subject fields. It is the central point, for example, for the OECD Information Planning Group and for the Swedish Center for NORDOK (the Scandinavian regional information services coordination agency), both of whose areas of coverage are broader than STI. SINFDOK is also a principal participant planner in the development of the Scandinavian Information and Documentation Network, under the sponsorship of the Scandinavian Council for Applied Research. This network is designed to permit users, including library patrons, to communicate by terminal or telex with, and to interrogate, various data banks in all fields of knowledge in Scandinavian countries as well as in certain other foreign countries.

In Sweden the task of what might generally be deemed the planning and operation of systems for the manual and automated processing of nonscientific information, as well as services of a more bibliographic nature, complementing SINFDOK's information retrieval types of service, is being undertaken by three other LIS systems. None of these is as yet officially related to SINFDOK but all, in varying degrees, coordinate their activities with it, and with each other. The three services are:

1. LIBRIS (Information Systems for Libraries), which operates principally at the research and higher education levels.
2. The service provided by the Library Division (the Library Advisors) of the Swedish National Board of Education.
3. BUMS (the Bibliotekstjänst Utlånings—och Mediakontroll System).

A description follows of the planning efforts related to each, and also the functions of each, with major emphasis on LIBRIS, which is currently by far the most important of the three.

The designers of LIBRIS (*4,5*) share with SINFDOK the principal roles in the planning of Swedish LIS. LIBRIS is being fashioned to serve as both a national and a Swedish regional system and network. It is to be a cooperative enterprise centered on the Royal Library, which, to an extent, still retains a university library function. Its other components are to include the libraries of each of the universities and institutes of technology, with each such library serving as a regional information center.

Planning for LIBRIS began in 1973 under the aegis of the Swedish Agency for Administrative Development, in cooperation with both the Swedish Council for Research Libraries and Swedish manufacturers of library automation and computer hardware. Its evolution since then has continued under the direction of the same entities. Its major parts are scheduled to be operational by the end of 1976.

A steering committee was formed to facilitate the task for planning LIBRIS and of making priority decisions concerning its development. The committee's mem-

bership consists of individuals appointed by the Subcommittee on Automation of the Swedish Council for Research Libraries, the Ministry of Education, and the Royal Library. The steering committee works in cooperation with the Agency for Administrative Development. Apparently it is committees and task groups of the Swedish Council of Research Libraries that do most of the actual planning work. A recent proposal of one such working party, for example, involves plans for the establishment of a National Lending Library, similar in function to the former British National Lending Library for Science and Technology, now a part of the Lending Division of the British Library. This Swedish Lending Library has been especially designed to provide access to a large collection of periodicals, including those of foreign origin.

LIBRIS itself is designed to comprise a national integrated and computerized service, with on-line routines for serials controls, search location, acquisition, and cataloging of books and other types of documents. The catalogs are to be output by computer in microfilm format (COM). Plans are also underway for LIBRIS to produce the Swedish National Bibliography on tape for foreign subscribers.

Each of the constituent libraries of LIBRIS, in its capacity as a regional information center, is to maintain on-line access to a machine-readable file which will store information on the print materials (books initially) in its possession. A single data base providing on-line access to the holdings of all the Swedish libraries will eventually be provided. It is also planned that the terminals used in the system will be of the visual display keyboard type.

Although LIBRIS is being established largely for the computerized performance of library routines, for bibliographical control purposes, and for bookkeeping and statistics gathering, its existing and proposed connections to various national, regional, and international data systems and networks, such as the nascent Scandinavian Information and Documentation Network referred to above, render it capable of providing information retrieval functions as well.

To facilitate international exchanges of information, LIBRIS has been made as compatible as possible with international standards. There is a continuous exchange of information on plans for the future, especially with the information service administrators and planners in the other Scandinavian countries. As a result of these activities, for example, a joint working committee has devised an adaptation of LIBRIS for Finnish purposes and the two systems will presumably be interlinked sometime in the future.

LIBRIS has built into it an arrangement for its ongoing evaluation by a special committee which serves as an accessible forum for criticism and improvement of both the plans and the proposed operational systems. In addition, all libraries involved in the LIBRIS project are kept informed of current developments in the system by means of an informal newsletter. And, in order to ensure that those in responsible positions in the member libraries are kept abreast of international trends and activities in library automation throughout the world, LIBRIS regularly provides them with a periodical which surveys this topic.

LIBRIS has been planned from the outset with a view to its eventual integration not only with SINFDOK but also with the two other previously noted na-

tional LIS, that provided by the Library Division of the Swedish National Board of Education and that provided by BUMS. The latter two services and their interconnections are very briefly described in the paragraphs which follow.

The Library Division (*3*) provides national, governmental, overall planning and control of all libraries which receive governmental support, such as school libraries and public libraries, apart from institutions of higher education. The planning functions are performed by the Library Division in cooperation with staff members of local libraries and with school administrators.

BUMS (*4*), the remaining LIS to be described, was established by the Swedish Library Association primarily for use by public libraries. It was devised to reduce the repetitive manual work involved in loan routines and to supply centralized technical services for almost all types of recorded information. BUMS is operational as an off-line computerized service. It has been planned to be fully compatible with LIBRIS, and testing activities are underway for the implementation of the planned complete integration of the two systems. And, as the public libraries which are served by BUMS fall within the jurisdiction of the Library Division of the National Board of Education, the coordinative functions of the latter body ensure the compatibility of BUMS with what is being planned for school and other libraries.

In summary, then, it may be seen that national LIS planners in Sweden are rapidly evolving a computerized and integrated, but as yet far from complete, broad-based system and network to aid Swedish information seekers.

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Israel

Israel appears to be one of the few (if not the only) Western-style democracies which are technologically advanced and yet have no broad national LIS, other than

STI, currently in operation, or even under serious consideration. This anomalous situation is all the more surprising in view of the existence in Israel of certain apparently countervailing attitudes, values, and indicators. The Israelis, largely Judaic in faith, have traditionally deemed themselves "the people of the book." For political and economic survival they have demanded of themselves a very high standard both of education and of scientific and technological accomplishment. They have also regarded their expertise and their well-organized knowledge resources as a potentially valuable export commodity. Additionally, they have recognized the need for systematic planning in most aspects of their social existence. Perhaps the best explanation of the apparent anomaly is that the lack of either a broad national LIS or LIS plan is a matter of national priorities. Israel presumably regards a national LIS, one which covers most or all fields of knowledge, as being unaffordable at present. To all appearances, it holds the view that the time and resources available for the provision of information services should be devoted almost exclusively to STI. The planning and operational enterprises of the Israelis in the latter area are both extensive and very advanced technologically.

The importance which the Israeli government attaches to scientific and technological matters, and within that area, the importance which it attaches to science information services may be gauged by the fact that the principal national information planning and operational service agency, the Center of Scientific and Technological Information (COSTI), is a subsidiary organ of the National Council for Research and Development, which is located in the Prime Minister's Office (*1*).* COSTI has been designated as the national focus for all science information activity, including planning. Its director, Carl Keren, is the writer of the authoritative UNESCO/UNISIST publication "Guidelines on the Planning of National Scientific and Technological Information Systems" (*2*).

In the establishment of COSTI, Israel was enabled, as a result of her centralized form of government, her small, relatively well-educated population, and her limited geographical area, to minimize the extent of some of the problems to be faced. It was possible, for example, for the planning process for the development of a national STI service to itself be planned. Some of the features of that preplanning (*3*, *4*) included a prior decision that the planning process was to result in a 3-to-5-year plan wherein priorities were to be defined, that the proposed organizational and financial structure was to be documented, and that the investments required, as well as the potential benefits to be derived from them, were to be carefully spelled out.

There were a number of additional features which were noteworthy. One was the construction of a list of parameters which, in view of their possible role in the evolution of decisions concerning the eventual national STI service, system, and network, warranted special attention. Note was taken of the relationship between the foregoing parameters and various alternate approaches to planning, particularly mission-oriented, subject-oriented, and organization-oriented approaches. The potentialities for the integration of these approaches within such a service were also

* The References for this section appear on page 430.

considered. As well, the requirements for the basic factual data deemed essential for the planning process were identified. This identification, in turn, involved the preparation of plans for the conducting of surveys which would permit the accumulation and evaluation of the required information. The data sought were found to fall primarily within the two following areas:

1. Existing facilities—their physical plant, functions, personnel, material holdings, costs, limitations, and future plans. (This survey was designed to cover all libraries, except public libraries and information centers, both government and privately owned.)
2. User needs and user information-seeking behaviors, with particular reference to those thought to be peculiar to Israel. (It was found necessary to take the very high ratio of university-educated persons in the national work force into consideration here.)

An effort was additionally made to predetermine the nature of the serious problems that could be anticipated in the STI infrastructure, in order that the search for their solution could be given priority. Two of the problem areas identified were:

1. The need for a national system for dealing with government documents.
2. The need to discover ways and means for the optimization of the purchasing and collection policies of libraries, through the facilitation of interlibrary cooperation and coordination activities.

A careful study was also made of the national STI planning, including LIS planning, of other countries. These studies involved a critical evaluation of the experiences, the rationale, and the philosophy inherent in the systems eventually proposed in each country, as well as a list or table of the phases or priorities established, and the cost-benefit considerations dealt with in the planning process.

The current planning activities of COSTI are founded on the improvement and extension of its existing operational national STI services. The latter include:

1. Accession services for the procurement of documents which would not otherwise be available in the country.
2. Computerized current awareness services, particularly STI services, involving the accessing of internationally available data bases.
3. A literature search service.
4. A current R and D projects registry, involving the construction of a data bank used mainly for research grant administration.
5. A computerized data bank registry, listing electronic data processing institutions and the data banks which they possess or to which they have access.
6. A directory and union catalog service, including a union catalog of science and technology serials found in Israeli libraries, a directory of serials published in Israel, a directory of libraries, and a directory of scientific institutions and associations.
7. In-service training mechanisms and services for the continuing education of information scientists (5).
8. Establishment of a network for information analysis centers.
9. Industrial reference/referral services.

10. Consultative services concerning all aspects of information science, including information system development.
11. Coordination of the planning of automated information retrieval systems which are being established at several information centers and special libraries (6).

The fact that the planning activities of COSTI are proceeding concurrently with and are closely integrated with its operational functions and services affords COSTI a number of advantages deemed by its staff to be sufficiently great to outweigh the disadvantages that inhere in such an arrangement. Further comments anent this matter appear in a subsequent section of this article.

As previously indicated, the relatively advanced state of national STI services in Israel is not, unfortunately, paralleled by a similar status on the part of the nonscientific information services. The Israeli libraries—public, special, and academic—are still largely in the initial stages of mechanization, networking, and even interlibrary cooperation or coordination. The background of library school graduates and faculty members until very recently has been mainly in the humanities, rather than the sciences. Because almost all librarians, except for recent immigrants, were trained for traditional library services, they tend to be lacking in both knowledge and awareness of the new techniques available and the new roles which libraries are likely to assume within the general scheme of national development and information-communication services in the years to come.

However, it is not only the backgrounds of the library and information science personnel that tend to limit interlibrary and automation projects in nonscientific fields. Financial exigencies require that such projects involve little or no monetary outlays for the government or the institutions concerned. The most ambitious activities for which it has been possible to find support thus far are those which have been initiated by the Standing Committee of the National and University Libraries (7). This committee meets at regular intervals and seeks to effect cooperation in areas of common interest. In 1970 it received sufficient funding for three cooperative projects which are currently approaching completion. These projects were designed to permit: the acquisition of telex teleprinters, to be used for interlibrary communications such as requests for bibliographic information and interlibrary loans; the construction of an automated system for the regular updating of a new edition of the previously referred to union catalog of science and technology serials; and the production of a catalog of the Jewish National–Hebrew University Library.

The Standing Committee currently has an additional long-term cooperative project underway and has several working parties involved in its planning and implementation. The purpose of this project is to produce within each participating library a "center of excellence" in terms of its "research-level" holdings in one or more subject fields.

These collaborative enterprises, even if completely successful in the attainment of their objectives, could, in aggregate and at best, be regarded only as seeds of a nascent broad-based, nonscientific, national LIS system. Another potential LIS already exists in Israel but its role appears destined to be relatively minor for some

years to come. It is a service provided by the Center for Public Libraries. The center is jointly operated by the Ministry of Education and Culture, the Israel Library Association, and the Graduate Library School of the Hebrew University at Jerusalem. The center, in addition to operating a central cataloging service for public libraries, attempts to assist public librarians in their planning and development activities. Unfortunately, the resources which the cooperating institutions have thus far been able to devote to the operations of the center have not as yet enabled it to engage in any major nationwide planning endeavors.

Given a few years of peaceful existence and a possible infusion of financial backing for the upgrading of her nonscientific national LIS, rapid changes may be anticipated. For by accident and/or design, Israel has in the past few years had an influx of highly qualified information scientist personnel from North America, Western Europe, and the Soviet Union. It will be interesting to observe the effects, if any, on Israeli information services of the efforts of the new amalgam of LIS personnel, who bring to the country a diversity of experiences which include previous employment with VINITI in the U.S.S.R., and the U.S. Library of Congress.

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Japan

As in most countries, the state of LIS in Japan reflects the status of general economic, political, and cultural developments within the nation. As in the case of the Netherlands, Israel, and Switzerland, Japan's paucity of resources for heavy industrial production has perforce brought about an industrial production and export emphasis on low-resource-use–"high-technology" products, such as elec-

tronic equipment and information/communications technology items. In the rapidly changing world of high technology, the notion that Japan's economic success, if not her economic survival, is dependent upon the availability of effective, advanced, automated information services has speedily permeated and attained acceptance at the highest levels of government and industry.

The vesting of the responsibility for general scientific and technological policy making in a Council for Science and Technology which is chaired by the prime minister is indicative of the importance which the Japanese people attach to such matters. The council, in turn, shares with several other scientific organizations the ultimate responsibility for national-level policy making, planning, and activities in the field of "documentation" or information services. In practice, however, the Japan Information Center of Science and Technology (JICST) officially carries out the mission of collecting, processing, storing, and disseminating STI throughout Japan.

Almost at its inception, in 1969, JICST launched a two-pronged effort to strengthen national STI services. It gave top priority to the immediate provision of various secondary information services, such as the application of micrographic technology to document storage and retrieval, the publication of abstracting journals, and the application of computer technology to information processing (*1*).* At the same time it initiated a long-term information service development plan, the National Information System for Science and Technology (NIST).

Under the NIST Plan or Concept (*2*), JICST serves as the operating agency in a nationwide, quite comprehensive, STI system covering all fields of STI, including agriculture and medicine. The basic assumptions which underlie the NIST Plan, as indicated by Ueda (*3*) and cited in Aines and Day (*4*), include:

1. Information activities should be delineated schematically for a long-range comprehensive approach.
2. NIST should be consolidated along national lines by government in close cooperation with the private sector.
3. Rapid service and quality service are required.
4. NIST should be developed in close coordination with other information systems.
5. Transfer of information should be promoted in Japan with close international cooperation.

According to Ueda, NIST is being developed not as a single, rigid system but as a system of systems, with many subsystems involving both governmental agencies and the private sector. As it is currently envisaged, it is to be comprised of two superordinate cooperating entities, together with a number of subsidiary agencies. One of the two principal parts of the system is the Central Coordination Organ (CCO). As indicated by its name, its purpose is to coordinate the various centers comprising the entire organization. The other major component of the system is the Integrated Information Center. Other elements to be included eventually are:

* The References for this section begin on page 434.

a Clearinghouse, a group of Specialized Information Centers, a Data Center, a Central Depository, an R and D Organ, a Training Organ, and a group of Regional Service Centers. The latter centers are designed for the dissemination of both primary and secondary STI information to local users.

