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# Entrepreneurial Leadership

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## ABSTRACT

THIS ARTICLE REVIEWS entrepreneurial librarianship of the last century and a half and describes entrepreneurial opportunities in the foreseeable future involving the transfer from bibliographically based librarianship to user based systems.

## INTRODUCTION

Entrepreneurship is innovation tinged with risk, a factor for which people in general have an aversion. Innovation is the third of the three principal processes of technological evolution: *invention*, an intellectual event, an idea; *development*, conversion of the idea into something that “runs”; and *innovation*, the further conversion of something that runs into something that “works” and survives in the marketplace. In common parlance, any one of these three words is often used to represent all three. An entrepreneur is an innovator who often carries out all three processes, but it is the successful completion of the third process, innovation, that earns one the title “entrepreneur.”

The Nobel Laureate economist, Paul Samuelson (1951), distinguishes the entrepreneur “from the bureaucratic executive and the manager [librarian] who simply keeps an established business running” (pp. 594-95). He writes that the entrepreneur is “a man with a brand-new idea to invent a revolutionary machine or a softer soft drink—to promote a new product or find a way to lower costs on an old one,” and goes on to say that: “Many economists...*think*

*of profit as the return to innovators, or entrepreneurs....* People with management skill are bid for in the market place, and like any other factor, they move into those jobs where they will receive the highest wages. The innovator is different...he is trying to carry out new activities. He is a man with vision, originality, and daring" (pp. 594-95). But for those who are in a governmental or other not-for-profit organization, as are the majority of librarians, there is no profit or return to the entrepreneur. So much for entrepreneurship.

As for leadership, Warren Bennis (1989), University of Southern California, has listed a dozen differences between leaders and managers, of which the most pertinent for this presentation is: "The manager accepts the status quo, the leader challenges it" (p. 45). Entrepreneurial leadership challenges the status quo whenever it presents a new idea.

In published inventories, the qualities of an entrepreneur are numerous, but the two most significant are self-confidence and the ability to accept risk. The factor of risk is a presence over which the entrepreneur has only partial influence, and his colleagues can generate much of the risk in a manner far from forthright. The entrepreneur may be able to diminish the risk, but it may be hard for him to neutralize it, much less overwhelm it. The principal risk to which the entrepreneur exposes himself he alone begets. That is, the risk, inherent in any enterprise, that an innovation that has satisfactorily progressed to implementation may still result in a product or system that fails to work satisfactorily even after extensive retrofits. Such failure disables the entrepreneur, and he is constantly aware of its threat.

Self-confidence is a purely personal and multifaceted quality, but it means essentially that entrepreneurs are confident they can do anything they intend to do, specifically that they can solve any unforeseen problem in the course of development and innovation. However, it does not mean that they will always solve it; entrepreneurs do fail.

## ENTREPRENEURIAL LIBRARIANS

This section will discuss the entrepreneurial activities of nine librarians and of two others who have produced information systems of great value to libraries. There were two different environments in which these people worked—a new separate organization or an existing one. Examples of new organizations are Melvil Dewey's Library Bureau, Eugene Garfield's Institute for Scientific Information, and the Online Computer Library Center (OCLC). Examples of organizations within which entrepreneurs worked successfully are the British Museum Library of the 1830s and 1840s,

the Library of Congress at the end of the nineteenth century, and the Lockhead Corporation.

Antonio Panizzi (1797-1879) has been accurately described as having reinvented the British Museum Library. He was appointed an assistant librarian in 1831 and literally fought his way up to principal librarian in 1856, "reinventing" on the way. His other major accomplishment was his *Rules for the Compilation of the Catalogue* (1841), universally known as "Panizzi's 91 rules." These rules have lived on via Jewett (1852), Cutter (1876-1904), the Anglo-American Rules of 1908, the A.L.A. Cataloging Rules of 1949, to the present-day *Anglo-American Cataloguing Rules*.

Charles Coffin Jewett (1816-1868) appended to his *Catalogue of the Library of Brown University* (1843) an "Index of Subjects" arranged alphabetically so that it would be "convenient to the class of persons who will use this library" (Jewett, 1843, p. xx). As Charles Ammi Cutter (1876) put it nearly a quarter-century later: "Mr. Jewett was thinking more about those who are seeking information than those who are searching for a book" (p. 539). The "Index of Subjects" was the first structured subject heading arrangement, and Jewett (1843) apparently succeeded in promoting his innovation over "the bibliographic systems which have been proposed" (p. xx). It was a major contribution toward a full author-title-subject dictionary catalog.