JICST is being upgraded to become the above-noted Integrated Information Center. As the core component of NIST, it is to undertake the overall task of processing the world's STI information in service of the general STI needs of the entire country. Additionally, it will monitor the regional information service network, further develop both R and D programs and technical training programs, and serve as a national STI referral center. JICST is currently also in the process of completing the development of a national, on-line, scientific literature retrieval system/network. It is already providing access to two American data bases—MEDLARS and Chemical Abstracts, and to one Japanese data base. JICST additionally supplies a batch-processed STI and retrospective search service permitting access to a variety of data bases for clients throughout the country.

JICST is also spurring the inception, at over 20 designated institutions, of the series of Specialized Information Centers noted above. Each of these is to collect and process information, including machine-readable information, in a particular subject or professional STI field. Each is also to provide, in its field, duplication and translation services as well as abstracting and indexing services. In the manner of the information analysis centers in the United States, each will additionally engage in the evaluation of the information compiled and will construct appropriate forecasts. Several existing data centers dealing with strictly numeric data and/or semantically organized content are in the process of being consolidated to round out the system of Specialized Information Centers.

Three categories of Regional Service Centers are in the process of being established: block-unit centers in 10 major cities, where each center will service several prefectures; prefecture unit centers; and special-care centers, such as those to be located at industrial complexes. These Regional Service Centers are expected to provide more than mere factual data in that they are to supply technical guidance as well.

When fully functional, the Clearinghouse, as the information "guiding" organ or referral center in the system, will make available information concerning the location of pertinent information located within the NIST community or elsewhere. Through its announcements and its collection and processing of location data, it will be enabled to guide users to appropriate local or regional information centers.

The Central Repository is being set up within JICST to serve a custodial or archival function. It will store copies of documents (in the broadest sense of that term) and data gathered and processed by the components of NIST. A variety of locations, such as Regional Service Centers, research institutions, reference departments of science libraries, and local public libraries, will be found for the terminals which link together NIST, its component parts, and its users. The Central Repository is also intended to play a key role in the preparation of a national STI union catalog.

NIST is primarily intended to serve professional users in the various fields of science and technology. National LIS planning, implementation, and operational activities, designed to serve most other types of users, are the responsibility of a quite different and separate governmental body, the Ministry of Education. Its system of services takes place on the basis of two levels of institutional components, national and local, that is, the National Diet (parliamentary) Library and its branches; and other libraries such as the many local public, prefectorial, municipal, rural, and private libraries, as well as the thousands of school, junior college, university, and professional school libraries. Among the foregoing institutions, the activities of the public and the school libraries fall in practice, and for the most part, under the jurisdiction of the local Board of Education (*1*) and hence their relationship to the national LIS system appears to be very tenuous.

The National Diet Library is, in effect, the national library in the sense that it publishes the national bibliography and is the official depository for all Japanese publications. The various national government-owned libraries are all regarded as branches of the National Diet Library. The National Library itself serves as a focal point for the international exchange of documents, the publication of reports on LIS matters, and the like.

Within the National Diet Library, a planning entity called the Preparations Office for Automation has been in operation since 1969. It has produced two successive 5-year plans covering the years 1969 to 1979, during which time many of the services of the library are to be computerized. By the end of the first of these 5-year plans, with the aid of the U.S. Library of Congress MARC II tapes, the automated acquisitioning, the accession listing of foreign books, and the preparation of the national Union Catalog had all been initiated. In addition, the computerized compilation of the Index of Diet Debates had been accomplished.

The on-line processing, including the acquisitioning, of Japanese books is presently being undertaken under the second 5-year plan. The system will permit the on-line information to be available not only to the National Diet Library branches but to certain other libraries in the university, public, and private sectors as well.

Two additional current Japanese national LIS planning enterprises warrant note here. One is the virtually completed "Plan on Usage of the Electronic Computer in Government" (*5*). It is a scheme drafted by the Information Processing Council, an advisory body of the Administrative Management Agency. It is designed to improve information handling in the national government by means of a series of subplans for computer-personnel sharing, systems development, and the standardization of computer systems. To all appearances, its activities bear no formal direct relationship with the NIST–JICST planning enterprises, those of the National Diet Library, or those of the Japan Computer Usage Development Institute noted immediately below.

National LIS planning in Japan culminated in 1972, in Tokyo, in the publication of *The Plan for Information Society—a National Goal Toward Year 2000* (*6*). It is unquestionably the world's boldest and most famous national-level LIS projection thus far produced and publicized, either officially or unofficially. The docu-

ment is the final report of a Delphi study made by the Computerization Committee of the Japan Computer Usage Development Institute, a nonprofit, nongovernmental organization. The long-range basic design presents a picture of a goal involving a planned, computerized, but software- rather than hardware-oriented, "information rich" society in the year 2000, wherein the main concerns will be societal problems and the quality of life, rather than problems of an economic nature. It is prophesied by the *Plan*'s author(s) that information, particularly STI, will soon be Japan's principal natural resource and stock in international trade.

In challenging Japanese society to respond to the impending realities, opportunities, and dangers of the new era, the author(s) of the *Plan* declare:

> It is our conclusion that Japan has to change its goal from industrialization to informationalization. . . . We propose that the final national goal be a new information society which will bring about a general flourishing state of human intellectual activity.

Within the long-range plan there is an initial, medium-term blueprint. Both are to involve numerous phases and projects requiring the integration of a variety of subsystems. At the time of its dissemination, the medium-term plan was estimated by its author(s) to require only about $3.5 million. However, the fulfillment of the long-range aspects of the goal was estimated, at that time, to entail the enormous sum of approximately $65 billion. In view of the latter cost estimate, the failure of the Japanese government to grant any official endorsement of the *Plan* is not surprising. Its piecemeal implementation is nevertheless more or less in line with the *Plan*'s prescribed target and objectives and is apparently proceeding apace, even though, as a result of Japan's current economic vicissitudes and political and energy crises, progress is somewhat slower than anticipated. Japan is clearly committed to the task of gaining a leadership position among the nations of the world in the "new information society." Only Israel can vie with it in its acceptance of the coming of the "information age" and of the importance of information services, systems, and networks in the days and years ahead.

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THE COMMUNIST NATIONS: THE U.S.S.R.

The Soviet Union's national LIS stands, without question, at the forefront of all the systems of the world in a number of respects. It is certainly the pioneer in the field. For more than 20 years it has been by far the largest extant system. It serves more users—scientists, engineers, educators, technicians, administrators, and members of the public—than does any other national LIS (*1*).* It employs well over 100,000 specialists and other personnel. It is also the largest in geographical coverage. And, perhaps because the Soviet Union is dedicated, by means of the Dictatorship of the Communist Party on behalf of the proletariat, to long-term development and planning from above as a way of life, the Soviet Union also has one of the world's most "organized" and most highly controlled national LIS systems.

There are several interrelated factors affecting the U.S.S.R.'s national LIS which result in the occurrence of qualitative differences between it and the LIS found in the Western democracies. These distinctions also apparently apply, but to a lesser extent, in the case of the Communist countries of Eastern Europe. The differences appear to be founded on the closeness of the relationship assumed to pertain between information science, education, and the natural sciences and technology in the Soviet Union, as compared with the relationship deemed to exist between them in the West. This distinction in perceived relationships may be said to have a significant effect upon the status and functions in society ascribed to two particular professional groups which are of special interest herein, viz., information scientists (informaticists) and educators. In the U.S.S.R., members of these two professions play far more important roles, both in society and in government, than they do in the majority of the Western democracies.

In the Soviet Union, because science and technology are deemed to include the natural sciences, technology, education, and many of the social and behavioral

* The References for this section begin on page 441.

sciences, STI services involve almost the same range (with the exception of the humanities) as do LIS in most other countries. In addition, because the Soviet government has always stressed the need for the ready availability of information services in its operations, the STI services and networks function not only within the industrial complexes and research and technological institutes, but also within government agencies, at the regional, republic, and national levels. The government thereby attempts to avail itself, at all levels, of a direct, current, information "pipeline" for policy-making purposes in the various areas that affect the national economy. Moreover, the LIS system, particularly the STI portion of it, is based upon the active and constantly increasing participation of subject-matter specialists, especially scientists (including educators) and engineers, as information scientists, in the activities of the constituent information agencies. The importance of information science and information scientists in the Soviet Union is further evidenced by the fact that one of the major national institutions providing LIS, VNIIKI, the All-Union (national) Research Institute for STI, Classification and Coding, is, in essence, an information science research institute.

The higher status accorded to education, as a discipline and a profession, arises from the fact that education has long been regarded as a science, almost a natural science, in the U.S.S.R. It has been espoused, from the time of Lenin, as an important function of government, almost next to economic development. Education, along with other sciences, is, indeed, regarded as essential to economic development. VINITI, the All-Union Institute of STI, probably the world's most renowned national LIS, and the Soviet Union's single most important operational information facility, accordingly embraces in its planning and its operation, information services in and for education, along with services in and for science, technology, and government. The significance of the role of education and educators is further enhanced by the fact that the distinctions between education, propaganda, and information science that are made in the West are not as clear-cut in the U.S.S.R., where propaganda has always played a major "educational" role, both internally and externally.

The Soviet espousal of technology for educational advancement and for the organization and dissemination of knowledge has paralleled its espousal of technology for economic advancement. As a consequence of the high priority status of education, information science, and technology, and their assumed close relationship, educational technology is viewed as epitomizing the greatest potentialities for progress in these areas. And the essence of their conjoint prowess for the future is seen to lie in the field of computer-assisted instruction (CAI). Although the U.S.S.R. still lags far behind the United States in the availability and quality of audio-visual terminals capable of being used for CAI or for information retrieval purposes, this state of affairs is not the result of a lack of recognition of the potential role of these devices as integral and even central aids to rapid advancement. This nominal and insofar as possible actual status ascribed to CAI is obviously a far cry from that given to it in the West and it comprises another facet of the qualitative differences, present and probably future, in the LIS of the two countries in question.

The various important differences in perspective as between East and West, as indicated above, are, of course, reflected in differences in the nature and scope of both the LIS planning ventures undertaken and in the resultant plans.

Attempted progress in LIS in the Soviet Union, as in the case of development in other sectors of the Soviet economy, is "blueprinted" by means of successive 5-year plans, the most recently completed one having been begun in 1971. The nature and direction of its LIS planning processes can best be comprehended in relation to the institutional arrangements for information services currently in existence. The general picture is one of centralization, immensity, and complexity.

The principle of centralization is paramount in the structure and organization of Soviet LIS and is inherent in both the short- and long-term LIS planning and in the R and D which is undertaken. There are, however, some elements of decentralization involved in the system(s)/network(s). In planning the location of STI information centers, for example, priority is always given to the situation of the center close to its intended user community. In brief, the U.S.S.R.'s high-level information network(s) perform the centralized national-level information functions, such as abstracting and indexing, whereas the decentralized functions are performed by the basic units of the system(s). In the case of STI facilities, these local units are the ONTIs (Sector of Scientific–Technical Information), concerning which more will be said in a subsequent paragraph.

The many information services, despite all efforts to rationalize them, remain a vast hodgepodge of virtually independent—yet somehow, to a degree, coordinated and even integrated—facilities and systems. Among the various major LIS systems is the public library system, which is supervised by the Ministry of Culture. Another is the library system of the universities, which operates under the direction of the Ministry of Higher Education. Four other principal systems or agencies exist which operate largely in the STI field. They were established by the State (national government) Committee for Science and Technology of the Council of Ministers (the Cabinet). One of these is the quasi-independent system operated under the aegis of the Academy of Sciences. VINITI, about which more will be said in subsequent paragraphs, is the chief component of that system. The academy's system also includes three major libraries: the Library of Natural Sciences; the Fundamental Library of the Social Sciences, located in Moscow; and the Library of the Siberian Branch of the Academy, at Novosibirsk.

The second STI system, serving parallel to but independent of the academy's system, is, like VINITI, another All-Union agency. It is the State Public Scientific and Technical Library of the U.S.S.R. Like VINITI too, it is one of several major Moscow-based national institutes and agencies. It stands at the apex of a complex structure of some 23,000 technical libraries in Soviet industrial enterprises and research establishments. As the holdings of these libraries are directly available to the U.S.S.R.'s technical personnel, they constitute vital components of the Soviet STI system.

The State Committee for Science and Technology directs the operation of two additional STI agencies, both of which are located in Moscow. They are the All-

Union Exhibition of Economic Achievements and the All-Union Center for Translation of Scientific and Technical Literature and Documentation.

The three remaining important and also Moscow-based national agencies are creatures of three different committees of the Council of Ministers. They are: the All-Union Book Chamber, which operates under the direction of the State Committee of the Press; the previously noted VNIIKI, which is directed by the State Committee for Standards; and the Central Research Institute for Patent Information, under the State Committee for Inventions and Discoveries.

Each of the many foregoing STI national institutes or agencies provides a part of the central resources required in support of the overall national-level STI system (*2*).

There are also STI information institutes serving each of the Union Republics in the U.S.S.R., as well as many "interbranch" institutes in the Soviet territories. In addition, there are STI departments in numerous local research institutes, industrial concerns, and libraries in both the republics and the territories (*3*). They comprise the ONTIs, the basic units of the Soviet STI networks. In 1975 there were over 20,000 of them (*4*). They are similar in function to the information analysis centers which operate in the United States. Each ONTI consists of eight major STI-processing subdivisions. These divisions are: collection, analysis and reporting, bibliography, editing, organizational-methodological and technical propaganda, duplicating, library storage and retrieval, and translation. Each ONTI is required to establish direct communication with the users of information in the relevant research or industrial organizations or libraries, in order to determine their information needs, to obtain from them information of value to other Soviet users, and to provide feedback for the improvement of the ONTI's information acquisition program. Each ONTI, in addition, must collect, evaluate, and condense information in its respective area of concern on a day-to-day basis, participate in the dissemination of information from the higher levels in the information network, and prepare materials for the information institutes at the higher levels, such as VINITI, for dissemination to other production facilities and research organizations and for publication (*5*). Although functionally and structurally uniform in the above respects, the ONTIs vary in nature from short-term, mission-oriented, multidisciplinary types to discipline-oriented, long-term study units.

Despite the structural complexity of the Soviet Union's STI systems and networks, as described in the preceding pages, the overarching objective is clear—the reduction of the "lead time" involved in R and D, through the widespread and rapid dissemination/publicizing of scientific and technological advances at home and abroad, in order to advance the Soviet economy and, hence, the Soviet way of life. The agency which appears to carry the responsibility of ensuring adherence to this objective, and the one which carries the responsibility of overall national STI policy making, planning, control, and coordination, is the Information Directorate of the All-Union State Committee. The formidability of its power is evidenced by the facts that, in addition to the foregoing functions, it vets all information budgets and monitors all expenditures. It also evaluates the effectiveness of the information

services. Besides making available the necessary resources for the further development of information programs, it must approve the inception of new information services, such as the establishment of new scientific journals. In addition, all foreign STI acquired for use in the Soviet Union falls under its control (*3*).