On 11 February 1847, Jewett accepted appointment as librarian and assistant secretary of the Smithsonian Institution which was just getting underway. Jewett's goal was to build up the Smithsonian library to be the "national library." He also envisioned an alphabetical union catalog of libraries in the United States so that "every student in America would have the means of knowing the full extent of his resources for investigation" (Harris, 1975, pp. 100-01). The catalog was to be maintained as "stereotyped titles" which could be selected to print the bookform catalog for each participating library. The catalog, however, was not to be.

The scientists of the country were solidly opposed to the "big library" idea and not surprisingly preferred that the Smithsonian's income be spent in support of scientific activities. The scientists won out, and support for Jewett's plan was diminished. Unfortunately, Jewett reacted in such a way as to be insubordinate and was "removed" from his position in January 1855. His national library plan could have been enacted, but the stereotype technology of his union catalog would never have worked.

What did work was his "Rules for Preparing Catalogues," which he "founded upon those adopted for the compilation of the catalogue of the British Museum; some of which are, *verbatim*, the same"

(Harris, 1975, p. 135). He realized, as has everyone else who has designed a union catalog comprising the catalogs of many libraries, the "minute and stringent rules become absolutely indispensable, when the catalogue of each library is, as upon the proposed plan, to form part of a general catalogue. *Uniformity* [he often italicized this word] is, then, imperative" (Harris, 1975, p. 135). He cautioned that: "Nothing, so far as can be avoided, should be left to the individual taste or judgement of the cataloguer" (Harris, 1975, p. 135). Jewett's rules were used for the next quarter-century and contributed to the rules of Charles Ammi Cutter which replaced Jewett's rules beginning in 1876.

William Frederick Poole (1821-1894) published *An Alphabetical Index to Subjects Treated in The Reviews and Other Periodicals to which no Indexes Have Been Published* (1848) at the end of his junior year in Yale College. It was the first index of magazine articles and was designed originally to help students find information primarily to support a position in a debate. Poole was working his way through Yale as an assistant librarian of the student-supported Brothers of Unity Library; Yale did not permit freshmen and sophomores to use the college library and junior and seniors had to pay a fee. Brothers, like most libraries of the 1840s, had a closed stack so that obtaining an article was a feat of memory involving both students and staff. Articles in the index, arranged entirely under catchword subjects, greatly increased the usability of the library.

Poole went through the full process of innovation: the idea of such an index, the development of a manuscript catalog for use within the library, and revision and expansion of the catalog for publication. His risks were lowered grades—which occurred—and exhaustion, which was thought to have caused the death of another Brothers indexer several years later.

The 500 copies of the first edition of the index must have sold out rather rapidly, for a second edition appeared in 1853. The third edition of nearly 1,500 pages, a major contribution to libraries, was published three decades later in 1882. Poole had not put up any money to support the first two editions, but he bought the plates of the third edition for more than \$6,000. It is doubtful that he ever recovered all of this investment. A five-year supplement appeared in 1888 which ended Poole's association with the index. However, five-year supplements appeared in 1893, 1897, and 1903, and in 1908 the fifth and last supplement appeared. A new printing technology, which allowed the H. W. Wilson Co. to put out frequently cumulated issues of the *Reader's Guide to Periodical Literature*, caused the demise. In a very real sense, Poole's pamphlet of 1848 is the forerunner of the H. W. Wilson's family of indexes.

Melvil Dewey (1851-1931) is the entrepreneurial librarian *par excellence*; he is prominent without peer. His first triumph was the creation in 1873, while a junior at Amherst College and an assistant in the library, of the first narrow classification scheme, now known worldwide as the Dewey Decimal Classification (DDC); Amherst College published the first edition in 1876 (Dewey, 1876), retaining 150 copies for the college and giving fifty copies to Dewey (Vann, 1978, p. 33). This first edition had forty-four pages; the twentieth, published in 1989, comprised four volumes.