The directorate is not, however, an operating agency per se. Operational functions as well as internal planning are reserved for the subsidiary agencies, small and large, such as the ONTIs, VNIIKI, and VINITI.

Because VINITI is the star in the U.S.S.R.'s LIS–STI systems, and also because it is the leading single planning and operational entity in these systems, somewhat more detail is provided concerning its functions, particularly its planning functions, than was given concerning other parts of the various systems. It should be noted at the outset that there is no counterpart to it in the United States, either extant or officially planned. A combination of the information functions of the U.S. National Science Foundation's Office of Science Information Service, the National Technical Information Service (NTIS), the former AEC, NASA, and several other federal agencies, as well as the various abstracting journals, the information analysis centers, and private publishers would be required in the United States to provide all of the services which VINITI already provides or proposes to make available in the U.S.S.R.

VINITI seeks to engage in the systematic and exhaustive collection, abstracting, indexing, and disseminating of the world's scientific and technical literature. In its role as an overall STI analysis center, it publishes "Spot Reports" which are intended to illuminate the newest problems of science and technology as they are presented in foreign and Soviet publications. These Spot Reports are published, on a rush basis, in the periodical *Express Information*. VINITI also publishes a monograph series entitled *Review of Science*, each of the items of which consists of scientific generalizations and state-of-the-art achievements in a specific scientific area (*5*). Its estimated (1973) 2,500 professional, full-time, on-site scientists and the over 22,000 outside scientists and technical people associated with it supply its national centralized services.

During the 1960s the effectiveness of VINITI's services was called into question by both internal and foreign critics. No doubt the commonly heard aphorism in the West, that "everything goes into VINITI and nothing ever comes out, not even garbage," was highly exaggerated, but nonetheless it contained a grain of truth. As a result of the criticisms, VINITI, since 1969, has engaged in a monumental task of overhauling itself, while maintaining its ongoing services. The self-modernization plans for coping with the then existing information-processing difficulties called for the assignment of top priority status to the automation of the entire system, particularly automated indexing, machine translation, and full text processing (*6*). To implement this policy, VINITI became engaged in the development of what it originally termed its Integrated Information System (VIIS) (*7, 8*). This system is now being referred to as ASSISTENT (Automated Reference Information System for Science and Technology). VIIS–ASSISTENT is conceived of as a major component of the entire Soviet STI system. Chernyi (*8*), one of VINITI's administrators,

claims that, in its comprehensive functioning, ASSISTENT will serve as an "effective *assistant* to scientists and practitioners in tackling the research, production, organizational and managerial problems that confront them."

The enormity of the task with which ASSISTENT is being designed to cope is such that Chernyi may rightly claim that "it has no analogue in world practice." Some notion of the breadth of its purview, and of the difficulties and problems to be encountered in its design and implementation may be gathered from the paragraphs that follow.

ASSISTENT is being devised as a system for centralized processing, by analysis–synthesis, of the world's STI. It is claimed that it will render feasible VINITI's aim of exhaustive STI coverage. It is to be a multidisciplinary system that encompasses all of the natural sciences and a few of the social sciences. It is also to include in its processing activities both published and "parapublished" STI, in all languages. In order to be able to serve in this fashion, it is purportedly planned to have the capacity to process several million publications a year, a capacity exponentially exceeding that of any existing integrated information system.

Among the reference services that are planned to be offered through ASSISTENT are SDI, demand retrospective searches, on-line and fact retrieval, and the supplying of the full texts of periodical articles. To all appearances, only the initial steps have been taken thus far in planning the capability for it to make available the machine-readable files to be used in connection with the above custom-made reference information services. The design of the necessary software for these and for other data retrieval services apparently remains to be undertaken, as does the task of building suitable software for the achievement of the compatibility of the various computer systems already in use. Still to be attempted as well is a planning task which is only in part a responsibility of ASSISTENT or VINITI, the design of an effective communication system linking VINITI with other Soviet and foreign STI agencies.

Complicating the planning of ASSISTENT is the fact that it is being developed simultaneously with attempts to plan and implement important modifications in the other activities of VINITI. The task of devising a subplan for the necessary retraining of VINITI's personnel, as a concomitant of these modifications, is an example of the intricacies involved in the planning process.

It is hoped that ASSISTENT, despite these difficulties, will, through its upgrading of the STI services, enhance industrial applications of scientific discoveries and also encourage creativity among scientists (*8*). It is also anticipated that it will facilitate both the upgrading of the STI systems of the Council for Mutual Economic Assistance (CMEA), the Communist counterpart of the European Economic Community, and the task of making the computer systems of the CMEA's members compatible. Assuming the success of these endeavors, it will then be possible to begin the gradual integration of the Soviet Union and the CMEA members' STI systems into the UNISIST Program.

The planning of ASSISTENT within VINITI is, as indicated, but a part of STI planning within the entire Soviet STI system. Few details are available, however, in the West concerning planning activities, other than those in which VINITI is engaged, nor do generalizations concerning them abound. One Russian com-

mentator, Felix Sviridov, as quoted by Kirson in 1973 (*5*), sought to sum up the STI, and hence LIS planning situation in the U.S.S.R., as follows:

> At present the entire system of STI in the Soviet Union is nearing the final stages of reorganization to meet the constantly growing demands on the part of the scientific and technical community.

Taking into account the planning and reorganization efforts being undertaken within VINITI alone, the planning ventures must be counted as prodigious. It would nonetheless appear that the overall LIS system that is to result will be integrated only to the extent that it will comprise a unified bibliographical and reference system, based on a nationwide network of coordinated reference collections and a uniform system of classification. Appropriate links between such major subsystems as the public library and university library systems and the major STI facilities seemingly are not provided for in the published accounts concerning the plans to be implemented.

To whatever extent the LIS planning and operational activities of the U.S.S.R. may be claimed to be successful and efficient, these qualities are ascribed by proponents of the system largely to their centralized structure and functional arrangements. They claim that the deliberately planned centralized activities result in net benefits related to such functions as the collection, bibliographical control, and editing of abstracts, and that the centralized processing helps to minimize duplication of effort in information activities and to solve problems in the effective use of the available literature. Critics of the Soviet national LIS system, on the other hand, in pointing to its enormous size and scope and to its highly centralized structure and control mechanisms, conclude that no matter how well planned it might be, it will still tend to be inefficient, inflexible, and destructive of the personal initiative necessary to improve it. Its supporters, in reply, claim that it not only serves the needs for which it was and is being planned, but that its rapid modernization, through high technology, will result in the citizens and the government of the U.S.S.R. having available to them the world's best LIS. Arutiunov, the director of the Information Directorate of the All-Union State Committee, and probably the top-ranking LIS administrator in the country, contends, according to Baker (*1*), that already in the U.S.S.R. the value of the yield of effort invested in information work triples itself annually.

Whether that yield, or higher or lower yields, currently obtain in the Western democracies is a moot question. There can be no doubt, however, of the firm resolve of the U.S.S.R. to overtake West Germany, Japan, and even the United States and Britain, in the applications of high technology to its national life, and thereby to surpass these nations in the satisfaction of the information needs of their respective citizens.

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THE LESS-DEVELOPED TECHNOLOGICALLY, "THIRD WORLD" COUNTRIES: BRAZIL

The inclusion of a brief treatment of LIS planning developments in Brazil is provided at this point for two cogent reasons. First, what has transpired there has been quite typical of the LIS planning process in the developing nations, especially in Latin America. Hence the account will help to round out the panoramic view of the

worldwide LIS scene. Second, the content of the subsection supplies crucial grist for the subsequent sections of the article which deal with suggested guidelines for future national LIS planning activities and with the prospects for LIS endeavors at both the national and the international levels, as set forth in the concluding section.

The paucity of recent treatments of LIS planning efforts in Brazil, written in English, renders the authoritative works by Carlos Penna and his eminent co-author Foster Mohrhardt all the more indispensable. The references included herein couched in the Portuguese language were found in their studies. Only the present author's inability to discover the whereabouts of Penna and Mohrhardt at the time of writing prevented him from seeking to quote them directly.

The initial planning and the first steps in the creation of what was intended to become a national "Sistema de informaçãoes sobre ciência e technológia" (system of science and technology information, SNICT) were taken in Brazil in 1970. SNICT was to be the direct product of national ministerial-level planning and implementation (*1*). Originally coordinated by the Ministério do Planejamento e Coordenação Geral (MINIPLAN), the planning for SNICT was subsequently entrusted to an applied economic and social research planning body, the CNPq. SNICT was to have a decentralized operational structure but centralized coordinative functions. It was to include among its first appendages a subsystem for each of scientific, technological, and agricultural information, as well as one for a patents bank and one for the dissemination of scientific information received from external sources. The planning of SNICT has also included inputs from and studies by professional organizations, the activities of which were to be integrated into SNICT.

In 1972 Harold Borko, then an information scientist employed by the Systems Development Corporation of Santa Monica, was invited to serve as an official UNESCO commissioner to review the plans for SNICT. His report (*2*), in turn, led to a new planning document (*3*). A further analysis of the problems raised by the proposed inception of SNICT was undertaken by the Seventh Congress of Brazilian Librarians and Documentalists in 1973 (*4*).

In the period since 1973, despite numerous economic and political exigencies, the national government has taken a number of concrete steps to implement the much-revised plan. The basic elements of a national LIS plan are already well developed in Brazil and there remains only the completion of the implementation of SNICT. But, even when fully implemented, SNICT will barely measure up to the minimal requirements set forth in this study for a national LIS, as it is expected to deal almost solely with print materials in the STI field.

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An "Overview" of the Current State of the Art of Planning National LIS and an "Overall" Evaluation of the National LIS Planning Process and the Resultant Plans

There are elements in common in national LIS planning ventures as well as in the plans eventually formulated as a result of these planning programs. These common elements are evident among the factors which have fostered the inception of national LIS planning endeavors in recent years and which have determined their nature and scope. In many instances it is also these common factors or forces which have determined whether or not the plans have been, are in the process of being, or are likely to be implemented in the near future. The categories of commonalities are prevalent, with some exceptions, not merely in the nations which are highly developed technologically but also in the less developed nations as well, at the various stages of the preplanning, planning, implementation, and operational phases of the national LIS planning and operational processes.

EXTENT OF THE EXISTENCE OF COMMON ELEMENTS AND ACTIVITIES AMONG THE VARIOUS PLANNING ENTERPRISES

Common Factors Fostering the Formulation of National Information Policies and the Inception of National LIS Planning Programs

Nowhere, as yet, has the genesis of recent national LIS planning ventures occurred as a result of a great upsurge among the general public in the demand for the undertaking of this task. In virtually every instance, the initiation of LIS planning activity has been the outcome of efforts of a small, politically and/or economically powerful, well-educated, and literate minority. Usually, the minority group in question is a coalition of scientists, technologists, educators, librarians and information scientists, and fairly high-ranking civil servants and other key governmental officials. They tend to have a need for improved access to information in their respective fields of endeavor. Impetus is often given to their demands as a result of publicized accounts of the inadequacies of the existing system(s) or nonsystems(s). Quite commonly it is the professional librarians and information scientists who have

documented the inadequacies of the existing arrangements. Although they may be among the first of the professional groups to become aware of the desirability of a national LIS planning program, they also tend to be conscious of the fact that they cannot, on their own, persuade their respective national governments to take the appropriate action. For even in those countries where the status of professional librarians and information scientists is relatively high, it is apparent that their role is one of comparative impotence in government policy-making circles. Hence they tend to seek allies among the other aforementioned groups in order to attain their ends.

It is noteworthy that in seeking to bring the need for a national planning program before the government, and the public too, the print orientation of the coalition of proponents of these measures all too often results in such groups overlooking the potentialities of the nonprint media.

Many of those who espouse the cause of national LIS planning have convinced themselves and others that, for a thorough LIS planning program to "get off the ground," it is a prerequisite, or corequisite, that the national government formulate an official national information/communication policy and define its main objectives, the area of responsibility that it is prepared to consider undertaking, and the means or resources it might be willing to employ to attain its ends. In part for tactical reasons, the effort to secure such an official declaration is often attempted via efforts to have the central government proclaim a "national science policy," wherein a "national science information policy" is a component part. Very frequently, as well, the campaign to achieve a national science policy is but a part of a larger movement to secure the formulation of a "national development policy." As an alternative, in a good many instances the cause of national LIS planning and national information policy making is furthered by its attachment to national development policy making via the education policy route. When approached from this vantage point, information policy making can assume a much broader mien, involving many more areas of LIS than is usually the case when information policy making is limited to STI. In the Western democracies, a comprehensive information policy may be almost impossible of achievement as a result of the fact that the national government is not constitutionally in a position to serve as a monolithic policy maker in such matters—for in these countries there is often a variety of public and private bodies involved in the information field whose actions may not be readily concerted. Their commonly diverse interests, actions, and policies may affect not only the possibility of the adoption of a national information policy but also the entire national LIS planning, implementation, and operational processes.

Several international organizations, most commonly UNESCO, the OECD, and the OAS (Organization of American States), have stimulated numerous national LIS planning projects. They have provided "ammunition" for the proponents of general national development policies and also of national information policies. In addition, they have provided grist for the mill of the national LIS planners. Their stimulation has usually occurred in the form of the provision of various types of assistance, economic, financial, and/or consultative. The assistance provided has, in aggregate, covered all of the phases of the planning process, from the encouragement of

national governments to engage in information policy making to the evaluation of newly implemented plans. The assistance has, of course, varied in form and extent from nation to nation. In numerous instances these international bodies have additionally succeeded in bringing to the attention of general national planning bodies—as well as those concerned with economic, scientific, and technological development, and educational or cultural progress—the desirability of including LIS planning in the national planning operations. The UNESCO Division of Mass Communications, for example, has been active in bringing to the attention of the governments of UNESCO member states the various policy issues at stake and the policy options available to them in connection with the establishment and operation of national communications systems. The OECD, too, has been influential in the inception of national LIS policies and planning through its provision to its members of reviews of the state of affairs regarding national LIS, particularly national STI services.

Where national information policies have been enacted, little heed seems to have been paid to the desirability of having them be flexible and constantly subject to critical review or evaluation, in order to prevent the emergence of an ineffective national LIS.

Once nations have determined to embark on national LIS planning ventures, certain similarities are apparent as regards the size and composition of the planning group. One such commonality is that political considerations seem to be paramount. There appears to be general agreement that the primacy given to the political factor assists in ensuring a measure of continued governmental interest and support in the program. It is assumed that the advantages of the insertion of this political element into the planning scene will far outweigh the known disadvantages of doing so. One disadvantage resulting from the political complexion of a major portion of the members of the planning body is the support which they commonly give to outdated practices and wasteful patronage-type financing.

Among the professionals within the group of government appointees, subject-matter specialists, librarians, and information scientists comprise the largest subgroups, with the subject-matter specialists usually being far more strongly represented than the librarians and information scientists. Presumably, the rationale for this allocation of planning-body membership is that subject-matter specialists are important users of LIS and their participation is requisite to the provision of effective information services whenever expert subject-matter knowledge is called for. Their presence as a sizable proportion of the usual planning team also tends to lend prestige to the planning group. Because, rightly or wrongly, the competence of librarians and information scientists to be engaged in the national LIS planning task is seriously questioned in many countries, they tend to be poorly represented numerically, and are seldom the key figures. However, the usual presence of one or more of the country's most eminent librarians and information scientists in the planning group often helps to improve that poor image. In addition, their presence frequently has the effect of ensuring that there is a link between the planning group and the national library, if one is already in existence, and of ensuring that there is consultation with the personnel of that library in the planning process. The presence of these eminent professionals also usually leads to the assignment of a potentially

important role to the national library in the establishment and operation of the planned national LIS. And although information scientists are not deemed to warrant strong representation on the planning groups, their work thereon is generally sufficiently impressive to result in the assignment of leading roles to them in connection with the implementation of the plans and in the operation of the envisioned national LIS.