Also in 1876, Dewey participated in the establishment of the American Library Association (ALA), which is now over 50,000 strong, and *Library Journal*, now in its 116th volume, and founded the Library Bureau, long a supplier to "libraries with everything they need except books" (Library Bureau, 1902, p. 7). It was Dewey and his Library Bureau who "fostered acceptance of the size of the catalog card (7 1/2 × 12 1/2 cm) currently being used" (Vann, 1978, p. 35). This standardization was signally important, for it enabled interchangeability of cards among catalogs in different institutions, thereby restoring the interlibrary flow of cataloging information that had existed in the era of printed bookform catalogs.

Dewey produced a plan for library education in 1879 but was not able to obtain support for it from libraries before 1883. It was not until January 1887 that he was able to open his School of Library Economy at Columbia University where he had been appointed librarian in 1883. Twenty students enrolled, seventeen of them women—in a university whose trustees were opposed to having women in the student body. In November 1888, the trustees suspended Dewey as librarian, and he resigned the following month. In January 1889, he became director of the New York State Library in Albany and secretary and treasurer of the Board of Regents, which immediately approved Dewey's plan for a library school. In March 1889, Columbia transferred the school to Albany where it remained until 1926. At that time it was moved back to Columbia where it has remained until the present but is currently in the process of being transferred again.

Dewey's library school was also a first. The German librarian, Albert Predeck (1947), described it as "the first library school in the world" (p. 125), although fifteen years earlier another German librarian, Alfred Hessel (1955), wrote: "Formal courses in librarianship were started at the University of Göttingen in 1886, being given by the eminent librarian Karl Dziatzko. A year later Melvil Dewey established the first library school in the United States" (p. 123). Neither Dziatzko nor Dewey knew of the other's teaching activities—a clear case of "simultaneity."

No other librarian has yet challenged Dewey's innovative contributions: (1) narrow subject classification; (2) standardization of the 75 × 125 mm catalog card; (3) establishment of the first major library school; (4) establishment of the first supply house for library "furniture, equipment and supplies"; and major participation in the foundation of ALA and the first library journal.

Dewey's extraordinary achievements crowned the technical advances of nineteenth-century librarianship—Panizzi's cataloging rules; Jewett's subject headings; Poole's article indexing; and Dewey's own DDC, standardized catalog card, and library school. Librarianship was based on these advances for a century.

In 1901, Herbert Putnam (1861-1955), appointed Librarian of Congress only two years earlier, initiated distribution of the library's cataloging data on printed 75 × 125 mm cards, a program that dramatically reduced expensive duplicate cataloging. For a quarter century, librarians had suggested, even pleaded for, some kind of cooperative or centralized cataloging; at least eighty-eight publications on these two topics appeared in the United States and abroad between 1876 and September 1901 when Putnam announced LC's being "ready to undertake to supply cards direct to any subscribing library" (Jahr & Strohm, 1903, p. 89).

In 1876, Charles Ammi Cutter (1876), discussing the plight of the printed catalog, said that it "cannot contain the newest books, the very ones most sought for....The card catalog has no such difficulty" (p. 554). The card catalog, existing in only one copy, did not allow the flow of cataloging information from one library to other libraries, particularly for the "newest books." On the other hand, 20,636 printed bookform catalogs had been sold or given away by fifty-seven libraries from 1860-1875 (Cutter, 1876, pp. 568-71).

During the last half of the nineteenth century, the development of the card catalog was of major importance to libraries, but the only entrepreneur who made a significant contribution was Melvil Dewey with his standardization of cards. Long before 1850, librarians in America and Europe maintained a file of "title-slips" that recorded works added to the collection after the most recent printing of the bookform catalog. Gradually these title-slip catalogs moved out of the workroom into a public area, often with the librarians protesting that only they should be allowed to use them and the users demanding access to the "newest books." These newest books were not just books published in recent weeks or months, but often in the years, or even decades, since the last printing of the catalog.

Title slips were pasted onto cards of many dimensions; next, the latest printings of the catalog were cut up and pasted; and finally a cabinet maker was summoned to build a case of drawers to hold

the unique size of cards chosen by the library. The result was not always a happy one. In 1881, the *Boston Transcript* ("The Astar Library," 1881, p. 259) scolded libraries that maintained a card catalog, writing that as far as a user was concerned "it has wasted more of his time in the invention of becoming epithets in its condemnation than he has given to the books consulted through its use."

In the summer of 1876, Otis H. Robinson (1876), professor and librarian of the University of Rochester, told a group of academic librarians meeting in July in Albany that he had visited "several of the large libraries in New England [and] all were busy making cards" that "were found to contain substantially the same thing." He urged cooperation based on the cataloging done "by men of experience at great libraries" (p. 114).