Another commonality is the absence on the planning group of direct representation from the lay public, as users and as taxpayers. Where representation of the public is provided for, it is usually through elected officials, such as members of parliament. Generally other user interest groups also appear to be underrepresented. This feature of the composition of the planning group, and the consequent common preponderance of "systems" personnel and government officials, is likely to have ramifications not only in terms of how the planning process is carried on but also in the usefulness of the resultant system to its intended clientele. Minority representation on the planning body, from the various relevant professional associations and functional interests, is quite common. In the democracies, such representation has quite often been permitted, up to some usually specified unofficial proportion of the total membership of the planning body.

An increasingly common procedure in recent years is the giving of careful consideration to the inclusion, within the planning body, of members who are in aggregate very conversant, not only with all of the national and international factors involved but also with their potential roles in relation to national LIS. One of the other commonalities is an apparent general lack of consideration given to the desirability, or otherwise, of having strong representation on the planning body of those who will either have the task of implementing the resultant LIS plan(s) or will be engaged in the operation of the envisaged LIS system/network. The "Guidelines" section of this article provides an indication of some of the major advantages and disadvantages of either procedure.

Common Features of the Planning Process and Common Factors Affecting the Nature and Scope of the Planning

Initially, as might be expected, national LIS planners were faced with a lack of agreed-upon terms of reference and parameters as well as an absence of generally accepted standards and procedures, including evaluative procedures. Time has apparently remedied some of these hindrances, but the general absence of widely accepted procedures and standards for the evaluation of their activities still persists.

Inspiration for the organization of the national LIS planning process has usually been derived from a variety of internal and external sources, in part depending on the time in which the planning process had its inception. The more technologically developed nations have tended to rely upon the expertise and wisdom of their own personnel in this matter, whereas the developing nations have tended to rely to an appreciable degree on the suggestions and recommendations of foreign experts, such as B. V. Tell, Carl Keren, and H. Borko. In order to determine the nature and scope of the procedures to be followed in the planning of their national LIS, the

direct participation of such consultants has in some instances been invoked throughout the process. Usually the stimulation provided by foreign experts is supplied under the auspices of one or more international organizations, principally UNESCO.

It is not, however, only the less technologically developed nations that have derived benefits from the efforts of these international organizations. Both developed and less-developed nations, especially in the past 3 years, have profited in varying degrees from such assistance. It has largely taken such forms as:

1. The bringing to the attention of national LIS planners of the need to incorporate a variety of LIS into the overall system.
2. The provision of sets of guidelines for the near-term and long-term design efforts of the planners.
3. The provision of background information on the problems and potentials of designing and maintaining national LIS.
4. The familiarization of planners with the techniques of LIS planning.
5. The familiarization of planners with the notion of the interdependence of LIS, national development planning, and educational planning.

One of the increasingly common features of the national LIS planning scene is the growing knowledgeability of the members of the planning body concerning certain aspects of their terms of reference, including their functions. They have, for example, by and large become aware that their task does not ordinarily include policy setting or plan implementation. They have ever more commonly had made clear to them the need to avoid attempts to preempt functions usually reserved for politicians and administrators. Considerably less common, however, is knowledgeability concerning the channels available to them and to policy makers and administrators whereby they might have inputs to each other. In particular, there appears to be a prevalent lack of information available to them as to whether they have sufficient scope to render possible the making of indirect contributions to policy making, in the form of statements of issues to be researched; suggestions of alternative objectives, programs, and plans; and statements setting forth the positive and negative implications of the available principal alternative courses of action. For example, in those countries where, in the past (for a variety of good or other reasons), the national government has taken no significant part in the provision of information services, they might attempt to recommend that a careful examination be made of the role which might thenceforth be played by the national government in the creation, storage, and transmission of the information resources of the country. The acceptance, or otherwise, at the policy level of any recommendations made in this regard would, of course, be crucial in determining the nature and scope of the subsequent LIS planning activities.

Another commonality may be found in the usual initial lack of awareness on the part of the LIS planners of the multiplicity of available and possible perspectives for the planning tasks, with each approach having an influence on subsequent decision making and thereby preempting or foreclosing certain options. Examples of these different approaches may be observed in the varying degrees of centralization or decentralization which might be proposed for the various national services,

or in the "mission" or "subject" orientation of such plans. The discovery of these alternative perspectives, unfortunately, often occurs too late in the process to prevent somewhat inconsistent philosophical stances being embodied in the resultant plans.

Partly offsetting the latter characteristic is the generally excellent awareness on the part of the LIS planners of the need to take into full account the political, financial, and legal complications and government procedures involved in their planning activities and the need to take advantage of the knowledge of available experts in these matters. The planners are also usually quite conscious of the desirability of their having a thorough understanding of both the technical and the professional problems involved.

Few of the national LIS planners, however, seem to have been able to pick their way through what is frequently a maze of national LIS problems which face their nation and to emerge with clear-cut notions concerning such vital matters as:

1. Which national LIS problems, or objectives, warrant particular attention and concerted action; which of these, if any, deserve high priority for immediate attention.
2. Which strategies or approaches for the attainment of the objectives or solutions to the problems deserve the highest priority.

In addition, most of the planning groups, despite their eminence and personal expertise, are inexperienced in the task at hand, and as a result are not, at least initially, aware of their need to examine the desirability of a phased planning sequence and a phased implementation schedule. Some of the considerations involved in the making of decisions in this matter are dealt with in the "Guidelines" section of this study.

Another common weakness is that most national LIS planners do not seem to differentiate adequately between short-term and long-term objectives, in that they do not determine what requires being done immediately, what shall be done the following year, and the year after that, in order to achieve the long-range objectives. This seemingly occurs in part because they neglect to keep the long-range objectives clearly and uppermost in their minds. Most planners, too, for a variety of reasons and deliberately or otherwise, neglect the planning of a final evaluative phase or an ongoing evaluative process in their own activities and also in connection with the phases of the plan's implementation. Usually, only belatedly do they discover that there must eventually be some comparison of the results of the carrying out of their recommendations and their original expectations; and in consequence, a hurriedness in the final evaluation phase, if any, is often in evidence.

Still another common feature is the failure of the planners to give due consideration to the desirability of having each of the various phases of the implementation of the plan economically viable. Again, the "Guidelines" section of this article sets forth some of the principal considerations which should be taken into account in this regard.

Despite their relatively high state of knowledge in some of the foregoing respects, national LIS planners have commonly neglected to take into account the entire spectrum of parameters, constraints, and demands that are likely to affect the out-

comes of their projected plans. They are, almost universally, initially not fully conscious of the very constrained nature and scope of their work. These parameters are, in effect, often subtly predetermined for them by the particular characteristics of the individual countries, arising from their historical, social, geographical, political, economic, and cultural backgrounds. The nature of the existing political and economic structure or system in particular, whether the nation is a federal or unitary state, or a democratic or communist nation, whether private enterprise and initiative are permitted to exist, comprise a preponderant influence on the planning of national LIS systems. In certain democracies, for example, in the United States, Canada, West Germany, and Switzerland, the federal nature of the national government and the constitutional apportionment of educational, cultural, and informational matters to the lander, provinces, states, etc., hinders or precludes comprehensive national LIS planning. The sharing of responsibilities in education, etc., between national and lower levels of government results in similar effects on the national LIS planning process. A further consequence of such allocations of governmental functions is that the various guidelines provided by UNESCO for the planning of national LIS become extremely difficult to follow. The decisiveness of these background factors is evidenced by the fact that even though most of the problems which the generation, recording, storage, retrieval, selection, dissemination, and use of knowledge involve are common to all high technology countries, differences in the backgrounds of these countries compel widely variant solutions to be sought for the problems.

In addition to the foregoing national background constraints, other restrictions must be taken into account as a result of the nature of the implicit or explicit official or unofficial national information policy in question. The latter constraints may have the effect of either excluding additional portions of the information/communication realm from the purview of the planners, or foreclosing certain actions by the planners. For example, decision making concerning the issue of whether a pluralistic or a monopolistic LIS is to be espoused in the plans may, in effect, have been predetermined. Still another constraint, a hidden one, is the fact that the national government, in its usual role as the main or sole provider of the financing for both the planning and the operational phases of the national LIS, is the caller of the tune; and its representatives, if any, on the planning body are, as a result, somewhat more equal than others in voting power.

These many restrictions notwithstanding, there are evident strong common trends among most planners to:

1. Found their efforts on the notion that national LIS planning is an integral part of national development planning.
2. Seek to coordinate their efforts with international developments in LIS planning.
3. Make the existing and new information resources of the nation available to the entire citizenry.

Despite their efforts to put these planning principles into effect, however, few actual coordinated planning efforts appear to have emerged, in part because the planners

have been thwarted in a variety of ways, particularly by the political or administrative arms of national or state governments. In some cases the frustration is due to the intermittent nature of many of the planning ventures. This "timing" factor plays serious havoc with coordination efforts. More frustrating for LIS planners, however, is the common situation wherein they are permitted only a very minor role, if any, in broader planning schemes, such as attempts to coordinate their plans with those of educational, scientific, or general planning agencies, and are frequently unable even to scrutinize the plans being constructed in these broader areas until it is too late for the articulation of the LIS plans with those of the more general area.

Many nations, some belatedly, recognize the desirability, before national LIS planning proper begins, of undertaking the costly and time-consuming task of gathering complete and accurate data concerning the nature and functions of the existing LIS. Less commonly it is, again sometimes belatedly, recognized by planners that an analysis of such data should be carried out by persons with a thorough understanding of the implications and the limitations of the data and that there should be constant checking, by those thoroughly familiar with the LIS field, to avoid their misinterpretation. Where inadequate attempts have been made to determine the existing state of affairs concerning LIS at the outset of the planning process, this situation may have a serious impact on the effectiveness of the resulting planning activities, especially if the resultant plans are intended to be of a short-term nature. Probably most serious in this connection, yet probably most common, because it is the most difficult information to acquire quickly, is the lack of information concerning the extent of existing weaknesses or gaps in the available LIS infrastructure. Such weaknesses might relate to the quality and/or quantity of the available personnel; the location, structure, and/or organization of the "document" holdings; the availability of affordable hardware and software; and the availability of the necessary expertise for the use of these resources. The weaknesses and lacunae might also relate to the knowledgeability of the prospective users of the services and to the capabilities of the existing systems to interact with the users. Intangibles, such as the attitude of the public and the administration toward the existing services and systems may also contribute weaknesses, as may tangible items, such as available financial resources.

Almost everywhere, the planning process is still largely piecemeal in nature. In country after country there are, in the view of this observer, glaring omissions in the scope of the planning efforts, even when the aspects of information services which are lacking have not been legally ruled out. Probably the most important factor in these omissions is the inadequate awareness on the part of the planners, despite their expertise, of the full range of information/communication services that might usefully and potentially be included in a national LIS. A second factor affecting the situation arises from the perception which the planners have of the entire array of constraints under which their planning perforce takes place. This perception commonly leads them to interpret the breadth of their scope very narrowly. Yet another cause of the limited attention given by LIS planners to certain facets of the information service area is the characteristic desire of professional

people and institutions to engage in autonomous, individual action and hence to resist even voluntary cooperative enterprises.

For whatever reasons, in almost every nation, one or more of the following potentially important areas of LIS planning activity is being largely ignored or sidestepped, instead of being considered as part of the central core of the present or envisioned national LIS system:

1. Current (ongoing) and/or contemplated research activities, especially in the social and behavioral sciences and in the humanities.
2. Computer teleprocessing and communications networks.
3. Recorded nonprint media resources and systems and "live" unrecorded human specialist resources.
4. Services for and resources of archives.
5. Services for and resources in the form of artifacts and realia, such as the contents of museums, aquaria, etc.
6. Services for and resources of public libraries, school library-media centers, and community information centers/bureaus.

In addition, when planning in any of the foregoing areas is legally or for practical reasons excluded from the purview of the LIS planners, no serious effort seems to have been made to link forces with the recognized planners or other authorities in these fields, in order that the resulting parts of the overall system may be effectively linked and/or integrated.

Among the various aspects of the LIS realm that have not, by and large, been taken into consideration, some are more readily understandable and/or excusable than others. Some personal observations anent several of these omitted services merit inclusion at this point.

The fact that computer teleprocessing and communications networks seldom figure in the national LIS plans, particularly short-range plans, is both understandable and excusable. For although computer networking offers potentialities for the sharing of resources which are inexpensive to transmit, the necessary computer programs, computing power, and data bases are very expensive to develop and maintain. In addition, the institutional, legal, economic, and political obstacles in the Western democracies to computer networking and internetworking involve governmental and private sectors which tend to interact with each other unwillingly and/or infrequently, that is, national governments with state governments, governments with private "common carrier" communications/telecommunications concerns, and private concerns with other competing and/or geographically separate private concerns. This situation may result not only in barriers to understanding but it may also create hurdles to be overcome in the integration, coordination, or even cooperation of national LIS suppliers within a country. Interests as diverse as ministries/departments of trade and commerce, justice, communications/telecommunications, national development, education, and science and technology, and information processing agencies, must somehow be induced to work in concert. Each nation must grapple with the problem of how to organize and coordinate such an effort, and to determine what priority to accord to it (*1*).*

* The References for this section appear on page 460.

It is interesting to note in passing that, in the few countries where LIS planners have attempted to incorporate the communications services and industries in their planning programs, it has occurred thus far almost solely in terms of the facilitation of the transmission of printed words or numbers and in terms of the enhancement of the images of printed words and numbers.

In the view of this author, the common failure of national LIS planners to deal adequately in their plans with either the nonprint media or the information services and resources of archives, museums, and similar institutions warrants a somewhat more elaborate comment. To deal first with the nonprint media, the extent of the treatment provided seems largely self-imposed in nature. In addition, it appears to stem from the print orientation of the members of the planning bodies. Moreover, such treatment as is provided is usually accompanied by praise for the nonprint media and by a statement concerning the need to incorporate them into the LIS. Commonly, however, such statements, as well as the resultant national LIS plans, betray a naïveté about, or a blinkered view of the potentialities of the nonprint media per se as integral parts of national LIS. Examples consequently abound of plans for the use of the television medium and facsimile facilities for the transmission of print materials, or even the contents of illustrated books. LIS planners deal with the need to provide printed abstracts of the contents of nonprint materials and printed indexes or printed "bibliographical" information concerning nonprint "documents." Plans for printed catalogs of nonprint items are also announced. The use of computer output of microfilmed printed information is often conceived of as a sophisticated type of integration of the nonprint media in the LIS. Very sophisticated LIS planners are concerned about the standardization of print formats for the "bibliographical" description of nonprint "documents" in order that they may be put into machine-readable form, stored on computer tapes, and reproduced in printed form.