The next quarter-century witnessed continued discussion, three plans that were never developed (Ranz, 1964, p. 98), and three failed implementations. At the 1877 meeting of the ALA, it was suggested that publishers should print, in each copy of a book, title-slips containing catalog entries that could be cut out and used by libraries—a suggestion on which R. R. Bowker, one of the best friends libraries have ever had, was constrained to observe "that publishing books is a business and not philanthropy" (*Library Journal*, 1877-1878, p. 33). Nevertheless, in 1882, Henry Holt and Company did include in some of its books a catalog entry sheet for librarians to "take out carefully" (e.g., Kemble, 1882), but apparently they discontinued the practice almost immediately. In 1894, the Library Bureau began a cataloging service that required a library to subscribe to every card printed, but the bureau had difficulties in obtaining books from publishers. On 1 October 1896, the service was transferred to ALA, which initiated a procedure enabling libraries to order cards for specific titles, but ALA had the same problems with the receipt of current books.

Construction of a new and separate building to house the Library of Congress (1897) and the appointment of Herbert Putnam as librarian in 1899 gave many American librarians an opportunity to plead anew for the Library of Congress to make available its cataloging data. Putnam heeded them, traveled around the country to hear others, and became sure, albeit not certain, that a cataloging service would be a contribution to libraries. He wrote, "it must be understood, however, that we are justified in entering upon this undertaking only in case it presents a reasonable probability of success" (Edlund, 1978, p. 395). The three elements he saw as essential for success were: (1) counsel and advice from ALA; (2) assistance from *Publishers Weekly* to obtain recent books; and (3) a guarantee that a possible deficit occurring in the first year could be met. The two major risks

were that the demand for the service would be too small to make it financially viable and that the library would not receive books soon enough to provide the service in a timely manner. Putnam activated the service at the end of 1901 despite the half-dozen failures of similar ventures in the previous quarter century. He surely realized that, should it fail, the failure would be his and would be spectacular.

R. R. Bowker personally made \$1,000 available to offset the possible first-year deficit, and Congress wisely insisted that the expense of card production and distribution should be offset by a charge to libraries at cost plus 10 percent. Putnam appointed as head of the Card Division Charles H. Hastings, who remained in that position until he retired in 1938, a year before Putnam. Putnam was fortunate in having Hastings, for he was a man of unbelievable loyalty to his division and "its outside library world." One former LC cataloger of the early twentieth century visited the library in the 1930s and wrote of Hastings to Putnam: "He is still working twenty-four hours a day, eight days a week, so they say, just as when he first organized his section" (Edlund, 1976, p. 401). In the last decade of Hastings's career (1928-1938), libraries were often unable to pay promptly so that the risk of deficit, which Putnam had feared only as a start-up event, appeared annually—a type of deficit that could cumulate into bankruptcy. Toward the end of each fiscal year, Hastings negotiated a personal loan for as much as \$5,000 (probably as much as his yearly salary) from the National Capital Bank "to meet the remaining payrolls for the year" (Edlund, 1976, pp. 409-10). Later the library would reimburse him, but apparently it was Hastings who paid the interest on the loans. Fortunate indeed is the entrepreneur who possesses this kind of risk insurance.

In the same year in which he started the Card Division, Putnam also launched what later became the National Union Catalog (NUC), which operated in the Card Division under Hastings until 1926, although it was not until 1932 that the NUC "became a formal part of the Library of Congress and began to function under funds provided by Congress" (Schwegmann, 1942, p. 231). To construct this "national finding list," Putnam chose to exchange his newly available printed cards for cards from other libraries. The Boston Public Library, the Harvard College Library, the John Crerar Library, and the New York Public Library were the original contributors. By 1909, four government libraries and the Washington Public Library were also contributors, and they were followed by the University of Illinois, the University of Chicago, and the Newberry Library (Schwegmann, 1942, pp. 229-30). By 1926, the UNC contained 1,960,000 cards, not including LC cards; by 1941 there were 11,156,211 cards (pp. 230-32).

In 1961, LC published in bookform *The National Union Catalog: A Cumulative Author List*. It superseded *Library of Congress Catalog—Books, Authors*, an annual that had followed the printing of 167 volumes containing cards issued up until July 31, 1942. The printed NUC served the double function of locating titles and, more importantly, supplying cataloging information. It appeared after Herbert Putnam's death in 1955, but he surely would have seen it as another major triumph arising from his two 1901 entrepreneurial decisions. Annual volumes followed the bookform NUC, and in 1968 LC began the publication of the gigantic long-awaited *National Union Catalog Pre-1956 Imprints*, which finished in 1981 with the 754th volume.

The second major library entrepreneur following Melvil Dewey was Henriette Avram, who joined the Information Systems Office of the Library of Congress in 1965 as senior systems analyst and forthwith developed a computerized equivalent of the nearly century old catalog card format standardized by Dewey. In addition to developing an electronic format for a machine-readable catalog record, which became known universally as MARC, Avram brought about both the national and international standardization of it. In the past two decades, the MARC record has become the one and only vehicle for rapid electronic transmission of the cataloging information that the world's dozen library networks transmit to their thousands of participants. Most networks maintain their MARC records in online union catalogs that provide precise location information, which greatly facilitates interlibrary borrowing.

The author's entrepreneurial activity began at the Harvard College Library with the installation of a McBee Keysort circulation system, the first application of edge-notched cards in libraries, which was patterned after Ralph Parker's (1936) IBM 80 column punch-card system introduced at the University of Texas to replace the inefficient systems Parker described as: "Multifarious files of charges arranged by date, borrower, and call number..." (pp. 903-05). There were risks for both Parker and Kilgour in replacing systems that had worked since the beginning of time, as far as staff were concerned, with forms and procedures that staff would not or could not make work. Having to return to the former systems—a potential with all such innovations—would have been an expensive and disastrous experience. However, in 1952, at least forty-one libraries were using the Kilgour system (McGaw, 1952, pp. 174-76), and in 1961, 17.8 percent of academic libraries were using it (Fry and Associates, 1961, pp. 1, 38). Much to the author's surprise, one still does.

The author's next entrepreneurial activity was the development and operation, in the Office of Strategic Services (OSS), of the

Interdepartmental Committee for the Acquisition of Foreign Publications (IDC) established by President Roosevelt in 1941 for the purpose of acquiring publications for intelligence purposes from enemy and enemy occupied areas during World War II. As executive secretary and acting chairman, he established outposts with staff and microphotographic equipment in Stockholm, Lisbon, Cairo, Istanbul, New Delhi, and Chungking, where publications needed by intelligence agencies were acquired, microfilmed, and transmitted to Washington for duplication and distribution—a unique and innovative library-like system. Because of the large volume of information to be distributed, he established an indexing and abstracting service based on specific requests from intelligence officers that was the first major operation of its type. IDC, by fulfilling its mission, was an entrepreneurial success (Winks, 1987).

In 1961, the author, along with Ralph T. Esterquest (Harvard) and Thomas P. Fleming (Columbia), activated The Columbia-Harvard-Yale Medical Libraries Computerization Project (CHY), the research and development for which was carried out at Yale. This first cooperative, computerized library project was designed to have cataloging information keypunched to produce catalog cards for each of the libraries plus an online union catalog for information retrieval. In 1965, a year after the successful development at Yale of the catalog card production system, Harvard withdrew from the project thereby causing it to collapse. It was a disappointing failure but provided the author with valuable experience applicable to the development of OCLC.

David Kaser, writing in the *ALA World Encyclopedia*, said: "In 1967 Kilgour was called to what appeared to many at the time to be a most unprepossessing assignment but that later proved to be a development of great significance to American librarianship, the directorship of the Ohio College Library Center (OCLC)." The center, which had been proposed by Parker and Kilgour (1965), was unprecedented and carried a grave risk of failure, but four years later, greatly aided by Avram's LC MARC record, Kilgour initiated OCLC's online operation. At the end of the five-year period that he had set as the time limit in which success or failure would be established, OCLC's online union catalog was electronically supplying libraries with cataloging and location information and was clearly on its way to achieving its two main goals: (1) to increase the availability of library materials to individual users at individual libraries (a service enhanced by the subsequent development of the online interlibrary loan system), and (2) at the same time to decrease the rate of rise of per-unit cost in libraries.