On the other hand, national LIS plans and planning ventures which deal with the nonprint aspects of nonprint materials in the light of the currently available technology are almost nonexistent. There are very few studies which deal with user needs and demands, or the methods and procedures that would need to be developed in order to provide services in the nonprint area. In particular, there is a conspicuous absence of the necessary interactions with authorities in the communications field which would render such services possible on a nationwide basis. Moreover, almost no research is suggested or undertaken as to the relative cost-effectiveness of various media—print and nonprint—in the recording/storage and transfer of information. Nor is there usually any attempt, in order to determine priorities in national LIS services, to discover the relative effectiveness in satisfying individual and group user information needs of various print and nonprint media.

In the writer's view, it is wasteful of personnel, time, and money to prepare 5- and 10-year national LIS plans which do not include planning, at the national and other levels, of services involving the generation, collection, storage, retrieval, synopsis, "repackaging," abstracting, indexing, transduction, translation, transmission/dissemination, display/presentation, and use of recorded and "live" nonprint, nonnumeric, and nonverbal, pictorial, auditory, polychromatic, multimedia, dynamic,

two- and three-dimensional sensory information or data. Such services as on-line, remote, random access and the selective dissemination of the "entire contents" (not the "full text") of such information, at least for selected classes of users, will inevitably be demanded of national LIS. Plans are needed, for example, to make it possible for a surgeon who is about to perform a rarely performed surgical procedure to view privately, at a time and place of his choice, a televised replay of an existing videotape of such an operation recently performed by a specialist elsewhere, without his having to engage in a time-consuming worldwide search to determine whether such a videotape exists, and if so, how he might obtain access to it in good time. It will also be necessary for scientists to have access to the existing color videotapes of the landscape of Mars and of the experiments done on Martian soil, experiments involving unexplained and as yet unnamed processes. As such dynamic "documents" are gradually becoming the original form in which certain scientific information resources are recorded, STI systems will have no choice but to be capable of providing ready access to them. In the nonscientific realm, services already provided for print materials will require extension into the nonprint field. For example, the accessing and delivery of some printed works, such as the science fiction novels of H. G. Wells, could theoretically be equally available with respect to motion pictures or videotapes based on those novels.

The effective exclusion, because of its format, of a portion of recorded knowledge—increasingly involving some of the world's most recent scientific knowledge—from virtually all national LIS plans consequently constitutes one of the major shortcomings of these planning efforts. Yet, it is one that has apparently not even been conceived of by the great majority of the planners in question. This phenomenon continues to be true, despite the fact that some of the nonprint information services, such as radio, are already more accessible to wider audiences than are those involving the printed word.

In the case of the information services and resources of archives, with the notable exception of France and the French-speaking nations, almost none of the national LIS planners appear to give any serious consideration to the potential role of archival materials and of archives, as integral parts of the planned services. Similarly, almost no consideration is generally given to the inclusion of the activities of such information-dispensing institutions as museums, zoos, aquaria, planetaria, etc.

Many of the failures of the national LIS planning groups to deal adequately with the full range of potentially useful LIS can perhaps be partly explained by the professional backgrounds of the librarians and information scientists and others who are members of the planning body. The failure to deal with the resources of archives, museums, etc., for example, is doubtless largely due to the fact that librarians and information scientists (and the archivists and museum directors as well) do not as yet conceive of such services as being integral parts of information services. No doubt the same comment holds true to a degree as regards the communications field and professional communications personnel. In the case of the nonprint media, however, it would seem to be largely a case of "they know not that they know not." It is apparently taken for granted by almost everyone but the

media specialists that if librarians and informed scientists have a rudimentary knowledge of media equipment operation and are knowledgeable concerning various media formats, then that is sufficient knowledge for the planning and offering of nonprint services. Hence no serious consideration is generally given to the provision of representation of competent personnel in the nonprint media on the membership of the planning bodies. Representation of persons with this type of expertise should be included on the same basis as are those librarians and information scientists who have strong backgrounds in computer science.

The writer holds, further, that the representation of educational media and technology professionals on LIS planning bodies would be helpful to the work of such bodies in a variety of ways. It would supply needed inputs by persons conversant with the production/creation of information materials, particularly those of an educational nature. (As students and teachers probably comprise the largest "consumer" group of information services, this input should be of no small consideration.) Such individuals would also be conversant with the recording or storage of "live" information as it is created, a rapidly growing task of well-rounded information services. Then too, the presence of educational technologists could presumably facilitate the process whereby the other planners could conceive of the various ramifications of the provision of CAI as a sophisticated form of individualized information services. They could presumably also be helpful in having the librarians and information scientists involved in the planning programs begin to conceive of themselves and their profession as, in part, educators, psychologists, and counselors, as would be expected of them if they were to take seriously the charge of providing truly individualized information services (*2*). The planning of such national services could then be conceptualized. A new perspective of LIS, wherein the commonly missing qualitative aspects of information services might be taken into account, could then perhaps be imposed on the long-range design.

To return to the various gaps in the planning of national LIS, the almost inexcusable, in this writer's view, lack of attention given to public and school libraries by most national LIS planners presumably stems (apart from legal constraints) from their notions concerning the economics of information exchanges and networks as well as from traditional notions of the kinds of information services which should be made available, at public expense or otherwise, to the public and to schoolchildren. Unfortunately, all too often national LIS planning has been a matter of planning by and for the elite, rather than planning for individual members of the lay public.

This elitist orientation results in national LIS plans, like national LIS policies, being formulated and implemented with little or no provision for the needs of lay-public user groups. In the Western democracies, for example, where numerous "store-front" types of community or citizens' information bureaus and services have sprung up, almost no consideration is given to the involvement of these organisms in the planning or in the resultant plans.

The prevalent attitude of many national LIS planning groups tends to be conducive to a rather cavalier treatment of sources of potential inputs to the process by nonmembers of the planning body. For the most part, inputs to national

LIS planners from interested groups, except library and information science groups, and from others who are most likely to be directly affected by the decisions of the planners, tend to take place, if at all, in a random rather than an organized fashion. And even when permitted to make representations, user interest groups and individuals are usually unaware of pending planning decisions until it is too late for their representations to alter the course of events. In addition, such groups or individuals seldom receive feedback concerning the impact, if any, of their inputs upon either the planning process or the plans eventually formulated. Hence, at least in the democracies, there is a need for an appropriate mechanism for the encouragement of continuous public and professional inputs and involvements in national LIS planning, from the beginning to the end of that process.

In general, and especially in many of the less-developed countries, progress in the planning and implementation of national LIS is hindered by the fact that planners still tend to use their expertise and resources in accordance with long-established ideas concerning the forms and aims of library services, despite the fact that neither necessarily match the current needs of the country. Almost everywhere there is a need to improve the planning process in terms of the actual cultural, socio-economic, and educational needs of national development. A reconsideration of the aims of LIS at all levels and a clarification of these for the educator, librarian, information scientist, and administrator is probably a prerequisite for future effective national LIS planning.

EXTENT OF THE EXISTENCE OF COMMON ELEMENTS AMONG THE VARIOUS RECENT NATIONAL LIS PLANS

Many of the common elements present among the various national LIS plans have already been alluded to in, or may be inferred from, the two preceding subsections. Hence the content of this subsection will be confined to a delineation of features of the plans which have not already been implicitly or explicitly indicated, or which merit further elaboration, and to evaluative comments concerning these features.

Common Features in the Nature and Scope of the Plans

There are, of course, great differences from country to country among the recently produced national LIS plans, for, as previously inferred, various background factors in the individual nations play the determining role in these matters. Four of these factors in particular—the status of industrialization of the country, the educational level of the citizens, the form of government, and the economic system—provide the principal keys to understanding the chief differences between the plans. There is nevertheless, in a number of respects, a strong family resemblance among the national LIS schemes, as will be set forth in the following paragraphs.

Regardless of the recognized need for the coordination of national LIS plans with general national development planning and/or with national plans formulated for science or education, very few plans have, in practice, been so coordinated.

In addition, few of the plans have incorporated recommendations for the establishment of a joint advisory national body, representing educational, research, social and economic development, and background interests, to ensure the overall coordination of plans for the development and operation of all LIS. On the other hand, even though the need to coordinate national LIS with foreign and international plans is not nearly so universally recognized as is the need for the coordination of LIS plans with general national development, such coordination is clearly in evidence in the great majority of the plans.

There is a visible growing trend in the plans to make them short-term in nature. Perhaps this trend is due to the fact that the predominantly long-term-type plans produced in the first few years of this decade seldom attained the necessary support from the various sectors of the population to result in their full implementation.

Although many of the more recent plans evidence the inclination of their planners to systematically design a step-by-step, priority-order procedure for the implementation of the plan—by following a "PERT" or similar "flow-chart" arrangement, one which provides details of the various options at each stage—very few of the plans, in the final analysis, contain any such detailed recommendations. Few have stipulated the amount of time required for the attainment of the various "en route" objectives or show how many persons, with what qualifications, will be needed at each stage. And few have indicated the hardware and software requirements for any of the stages.

There is also appreciable commonality among the plans in the minimal emphasis given to the identification and description of a supportable system, that is, one which includes only affordable facilities at each stage of the implementation process and one which is also supportable in terms of coordinative backing by all those working in the LIS field, as well as by specialist users, the general public, and government officials. As may be anticipated, within the group of plans which are deliberately designed to be so supportable, there is apparent a more careful attempt at the phasing of the implementation process than is otherwise the case.

Common Features among the Functions and Services Provided for in the Plans

Most of the plans provide only for relatively conventional but eventually automated types of services. Despite the fairly frequently proclaimed need to do so, especially among the developing nations, very few of the plans propose services relating to the "uses of information" end of the information/communication chain, such as those involving potential contributions of the national LIS to education in the classrooms of the nation and to other aspects of the teaching/learning process. For example, the well-known ineffectiveness and wastefulness of primary education and of adult literacy campaigns unless they are backed by locally available LIS have, in practice, led to few instances of the inclusion of the provision of organized school library services, or even university library services, as part of national LIS plans, even when the Ministry of Education holds the responsibility for both education and LIS. In countries where there is a paucity of LIS of any kind available to the public, it would seem almost a common sense proposition, which fails to

appear in many of the plans, that the national plans should include provision for encouragement by the national institutions for the local libraries to cooperate closely in the offering of local LIS to the public, both children and adults. Then too, particularly in the developing countries, where it is most needed, there is little evidence in the plans of a willingness to entrust to national institutions, such as national libraries, essential functions such as centralized bibliographic services, and national and international exchanges, which at very least require centralized coordination, if not national control. Similarly, centralized technical processing of books for public or school libraries is seldom provided for in the plans, even in the smaller countries.

Very few plans seek to significantly increase the accessibility of the vast stores of information now available on tapes and films, including those originally used for broadcast purposes and otherwise. This comment also holds true regarding materials in school media centers, where collections of audiovisual materials, both those produced within the school and outside it, are to be found.

Encouragement from UNESCO and other international organizations notwithstanding, little thought appears to have been given to the possibility of establishing networks of public, school, or special libraries, through the use of the same uniform technical methods and standards, such as common machine-readable formats, as those proposed for the overall national network.

With some important exceptions, the plans—even when they deal with the problem of increasing the accessibility of the contents of existing computerized data bases, and the improvement of the systems for the retrieval of information from these data bases—do not seriously attack the problem of eliminating the existing veritable Tower of Babel situation. For the plans, apart from standardized machine-readable formats, seem to envisage the continued operation of each of these systems on the basis of its own computer language and its own access procedures. As a result, communication across data bases continues to be costly, difficult, and inefficient.

Having pointed out some common facets of plans which involve, in the view of the writer, important services in need of inclusion in the LIS, we may now turn to a brief review of the functions which are found within the plans with considerable frequency. It should be noted that by and large, the services listed are ones which are appropirate for nonindividualized LIS systems, where the information "processed" is designed primarily for the benefit of groups of users or mass audiences. They include, for the print medium, the following:

1. Coordinating various national-level and other LIS.
2. Searching for existing information.
3. Acquiring primary and secondary information, including raw data, and storing it in preparation for its retrieval, including classifying, indexing, abstracting, and cataloging it.
4. Consolidating the available information, through evaluative procedures such as analysis–synthesis and compression, in order to produce compendia, surveys, state-of-the-art reports, annual reviews, handbooks, manuals, etc.
5. "Repackaging" information.

6. Reproducing information.
7. Distributing information.
8. Translating information.
9. Determining the needs of groups of users (as distinguished from determining individual user needs based on the individual's background and interests).
10. Offering consulting services of the SDI type.
11. Promoting the use of information.

It should be noted with regard to the above list that consolidating and "repackaging" types of information services are found far less frequently in the plans than are the other services enumerated. In fact, "repackaging" of information is only now becoming a common function, especially for lay citizen users. Also, although national LIS of a consultative and personalized nature, such as SDI services, are as yet relatively new, they are increasingly to be found in LIS plans, and it may be assumed that they will become more and more prevalent.

Common Characteristics of the Structural and Institutional Arrangements Found in the Plans

Although there is no evident common institutional pattern of organization, the institutional structures comprising a national LIS normally include:

1. National government libraries.
2. Library referral centers, documentation centers, and information analysis centers, especially those which are national government funded or owned.
3. Data dissemination centers and data banks.
4. SDI service centers.
5. Translation centers.
6. Local service centers as parts of national networks.

With the exception of the national library, it is usually institutions which function in the STI area which are initially included in any such system. University libraries and other higher education libraries figure in the systems less frequently.

Most of the plans deal with the need for available well-trained information specialists, technicians, and administrators, as well as educators, psychologists, etc., both to implement the plans and to effectively administer the resulting services. Similarly, most of the plans contain provision for the training of the necessary qualified staff.

Of all the nations that have initiated national LIS planning programs in the past 7 years, probably fewer than 50 have implemented the principal features of the envisioned plans. And even though many have enacted legislation "supporting" national LIS as a result of prior national LIS planning, few have provided the financial support or the qualified, or even unqualified, personnel required to implement the plans and to carry on viable national LIS. Including those planning efforts begun prior to 1970, probably less than 30 have eventuated in the form of official, formalized, national LIS currently in operation (*3*). None of these is "fully integrated" in the sense set forth in earlier pages of this study. Yet plans which are

appropriately designed to increase the capabilities of information systems, local and national, beyond that of being able to deal only with particular types of information in terms of their content and/or format seem to hold reasonable promise for their foreseeable fruition. In the non-Communist world, many of the systems are still founded, in part, on the voluntary cooperation of other than national government entities.

The designs of national and international LIS planners notwithstanding, and despite the development of on-line, remote information retrieval systems, information institutions and systems are and remain basically parochial in nature. This localized feature of the information service scene appears to hold true irrespective of whether the overall system(s)/service(s) or their parts are publicly or privately owned. This characteristic may be relatively impervious to change. Among the democracies, plans which are designed to break down the local nature of LIS are probably doomed to failure, at least for the next few years—for people within these countries appear to attach greater allegiance to and have greater confidence in institutions which they can personally observe in action and over which they can perhaps exercise some measure of control than they do to institutions which are located at a distance. If national LIS are to be extended to the lay citizen through the eventual inclusion of local institutions, such as public libraries, citizens, information bureaus, and school libraries, the participation of these institutions as part of the LIS will presumably have to rest upon their retention of a large measure of local control.

The foregoing observations bring to a conclusion the subjective and evaluative material to be presented concerning recent national LIS planning procedures and the resultant plans. After resurveying the overall picture, it would appear that the drawing of defensible generalizations which go beyond those already noted would be most hazardous, despite the presence of numerous commonalities—for the great diversity of schemes and their objectives preclude the discernment of trends which in aggregate provide a vector pointed in a particular direction. Based primarily on one's predilections, one may nevertheless speculate on the matter. Depending on one's viewpoint and outlook on life, then, one may or may not glimpse in the overall national LIS planning scene, including that of the United States, an almost inexorable movement toward at least the close cooperation, if not coordination, integration, rationalization, and unification of all forms of information/communication services in order to ensure the provision of either the most cost-effective or the most beneficial services, or both, to the user.

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Summary of Guidelines Concerning the National LIS Planning Process and the Proposed National LIS Plans

During the past 3 years several "Guidelines" have been produced for the edification of would-be national LIS planners. Some of these were constructed as the result of the initiative taken by international organizations, particularly UNESCO (*1–5*).* Others were the products of the efforts of researchers working on their own behalf (*6*). These guidelines have all provided important new contributions to the field. Despite the merits of each, and despite the fact that each new set purportedly takes the content of the concurrent or previous ones into account and is intended to complement and/or supplement them, a coherent picture based upon a very broad perspective does not, in the view of this author, emerge from a careful scrutiny of either the last one in the series or the entire group.

In the case of those sets of "Guidelines" sponsored by UNESCO, the internal politics and interdepartmental and professional rivalries within the organization have not always been conducive to a well-articulated rational stance as regards guidelines proffered to national governments in connection with the planning and implementation of their national LIS. For example, in 1973, under UNESCO's UNISIST Program, two sets of suggested "Guidelines," as separate Annexes in a single document (*1*), were distributed. Both set forth general principles for ensuring the maximum efficiency of national STI agencies, that is, of "National Focal Points for Science and Information" and of "UNISIST National Committees." It should be noted that both entities, according to the suggested "Guidelines," were to be involved in the coordination, at the national level, of various governmental and nongovernmental LIS–STI activities.

Subsequently, in October of 1974, UNISIST issued two additional sets of "Guidelines." One, authored by Carl Keren, was entitled "Guidelines on the Planning of National Scientific and Technological Information Systems" (Draft) (*3*). The other, authored by J. P. Poliniere, bore the title "Using and Improving Information Systems for Development: Some Practical Implications for Policy-makers" (*2*). The latter publications complemented the earlier documents, and supplied UNESCO member states with much useful advice for the planning and functioning of their respective national information systems, but again were intended largely for the benefit of national STI services.

Concurrently, the professional library organizations, together with their colleagues in the UNESCO Division of Documentation, Libraries and Archives, succeeded in having UNESCO sponsor an "Intergovernmental Conference on the Planning of National Documentation, Library and Archives Infrastructures." The conference was the culmination of a long-term effort on the part of UNESCO to assist countries in the planning and analysis of their library and archival systems. As its declared focus was "the planning of the infrastructure *per se* within the framework of national overall and sectoral planning" (*7*), the efforts of those in attendance were directed toward the facilitation of the successful planning of na-

* The References for this section appear on page 471.

tional information systems—NATIS, as they came to be called. The national information infrastructures dealt with by the "NATIS Conference" (*8*), it should be noted, involved all of the subject-matter areas of concern to all types of libraries and archives, that is, all fields of knowledge. The conference recommended, at its conclusion, the construction of guidelines for the creation and development of national information infrastructures and their links with the different sectors of national development plans.

At a subsequent meeting in Paris, in March 1975, it was agreed by the participants (*5*) that, in the preparation of the NATIS Guidelines, "there should be no overlapping or duplication with existing UNISIST documents already distributed or in preparation." It was also agreed that while the UNISIST documents could *not* be used for the preparation of the NATIS Guidelines, "their contents should be taken into consideration when preparing the NATIS Guidelines." No reason was provided for the dismissal of the UNISIST documents for use in connection with the NATIS Guidelines. The possibility that the latter guidelines, when issued, might conflict with but still not overlap or duplicate the preceding sets of UNISIST "Guidelines" was left for the reader of the documents to ponder upon. Fortunately, as one of the principal writers of the NATIS Guidelines, B. V. Tell, is also a member of the UNISIST Steering Committee, it is probable that most of the confusion will be dispelled. The published version of the NATIS Guidelines still remains to be made public at the time of the writing of this article.

The guidelines situation in the meantime has been somewhat further confounded by the fact that UNESCO's UNISIST Program has been extended to include the social and behavioral sciences and by the fact that UNESCO's entire library and documentation program, including its NATIS activities, is now subsumed under the UNISIST Program. Presumably, this consolidation of UNESCO's efforts, together with the extension of the UNISIST Program's area of concern, will eventually result both in the compilation of a consolidated list of guidelines applicable to NATIS as well as to the UNISIST Focal Points and National Committees, and in the extension of the subject-matter coverage of the Focal Points and National Committees to include the social and behavioral sciences. Until such time as the UNISIST Program is further extended to include the humanities, there will presumably remain, for those nations which seek to apply both the UNISIST and the NATIS Guidelines, a discrepancy in scope, insofar as their national LIS also deal with the humanities. Unless further clarification emanating from UNESCO/UNISIST occurs, there will therefore continue to be some difficulty for nations which are in the process of planning a national LIS program, or implementing or operating one, to reconcile various existing recommendations concerning national information infrastructures and to apply them to their respective national LIS.

Obviously, it is not the purpose of the following set of guidelines to further confuse the issue. Rather, its purpose is to present a set which, even though it is largely compiled from the foregoing sources, is hopefully relatively comprehensive in scope, though not in detail, and is also consistent in the sense that it is based upon a single philosophy or perspective concerning LIS. That perspective is delineated in the second section of this article in terms of the author's notion of "ideal" national

information services. The guidelines which follow, then, are intended to be such that if judiciously followed (and after taking the various relevant background factors into account) would increasingly lead, at all levels, to a comprehensive, integrated, national and global LIS, one approaching the postulated ideal.

The guidelines are but a summary of, plus elaborative or explanatory comments on, the more detailed set of guidelines implicit in, and hence inferrable from the content of the preceding section of this article.

GUIDELINES CONCERNING THE NATIONAL LIS PLANNING PROCESS

Concerning the Formulation of National Information Policies

It would probably be futile to await an upsurge of interest in the existence of a national LIS, or in the planning of a national LIS, on the part of the general public before taking appropriate action to foster the inception of a planning program. Competent and interested parties must themselves assume an "educational" and leadership role in this matter.

In attempting to obtain governmental involvement in information policy making, librarians and information scientists must assume the need for concerted assistance from the well-educated minority in the population, the scientists, researchers, teachers, and high-level civil servants, as well as from important political figures. If necessary, people in these groups must be made aware of their common requirement for improved access to information relevant to their needs. To gain their support, it may be necessary to provide them with convincing evidence of the inadequacies in the existing system(s) or nonsystem(s). Due consideration should be given to the use of all the available media to bring to the attention of the government and the public the state of affairs in LIS matters and the need for governmental and/or other action.

The next step might be an examination of the possibilities of attempting to reduce the inadequacies through the promulgation of an official national information or STI policy. If no such policy exists, then an attempt should be made to prevail upon the national government to formulate such a policy, to define its chief objectives, and to determine the areas of responsibility that it is willing to undertake, as well as to indicate the extent of the resources which it will consider employing to attain the desired ends. Consideration should also be given to the desirability of having the national information/communication policy comprise part of a national overall development policy, or alternatively, comprise part of a national science policy, or a national education policy, or both. In the event that a national information policy is to be determined, its text need not necessarily be embodied in an official document. But it must be clearly spelled out. More important than its formal statement is its built-in flexibility and susceptibility to continuous analysis, review, evaluation, and modification over time—characteristics which governments are prone to overlook. In the Western democracies, particularly those which are federal in nature, it must be anticipated that constitutional constraints and the existence of private information services not controlled by the government

will preclude, at least initially, the attainment of a comprehensive policy and, in turn, preclude a broad scope for national LIS plans.

Concerning the Inception of National LIS Planning Programs

If appropriate, due thought should be given to seeking the aid of UNESCO, the OECD, the OAS, and other international organizations for assistance in connection with any or all phases of the national LIS planning program, as well as in the formulation of the national information or STI policy. The possibilities of economic and/or financial and/or consultative assistance should also be examined. In the case of the developing nations, in particular, the desirability and possibility of obtaining assistance in the form of one or more expert foreign consultants during one or more phases of the planning and/or implementation processes warrants serious and priority consideration. The previously noted "Guidelines," as well as inputs of such consultants, have often proven to be especially helpful in such matters as:

1. The provision of indications of the need to incorporate a comprehensive range of LIS into the overall national system.
2. The provision of background and current information on the problems and potentials of designing and maintaining national LIS.
3. The provision of suggested techniques for national LIS planning.
4. The familiarization of planners with the notion of the interdependence of LIS, national development, and educational planning.

In any event, close scrutiny should be given to the various "Guidelines" produced by the above-mentioned organizations. The points therein which are applicable and mutually consistent, together with those listed here, should then perhaps be extracted and placed in sequential order for possible use during the phases of the planning and implementation process.

As to the composition of the national LIS planning group, it is probably the course of wisdom to be resigned to the fact that political considerations will largely determine its size and complexion. Political considerations aside, every effort should be made to ensure that at least one of the members of the planning body is highly conversant with one or more of the various factors which require being taken into account in the planning process—economic, political, financial, educational, cultural, professional, scientific, and technological, as well as communications, computers, and the nonprint media—and with their potential impact on the envisaged LIS, in order that aggregate expert coverage will be available for all the factors during the planning process. It is especially important that one or more of the planners be knowledgeable concerning the available technology and its cost-benefit relationship. Sizable representation on the planning body of highly competent librarians and information scientists will be crucial to the success of the planning venture. Competent representation should also be secured from other appropriate professional groups, from other user interest groups, and from the lay public. Where this is not possible, every effort should be made to ensure the encouragement of inputs to the

planners from such groups, as well as from interested individuals. It is suggested, however, that to be a viable working group, the planning body should probably comprise no more than 10 members. If planning by and for the elite is to be avoided, the inputs from the personnel of the institutions providing LIS to the public—the public libraries, the community/citizens' information services/bureaus, and the school libraries—must be provided with ample opportunities for inputs throughout the planning process, and in good time. Insofar as possible, too, the government should be prevailed upon to avoid the usual preponderance of "systems" and "establishment" people on the planning group, as they can all too readily lose sight of user interests in the ensuing inevitable political, economic, and professional "shuffle."

In addition, serious consideration should be given to the participation, or nonparticipation, as members of the planning body, of those who are to be involved in the implementation of the plans and/or those who are to operate the resultant system, as there are important offsetting advantages and disadvantages to either procedure. A common disadvantage for plans which are constructed by individuals or groups whose responsibility terminates once their conceptions are committed to paper is that the plans seem fated to being ignored, shelved, or filed in a wastepaper basket. Conversely, when the same agency and individuals who do the planning also implement the plans, a major disadvantage results from the fact that the integration of what has been newly planned with the ongoing operational activities tends to be slow and laborious and, as pointed out by Keren and Hoffmann (*9*), "sight might be lost of the broader practice—especially if it cannot be immediately implemented." Another disadvantage of this practice is that the planning process is likely to be prone to the production of plans which result in minimal modifications of the existing structure and procedures—for the attitude of "this works well now, hence no change is needed" (*9*) is likely to be prevalent and to inhibit the planning process. On the other hand, where the planning occurs simultaneously, and possibly within the same agency as that responsible for the implementation of the plans, there is the advantage of having the planners constantly aware of the operational milieu in terms of the requirements and capabilities of the system to comply with user needs. The requirement to translate the plans into practice is also conducive to cost-conscious and pragmatic planning. It permits more speedily than otherwise the validation of each successive phase of the implementation of the plans in relation to past experience.

Concerning the Nature and Scope of the National LIS Planning Process

No hard and fast rules as to the order in which the planning process should proceed can be suggested in view of the variety of different circumstances which prevail in the different nations. However, many national LIS planning groups have, where applicable, followed a path more or less akin to that set forth below. Similarly, no inflexible rules for the scope of the national planning effort can be prescribed, but many suggestions concerning a scope which would presumably result in a plan leading in the direction of the assumed ideal national LIS can be indicated. They, too, are outlined below.

As national LIS planners should not be faced with a lack of agreed upon terms of reference and parameters, any doubts in these respects require resolution before the planners progress very far in their work. Their assigned functions need to be made known to them as clearly as possible, and the time constraints under which they are to labor also need to be spelled out. It is almost imperative that they be aware of the extent, if any, to which their task involves policy setting or plan implementation. Is it, for example, within their competence to engage in an examination of the role that might be played by the national government in the creation, storage, and transmission of the information resources of the nation? In what respects, if any, is their work to be coordinated or integrated with other planning enterprises? And, if such coordination is not incumbent upon them, to what extent is it to be encouraged or discouraged? Must the progress of their work be based upon an ongoing consensus or are minority recommendations to be entertained? Are they expected to make, or are they precluded from making, statements of issues to be researched or decided upon? Are they to suggest a single course of action or a series of alternative plans, together with the positive and negative implications of each? Of the probable multiplicity of possible viewpoints from which the planning task might be pursued, which, if any, is prescribed, which is proscribed, and/or which is recommended? The appropriate answers to these questions will be crucial in the determination of the nature and scope of the subsequent design efforts. Where the planners are provided with freedom of choice regarding the perspective to be adopted during the course of the planning effort, it is, of course, important for them to be conversant with the available options. Decisions will need to occur, for example, regarding the degree of centralization that is to be assumed or proposed for the national LIS, and whether a mission-oriented or subject-oriented approach is to be taken. Such decisions need to be made in time to prevent the embodiment of inconsistent philosophical stances in the plans.

Knowledgeability is required of the planners concerning the channels, if any, available to them and to policy makers and administrators whereby they might interact with and have inputs to each other. They also need to know the extent of their prerogatives in terms of hiring consultants and of encouraging and accepting inputs and feedback from various professional and other organizations and from individuals. Also, before planning proper begins, consideration should be given to whether it will be necessary and feasible to undertake studies involving the gathering of reliable data, requisite to determining the nature, scope, and functions, as well as the adequacy of the LIS already existing within the nation. In the utilization of such information, extreme care should be taken to ensure that the data gathered are analyzed and interpreted by personnel who have a thorough understanding of the implications and limitations of the data, and who are also thoroughly familiar with the LIS field.

The many constraints which impinge on the nature and scope of the work of the planners require careful appraisal, as it is unlikely that they can be circumvented. The historical, political, racial, linguistic, and geographical background of the country; the state of economic, industrial, and techological development; the educational level of the citizens; the existing social and cultural arrangements, par-

ticularly the institutional structures; and the current form of the governmental structure and economic system all play important roles in circumscribing the decision-making powers of the planners. In the Western democracies, limitations may also be imposed by such interests as existing nongovernmental information policy makers and processors among public bodies and/or private organizations. As a result of these many constraints, certain decisions, such as those relating to the monopolistic or pluralistic nature of the envisioned LIS system may, to all intents and purposes, have been preempted. Then too, political, financial, and legal implications and technicalities, as well as governmental procedures, may require the advice of appropriate experts.

Additionally, it is important for the planning body to take into account in its deliberations the nature and extent of the weaknesses or gaps in the existing LIS infrastructure, particularly those relating to:

1. The quality or quantity of the available personnel.
2. The location, structure, and/or organization of the "document" holdings.
3. The availability of affordable hardware and software.
4. The availability of the necessary expertise in the use of the latter resources.

The planners need, as well, to be aware of the current and probable future level of knowledge of the users concerning the LIS, and of the capabilities of the existing system to interact with present and prospective users. They must also seek to weigh such intangibles as the attitude of the public and the government to the existing LIS and such tangible items as the extent of the currently available and prospective government or other financing for the planning and implementation activities. Another of the important curtailing factors to be taken into account, the effect of which must somehow be overcome, is the desire of professional people and institutions to engage in autonomous independent action and hence to resist even voluntary cooperative enterprises.

Once the necessary "state-of-affairs" information has been obtained and analyzed, the relevant constraints duly weighed, and an appropriate perspective upon which the planning process is to be based chosen, the planners must seek to thread their way through the usual maze of LIS problems and to emerge with clear-cut notions regarding two major items of concern:

1. Which national LIS problems or objectives warrant particular attention and concerted action, and which of these problems/objectives, if any, deserve high priority and merit immediate attention.
2. Which strategies or tactics for the attainment of the objectives or solutions to the problems deserve the highest priority.

Planners must endeavor to clearly differentiate between short-term and long-term objectives. They must also strive to keep the long-range objectives clearly and uppermost in their minds throughout the planning process. An effort should be made to systematically design a phased and step-by-step, priority-order procedure for the planning process and for the implementation of the plan, one which

provides details of the various options at each stage. Among the three types or phases of design activities—short-, medium-, and long-term—long-term planning activity is, in a sense, the most readily accomplished, but holds least prospects for its implementation. Conversely, short-term (1- to 3-year) planning tends to be the most difficult to engage in but tends to be the most effective in terms of its eventual implementation. The first phase should be modest in nature and such that readily visible, very practical, and easily evaluable results may be anticipated within 1 or 2 years. Information services in subject fields that are of a direct interest to a sizable portion of the population as well as to the government, such as agriculture, health, or industry, should be the first to be included in the plans, as well as in the first phase of their implementation. Success in any one of these areas should encourage the development of a more complete national information system in other subject areas.

Due consideration should be given to the desirability, or otherwise, of having each of the various phases of the plans economically viable. This decision should be made in advance of any implementation efforts. Here, again, there are important advantages and disadvantages to either procedure. It is, for example, typical of most well-integrated systems (of the type that comes closest to the model referred to earlier in this article) that the major benefits, in terms of the quality, the variety, and the cost of the services, appear only after such systems have been implemented in their entirety, not merely some of their parts. In such systems, the number of regular users must be appreciable for economies of scale in their operation to be significant. Hence in these systems, an initial period of uneconomic operation is to be anticipated until such time as a sufficient "critical mass" of users has been attained as to render them economically viable. However, such systems, because they involve a financial drain during their first few years of operation, may also give the appearance of being unworthy of further support, and as a result, may become unsupported. On the other hand, systems which are obviously supportable, or even profitable, however modest, may, from the outset, be expected to retain support for the subsequent stages of their implementation.

It is most important that the planners' perception of the entire array of constraints under which the national LIS planning takes place does not result in their interpreting the breadth of their mandate too narrowly. Unless specifically prohibited, the planners should found their efforts on the following three principles:

1. National LIS planning is an integral part of national development planning.
2. National LIS plans require coordination with international developments in LIS planning.
3. Existing and new information resources are to be made available to the entire citizenry.

Attempts should be made to prevent the planning process from becoming piecemeal in nature. Especially important in this connection is knowledgeability on the part of at least the librarians and the information scientists on the planning body concerning the full range of information/communication services that might usefully and potentially be included in a national LIS.

Evaluation procedures should be built into the planning process and should be dynamic in nature, preferably involving continuous assessments. Where ongoing evaluations cannot be arranged, evaluations at the termination of each phase of implementation should be undertaken. In view of its importance, it is essential that a hurriedness in the final evaluative phase, if any, be avoided.

GUIDELINES CONCERNING THE NATURE AND SCOPE OF THE NATIONAL LIS PLANS, THE FUNCTIONS TO BE PERFORMED BY THE NATIONAL LIS, AND THE STRUCTURE AND INSTITUTIONAL ARRANGEMENTS EMBODIED IN THE PLANS

No uniform guideline can be delineated as a typical pattern which embodies a single plan or structure for all national LIS, as the plans perforce reflect the unique and individual features of the various nations for which they are evolved. National LIS plans must conform to the type of government and the administrative system of their countries, as well as to the other significant facets of national institutional life (*6*). What can be provided in the way of guidelines must therefore be confined to precepts which are more or less generally applicable to national LIS plans within the limited area of maneuverability permitted by conformity to the dictates of the national milieux. Such directives, of necessity, comprise a conglomeration of sometimes disparate precepts, as is reflected in the collection of guidelines concerning national LIS plans set forth below.

Insofar as possible, national LIS plans should involve coordination, if not integration, with plans for national development, national science and technology development, and/or educational development, as well as with plans for international LIS development. And within the national LIS plan per se, there should be a focus on coordinative efforts designed to result in the eventual integration of the whole gamut of available information/communication services, on a nationwide basis. The plans should also involve the provision of all of the proffered information services to the entire citizenry.

It is essential that the plans not overlook, ignore, or sidestep any potentially important facets of national LIS. Care must accordingly be taken to ensure that some of the commonly neglected aspects of information services are, in actual practice, no longer treated as peripheral but rather as central to those services. The long-term exclusion of any such aspects of LIS from consideration should occur only in instances where there are overwhelming constitutional, financial, or other cogent grounds for so doing. The oft-neglected aspects in question include:

1. Current (ongoing) and/or contemplated research activities, especially in the social and behavioral sciences and in the humanities.
2. Computer teleprocessing and communications networks.
3. Recorded nonprint media resources and systems and "live" unrecorded human specialist resources.
4. Services for and resources of archives, museums, aquaria, etc.
5. Services for and resources of public libraries, school library-media centers, and community/citizens' information centers/bureaus.

If national LIS plans cannot in fact include any one or more of these service facets, the national LIS plans should alternatively incorporate provisions whereby they can be best coordinated with plans being constructed by other authorities in these areas.

Plans which attempt to deal adequately with both the print and the nonprint media, including the nonprint aspects of the nonprint media, should involve the undertaking of research studies concerning the relative cost-benefit features of the various media in relation to the satisfaction of individual and group user needs. Priorities among the various services to be offered could then be assigned on the basis of the findings, and their plans revised accordingly. This possibility should be contemplated in conjunction with long-range plans for the development and operation of computerized systems and networks (some of which would be required for the provision of certain nonprint services) which would render it possible to offer advanced services such as on-line, remote, random access to and the selective dissemination of the "entire contents" of both print and nonprint information resources. In addition, the offering of information "packaging" and "repackaging" services, including national-level CAI services, should be undertaken.

An effort should be made to have the national LIS plans both phased-in and supportable in nature. They should be supportable in the sense that they involve only affordable facilities for each stage of the implementation process and are also supportable in terms of the coordinative support they can muster from all those working in the LIS field, as well as from specialist users, the general public, and government officials.

Insofar as possible, without seriously hampering the effective operation of the national LIS, the plans should be based on a decentralized form of institutional structure for the provision of the anticipated services, with as much control as feasible resting in local hands.

No LIS institutions should be excluded from voluntary participation in the national LIS. Participation should be required, however, of virtually all of the institutions which are currently involved in national LIS, including:

1. National government libraries.
2. Library referral centers, documentation centers, and information analysis centers, especially those which are national government funded or owned.
3. Data dissemination centers and data banks.
4. SDI service centers.
5. Translation centers.
6. Local service centers which are parts of national networks.

Insofar as legally possible, the plans should also provide for services to and from various local educational institutions, including those involved in higher education. If national libraries exist, they should be assigned key roles in the implementation of the plans and in the central administration of the national LIS.

The plans should also provide for the training and the retraining of the personnel necessary for the implementation and operation of the envisioned LIS. This provision might well require the prior study of the anticipated roles of librarians and

information scientists in the national LIS, especially their roles vis-á-vis subject-matter specialists.

Whether it occurs as an ongoing dynamic process or as a terminal event following the completion of the construction of the plans or their implementation, the actual evaluation should comprise important constituent elements of the plans. There are, unfortunately, no sets of widely accepted criteria for the evaluation of the effectiveness of national LIS plans. In lieu of the absence of such standards, the following specific, but subjective, criteria are suggested:

1. The economic feasibility and acceptability of the plans.
2. The political feasibility and acceptability of the plans.
3. The feasibility and acceptability of the plans in terms of their satisfaction of the information needs of the intended users.
4. The feasibility of the plans in terms of their acceptability to relevant professional groups, particularly librarians and information scientists.
5. The feasibility of the plans in terms of the availability of the necessary personnel to implement and operate the planned services.

The essence of all the foregoing criteria may be stated in the form of a single criterion as follows: the quality of national LIS plans may be gauged by the extent to which the available information resources are best exploited in the interests of maximal satisfaction of the information needs of the various users, in relation to the expertise, time, and money available.

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Future Prospects for the Planning and the Implementation of Plans for National LIS

Any forecast that is to have a modicum of credibility, no matter how speculative and controversial, will, perforce, take into account current trends and will seek to extrapolate those trends. Depending on one's point of view concerning future studies, more credibility may, or may not, be lent to forecasting ventures through the use of Delphi-type techniques. Additionally, considerable assistance may be provided to the forecaster who builds his/her "preview" upon a reasonably coherent, consistent, and integrated outlook on life, or weltanschauung. As the latter aids to the formulation of a forecast may, however, facilitate, through the predetermined integration of the available "data," the arrival at foreordained conclusions, such procedures—unless accompanied by a forthright statement of the forecaster's ideology and the underlying assumptions on which it, in turn, is based—are legitimately subject to serious question. With the foregoing maxims in mind, the writer will attempt a prognostication, based on a particular group of stated assumptions, which, when placed in juxtaposition, comprise his leit-motif. From that frankly subjective philosophical stance, an interpretation will be made of the trends which he perceives as discernible, both in the literature and from the data which he derived from the employment of a much-modified version of the Delphi technique, one involving, as indicated in the first section of this article, personal interviews and, in some cases, reinterviews, with many of the Western world's leading authorities in the LIS field.

The forecast is based on the following assumptions:

1. Throughout the world there will be continued strong emphasis, nationally and internationally, on national development, including technological development, development which is deemed beneficial to national well-being and to the quality of human life.
2. Throughout the world there will be continued general acceptance of the notion that knowledge is better than ignorance; that a little knowledge is no worse than none; and that there is a close and positive link, on the one hand, between the quality and quantity of information and knowledge available to individuals and their governments and, on the other, the quality of the decisions made and the actions taken by individuals and governments with regard to matters affecting the national well-being and the quality of life.
3. Human beings everywhere are increasingly beginning to live in what may be termed the Information Age and as a consequence of this phenomenon, information services will continue to bear at least equal value to that which is currently ascribed to them.
4. Mankind is on the road to economic interdependence, an interdependence which will increasingly involve information and knowledge interdependence and information and knowledge sharing.
5. The purveyors of information services will increasingly conceive of their goal as the provision of "all of the 'right' information, and *only* the 'right' information, to *all* of the 'right' persons, and *only* the 'right' persons, at the 'right' time and place, as well as in the 'right' format, at a cost which is 'right' both for society and for the individual users of the information services."

The general perspective from which this writer views the state of the world, then, is one of cautious optimism concerning the possibilities for ultimate world peace based on world political unification and economic and information interdependence.

A particular viewpoint held within this general conspectus is that the improved availability of LIS is assisting in the long-term reduction of the existing "information gap" between the "information rich" and the "information poor." The latter phenomenon is occurring as the world slowly but progressively approaches the time when individuals, regardless of background, citizenship, etc., are able to satisfy their individual information needs.

The data derived from the literature and from the numerous interviews do not provide a very clear picture of the occurrence and nature of relevant trends. There was, for example, by no means a general consensus among the LIS professionals and LIS administrators interviewed concerning the existing information service trends within given nations, or on the international scene—other than the innocuous "more of the same only better" common summation. But there was a faction, indeed the largest single faction among those interviewed, approximately 26%, among whom considerable agreement existed around a whole congeries of topics, issues, and trends, both national and international, concerning the prospective availability of information services. It should be noted that these consensus views tended to coincide closely with those held by the author. He, like the members of the faction in question, may, of course, have seen only what he wished to see, and hence may have sought to construct a self-fulfilling prophecy.

Both those in the faction in question and the author contend that the trends in information services set forth below are discernible, either nationally or internationally, throughout the world.

1. There is a growing trend toward the coordination and/or integration of all information/communication services, locally, nationally, and internationally, especially under governmental auspices and/or control. The evidence of this trend was confirmed, in part, by Jacques Tocatlian (*1*),* one of the principal UNESCO–UNISIST administrators, in his aptly put conclusion to his article "International Information Systems":

   > The literature strongly indicates that the future of national information systems and services lies increasingly in international networks and systems, of one kind or another. Countries will become more and more interdependent on data bases and in information processing through sharing and exchanging information resources, efforts, and manpower.

2. There is a growing trend toward the elimination of duplicating and unnecessary competing and overlapping services, either through the "survival of the fittest" in the market place and/or through government encouragement, coordination, and control. This, in turn, is creating a tendency toward a unification of information services, monopoly situations, and standardization.
3. In line with the foregoing, there is the concomitant trend toward the placement of coordinative LIS functions in the hands of a single agency, usually the national government, at the national level, and a single international agency, at the international level.

* The References for this section appear on page 475.

4. There is a continuing rapid growth in the automation-computerization of information services everywhere and a continued increase in the use of other technological developments related to LIS, despite the great capital investments required for the relevant hardware and software.

In the light of the above-noted real or imagined trends, the assembled data, and the predilections of the author, the following forecast is made. The continuation of national LIS planning activities and the implementation of national LIS plans are part of an inexorable broader movement. Humanity is slowly but with ever-increasing rapidity moving in the direction of the provision of the various information needs of individuals and groups. The movement will culminate in the eventual establishment and operation of a single, worldwide, integrated, educational, encyclopedic information/communication system and network, as an integral part of a world political-economic and cultural agency (*2*). The evolutionary process by which this system and network are being built involves, as required, the concomitant prior, current, and future successful construction of appropriate articulated and comprehensive national LIS infrastructures. Their increasing numbers and viability will soon render it possible for the existing rudimentary international organ, the UNESCO–UNISIST Program, to come fully "on stream," as a prelude to the inception of the much more broadly conceived global system and network.

The new information/communication system and network will be highly decentralized in *most* of its functions and structural arrangements for a number of reasons, including: efficiency of operation, economy of operation, maximal satisfaction of user information/communication needs, protection of user rights to privacy concerning personal information, and local institutional control in order to assist in the obtaining and retaining of public support.

Whenever desired and necessary, national LIS systems and networks will serve an intermediary function as nodes (*3*) in the broader system, linking local nodes with other national nodes or with the central global focal point in the system, if and when the latter entity comes into existence. Eventually each individual, via his or her individual terminal, wherever it may be located, will be linkable to the entire system through the local and national nodes.

The system will not reach full capacity, however, in terms of traffic and work loads, locally, nationally, and internationally, until such time as individualized information/communication services become available through the system, and until bibliographical, print-only searches, and other services are succeeded by the delivery, if need be, of the entire contents of multimedia items, via bidirectional cable television or fiber-optical transmission of laser beams, or by other more efficient or economical means.

Some of the probable attendant problems, the encountering of which should be anticipated in the attainment of such a world encyclopedic, educational, information/communication service, system, and network are broached in Goodman's "Prospective Metamorphoses of the Roles of Public Information Utilities in a Global Information Network" (*2*). Needless to say, no easy solutions to most of these problems seem to be in prospect.

In view of the power that national governments wield politically, economically, and financially in the world today, national LIS systems doubtless comprise the most appropriate bases for the inception of the worldwide system. Until such time as that system comes into being, national LIS may very usefully serve, through their coordinative activities within their respective nations and through their interconnections with other national LIS, as well as with existing international information service organs, to improve the quality and the availability of LIS to their citizens and others as well.

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Supplement to the General Bibliography

It was the expectation of the author to include in the section dealing with the Western democracies accounts of planning activities in France and in the Federal Republic of Germany (West Germany), as he had visited both countries in connection with this and other research projects. Time limitations precluded the writing of the two subsections, however. The sources for these subsections were omitted from the general Bibliography in anticipation of their inclusion at the end of the two aforementioned subsections. They are provided at this point instead.

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PLANS FOR ACQUISITION OF CURRENT LIBRARY MATERIALS: APPROVAL PLANS

An approval plan for acquisition of current material is basically a long-term contractual arrangement between a given library and a bookdealer, who specializes in this type of service providing newly published titles based on a sophisticated collection development profile of the library.

The approval plan was introduced in the book trade in the early 1960s. It has since become a widely appreciated and valuable part of collection developments by American, Canadian, and Australian university and research libraries. Over the years approval programs have become more refined, and through computer technology a closely defined subject control or profile is utilized aiding the coordination between the dealer and the library.

The approval plan has emerged from earlier acquisition concepts that may appear quite similar, but are not. Among these concepts is the Farmington Plan, which is often mentioned as the first major gathering plan. The 1950s have also seen the emergence of blanket order plans, standing order plans, and all-the-book-plans. In reviewing the literature, it is regrettable that these terms have been mixed in use without much concern for the basic differences that do exist among the various types of acquisition plans, each serving a unique role in collection development.

There are three basic characteristics that must be present in the case of a true approval plan. The material sent to the library (*a*) is always current, (*b*) is preselected based on a profile, and (*c*) is returnable, since the final selection is made by the library. While the approval plans have gained strength, the 1960s have seen the deterioration of blanket order plans and gathering plans. It is not the purpose of this article to analyze the reasons for these phenomena, but it is simply sufficient to mention that both the Farmington Plan, which was a major European gathering plan, and the LACAP, a major Latin American plan, were discontinued.

Types of Approval Plans

Approval plans can be classified as domestic or foreign according to the location of the home office of dealership. Further, approval plans can be classified by language, country of origin, subject matter, and level of difficulty of the material to be supplied. There are specialized dealers who provide comprehensive coverage of English-language publications, worldwide, regardless of country of origin, and on any subject matter.

Some libraries prefer to divide the approval plan among several dealers. A typical division is, for example: (*a*) the domestic dealer supplies U.S. and Canadian works, (*b*) a dealer from England supplies all other English-language works worldwide, and (*c*) German, French, and Spanish works are obtained from dealers who are contracted from these countries for an approval plan.

Libraries using approval plans could exclude, if they wish, certain subject specialties from their comprehensive approval plans. Examples of such exclusions are art and music, both of which can be purchased on approval plans from dealers specializing in one of these subjects.

What to Look for in an Approval Plan

An approval plan is an important element in a library acquisition program. Its failure or success depends (*a*) on the ability of the dealership to perform a complex

set of services for the library it services, and (*b*) on the ability of the library and its staff to accommodate the new method of selection process as well as to design internal processing systems that will capitalize on the advantages it can offer.

The following considerations should be noted before embarking on an approval plan:

1. Select a reputable dealership which has solid financial resources. There should be a genuine concern about the dealer's financial stability. Only reputable dealerships in good financial standing should be considered, to avoid an expensive fiasco that may occur when change of jobbers must take place.
2. The approval plan should be custom tailored to the needs and financial abilities of the library. One must think of approval plans as a long-term investment similar to periodical/serial subscriptions. As such, a library must not contract for an approval plan if the institution cannot finance the plan comfortably year after year. As a general rule the library should not spend more than 25–35% of its materials budget on the approval plan, assuming that 50–75% of current budgets are needed for serials and periodical subscriptions. During 1975 a fairly comprehensive U.S. and Canadian plan will cost a typical university about $120,000; a British plan may cost an additional $20,000. However, there are plans now in effect that cost less, as well as some that cost more. The scope of the library profile basically determines the cost of the plan.
3. The cost of an approval plan is largely controlled by the scope of its subject profile and the final in-house selection. Thus, a good instrument that permits the development of a good profile is essential. A good instrument will have between 2,000 and 4,000 subject headings with such modifiers as language, country of origin, physical format, interest level, scope of the publication, and others.
4. The dealer should be able to demonstrate its ability to deliver from all types of publishers: trade; academic; societies and associations; university-affiliated departments, centers, and institutes; art galleries and museums; etc. This list should include about 4,000–5,000 such sources from the United States and Canada and should always be expandable. The dealer should provide a list of publishers to the library for reference purposes at least once a year, or more often, as this list changes rapidly.
5. The dealer should be willing to personalize the service and review performance of the plan at least twice a year. If the profile is well designed, and if the jobber performs well, then the library can expect to keep 90–95% of the books sent "on approval." The rest are returned.

   A new approval plan administrator can expect returns in the 40–50% range during the first several months of operation, gradually decreasing to an under 15% return level by the end of the first year. The return rate is reduced by corrections in the profile as well as a review of current acquisitions practices that may lead to unwanted duplications.
6. Detect profile deficiencies early. It is a relatively easy matter to determine when a given profile is defective if one looks at the return rate. Excessive return rate past the initial 3-month period will be a danger sign.

   There is another major consequence of an incorrect profile. This is the condition when the library does not get most of the important works published that should have been received. Subject bibliographers must spot-check holdings once or twice a year to be certain that the dealer performs in this respect.

7. The dealer should be able to provide notification slips for those types of books that may be of peripheral interest to a library and would not be supplied under the terms of the approval plan unless specifically requested.
8. Computer control is a must to all dealers claiming to be able to handle a comprehensive approval plan.
9. Approval plans can be competitive. While the number of approval plan jobbers is somewhat limited, there is competition among domestic and foreign markets. A library wishing to embark on an approval plan should investigate discounts, service charges, shipping costs and methods, frequency of shipping, and other features of interest before making a commitment.
10. Approval plans are like periodical subscriptions: a long-term commitment.

The advantages of approval plans can be measured in many ways. The percentage of rate of success in locating a wanted title is one measure. Approval plans that have functioned for 2 years or longer have reported substantial improvements in the percentage of their holdings for new books. There is evidence in the literature that traditional collection development methods have missed as many as 50% of the important new books that were subsequently purchased during the following 2 or 3 years. A good approval plan will produce results in the 90–98% range within 6 months after publication date.

The systematic purchase of new books at a relatively low annual cost continues to attract libraries to this method of collection development.

Libraries opting for an approval plan must adjust technical processing to accommodate the demands, adopt the conveniences, and assure the efficiencies it can offer. Failure of approval plans recorded are few, but there are some. They are the results of human inefficiencies. Only under proper management will the approval plan be successful. An approval plan is a powerful tool; like any powerful tool it can be dangerous if not handled properly.

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PLANTIN, CHRISTOPHER

The man who was to become the most famous typographer of his time was born in or about 1520 in the neighborhood of Tours (France), probably at Saint-Avertin. Not much is known of his youth, except that he spent some years at Caen with the bookbinder and bookseller Robert Macé, and that in that city he must have married in 1545 or 1546 the Normandian girl Jeanne Rivière, who would remain his faithful companion for the rest of his life. After a short stay at Paris, the young couple moved in 1548 or 1549 to Antwerp. The reasons which motivated Plantin to leave the rivers of the Seine for those of the Scheldt are not very clear, but in any case Antwerp was at that time the great commercial metropolis of the West, offering golden opportunities.

Yet, even in Antwerp the way up was long and hard. Plantin started his Antwerp career as a bookbinder, and it was not until 1555 that he installed his first presses. The explanation officially given is that one evening while bringing a leather casket to an important customer he was attacked by drunkards and stabbed in the shoulder; from then on he was physically no longer able to exert his trade as a bookbinder, so he became a bookprinter. This could be partially true, but it doesn't explain how the poor bookbinder got the necessary capital to open his printing press. This money seems to have been advanced by a religious sect, the so-called Family of Love, founded and led by the Dutch "prophet" Hendrik Niclaes. The Family of Love is still officially classified as an Anabaptist sect, but the reality was less clear-cut. H. Niclaes; and his competitor Hendrik Jansen Barrefelt (calling himself "Hiël"), who became the spiritual mentor of the older Plantin, were in fact visionaries and mystics. All that mattered to them was the love of God—"the spirit of Jesus Christ" as Plantin himself expressed it. Dogma and ritual were of no importance; tolerance and respect toward those who held different opinions was a duty and an obligation—a tolerant attitude in an intolerant time. Plantin never cut himself off from the Catholic Church, but spiritually he remained true for the

whole of his life to the principles reached by Niclaes and Barrefelt. And there are indications that he received money from Niclaes or other members of the sect to start his printing press and that during the first years of his new career, between 1555 and 1562, he printed a number of Niclaes's pamphlets and works in the greatest secrecy.

In 1557 Plantin took as his motto "Labore et Constantia," represented visually by a pair of compasses. The stationary point stood for *Constantia,* the moving point for *Labor;* this was how Plantin himself explained the symbolism of this, his third printer's mark, in the introductory pages of the *Biblia Polyglotta.* He and his descendants after him were to use this mark, which so admirably reflected the typographer's outlook on life, for more than three centuries.

By labor and perseverance Plantin worked his way up, but in the spring of 1562 he was accused of having printed a Calvinist prayer book and had to flee to Paris. Only in the summer of 1563 did he dare to return to Antwerp. In the meantime his household and equipment had been sold publicly by creditors, but businessmen belonging to the Van Bomberghen family came to the rescue. They formed, on November 26, 1563, a printing company with Plantin. Plantin was to be the technical manager; the others contented themselves with the passive role of financial backers. They could infuse enough capital to assure Plantin a new and splendid start. In January 1566, with seven working presses, the Officina Plantiniana could already boast that it was the most important printing concern of the whole of Christianity.

The company was intended to last for 8 years, but the Van Bomberghens got involved in the Calvinist uprisings which troubled the Netherlands in 1566–67 and had to flee early in 1567. Plantin was again on his own, but this time with a well-equipped plant and enough capital to weather the storm. However, his partners had dragged him into a dangerous plot: the founding of a subversive Calvinist and anti-Spanish printing office at Vianen (near Utrecht). Plantin had to fear for his life, and in despair he began literally to bombard the powerful Spanish and Spanish-oriented officials and patrons he knew with affirmations of his loyalty and Catholic orthodoxy. To one of these officials, the secretary of Philip II, Gabriel de Çayas, Plantin held out a specific bait: the publication of the original Bible texts. The secret of the Vianen printing office was not blown during this time, while Plantin's frantic efforts to gain the goodwill of the Spanish party paid handsomely. Philip II personally got interested in the publication of the original Bible texts and subsidized the enterprise. The result was the famous *Biblia Polyglotta* in eight monumental volumes and five languages—Latin, Greek, Hebrew, Chaldean [Aramaic], and Syriac—(1568–1572). This gigantic publishing enterprise was not quite a commercial success, but it paid off in another way. The Council of Trente had renewed the service books—breviaries, missals, hours—for the Catholic Church. Philip II wished to have special service books for Spain: Plantin eagerly proposed to print any quantities the monarch needed, and got the virtual monopoly of the Spanish market for this special kind of publications. The Officina Plantiniana arose in a few feverish years to the greatest printing office the modern times had known before the Industrial

Revolution. In 1575–1576 Plantin had 16 working presses—an absolute record for the century.

At that time Holland and Zealand were already in revolt against Philip II. In 1576 the other provinces joined them; on November 4, 1576, in the so-called Spanish Fury, Antwerp was sacked by mutinous Spanish soldiers. Plantin could save his head and his plant, but the rewarding business relations with Spain were severed. But somehow Plantin succeeded in steering his boat safely on the stormy waves along the cliffs and sandbanks of political upheaval and religious passions—an image he often used in his letters in those years. The great period was over, but given the troubled times Plantin could continue in a rather satisfactory way. The war, however, approached Antwerp. Early in 1583 Plantin left for Leiden to build in the Dutch university city a new plant, leaving his Antwerp office in the care of his two sons-in-law, Jan Moretus and Frans Raphelengius. When Antwerp capitulated to the Spanish armies in August 1585, the typographer hastily returned to his beloved city (the Leiden branch would be taken over in 1586 by Frans Raphelengius, and continued its activity under him and his sons until 1618), where he continued to work, aided by Jan Moretus, until his death on July 1, 1589.

In the 34 years of his activity Plantin printed some 1,500 works, that is, an average of about 44 editions per year—astonishingly high even when compared to today's standards, and not including the smaller printings which push the number up to over 2,000 items. The quality and intrinsic value of these publications match their quantity: they are cited with honor on nearly every page of the studies treating about humanism and sciences in the second half of the 16th century. At his height Plantin had 16 working presses and some 80 employees. This does not sound very impressive today, but in a period when industrial activity was dispersed among countless small workshops, the Plantin Press stood as the greatest private industrial enterprise of the Netherlands, if not of the whole of Christianity. It was the Renaissance equivalent of today's mammoth plants with their tens of thousands of employees.

Plantin had several houses in Antwerp, before he moved in July 1576 to a mansion with a large garden at the Fridaymarket that he baptized the "Golden Compasses." He bequeathed house and plant to his most beloved son-in-law, Jan Moretus. The Moretuses continued to live and work in the Golden Compasses at the Fridaymarket until in 1876 Eduard Moretus ceded the house with all its treasures to the City of Antwerp to become the Plantin–Moretus Museum. The combination of wealthy patrician mansion (built and rebuilt in the 16th–18th centuries, with living rooms filled with artistic treasures, and with splendid libraries) and of industrial plant (with a pressroom, type foundry, and proofreaders' room still in working order) gives it a quite unique character. The masters of the house have also preserved their typographical equipment with the utmost devotion. It is a peerless collection: seven printing presses, an early 18th-century intaglio printing press; some 5,000 punches and 20,000 matrices, cut by the greatest 16th-century masters of the craft; approximately 14,000 woodblocks and 3,000 copperplates used for illustrating the works published by the house; some 500 drawings from

which illustrations were designed. Plantin and his successors have also kept their archives, covering the whole period from the foundation to the winding up of the firm: a real gold mine for the history of printing and publishing, and more generally for the economic, social, and cultural life of the period.

Much has already been written about Plantin, the Moretuses, and the Plantin–Moretus Museum. The bibliographical references can be found in L. Voet, *The Golden Compasses: A History and Evaluation of the Printing and Publishing Activities of the Officina Plantiniana at Antwerpen* (Schram; Amsterdam, London, New York, 1969–1973, 2 vols.; Vol. 1: *Christopher Plantin and the Moretuses: Their Lives and Their World;* Vol. 2: *The Management of a Printing and Publishing House in the Renaissance and Baroque Periods).*

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