In 1976, Kenneth E. Dowlin activated an entrepreneurial computer system at Pikes Peak Library District in Colorado Springs, Colorado, that combined library operations and online services to users. It is the latter part of Dowlin's system, which he dubbed "Maggie's Place," that was innovative and therefore of interest here. Since 1976 the system has enjoyed two major enhancements and now provides users with access to a large number of both internal and external databases that are substantive, bibliographic, and directory in character. Substantive information sources include child-care information, the *Academic American Encyclopedia*, *The Source*, and *Dialog*, which has both substantive and bibliographic information. Other bibliographic sources are the Research Libraries Information Network (RLIN), as well as catalogs of Colorado university libraries, and public libraries in Boulder and Denver. Directory information includes social agencies, clubs, day-care centers, and transportation and other types of schedules. Following its inception, other libraries have mimicked Maggie's Place at least in part. It is important to observe that Dowlin's work is an entrepreneurial departure from traditional librarianship and is undoubtedly a forerunner of further user-oriented enterprises.

In general, entrepreneurs innovate to improve supply of library materials to users or to improve internal library operations. Of enterprises that have already been described, six were user oriented: (1) Jewett's structured subject listing; (2) Poole's subject indexing of magazine articles; (3) Dewey's narrow subject classification; (4) Putnam's national union catalog; (5) Kilgour's online union catalog and interlibrary loan system; and (6) Dowlin's multiple source information service. Six were operation oriented: (1) Panizzi's cataloging rules; (2) Dewey's standardization of catalog card format and his introduction of librarianship education and supplies for libraries; (3) Putnam's distribution of cataloging information; (4) Parker and Kilgour's punch card circulation systems; (5) Avram's MARC format; and (6) Kilgour's online provision of cataloging information, MARC records for online catalogs, and customized printed catalog cards.

There have been other entrepreneurs closely associated with librarianship who have produced innovations important to libraries. Two prominent examples are Eugene Garfield, who founded the Institute for Scientific Information (ISI) in 1960, and Roger K. Summit, who established Dialog Information Systems at the Lockheed Corporation in 1965. Both of these organizations have greatly enhanced the availability of journal articles.

## ENTREPRENEURIAL OPPORTUNITIES IN LIBRARIES

Librarianship of the 1990s abounds with opportunities for entrepreneurship. If libraries are to continue to exist in the twenty-first century, their metamorphosis from bibliography to information must begin now. A recent British Library study explored "likely trends in the ways that information would be generated, handled, stored and used in the period up to the year 2000" (*Information UK 2000*, 1990, p. [1]), and found, among many other things, that: "The *strategy of most libraries* emphasize access to information over holdings, and budgetary constraints will shift to allow money to move from the purchase of books to the purchase of information" (*Information UK 2000*, 1990, p. 31). This shift in emphasis alone will require major entrepreneurial activity.

First, the entrepreneurs should have a clear statement of the purpose of libraries accompanied by goals to be achieved. No general statement exists, but the author has been proposing for several years that the purpose of libraries is: "To promote the welfare and effectiveness of people by making information increasingly available." Three goals to attain and thereby achieve the purpose are:

1. provide immediate availability of information in electronic form to any user at any time;
2. increase the scope and quantity of available information; and
3. provide increasing success to users in obtaining information while at the same time reduce rate of rise of library per-unit costs.

Equipped with this statement of purpose and goals, entrepreneurs can then proceed to define objectives to enable attainment of goals.

While designing the objective, entrepreneurs will reveal gaps in existing knowledge of the information needs of users, of the capabilities and capacities of technologies, of the availability of types of information, and of the capabilities of users. Research will need to be undertaken in not only these four areas but more too. Almost nothing is known of the data and information that library users extract from library materials. However, several helpful studies have been done of the number of pages used in nonfiction library books (Gates, 1987; Prabha et al., 1987; Prabha et al., 1988; Sabine & Sabine, 1986).

The author has initiated a study program entitled Referenced Information Analysis (RIA) and has published a feasibility study of the references in four books to other books (Kilgour, 1991). These four books contained 5,516 references to other books of which three-quarters occupied one page or less of text. Data and information come in small dollops. A second unfinished study explores availability of referenced direct quotations from books. Eight books were spread among: fine arts (2), humanities (3), natural sciences (2), and social

sciences (1) and have been analyzed, and it appears that two-thirds of their references to other books are direct quotations. Of these two-thirds, 50 percent are less than a sentence, 23 percent are one sentence, and 28 percent are longer than a sentence. Of the total references, 29 percent are less than a sentence, 13 percent one sentence, and 16 percent more than a sentence. These findings will almost certainly justify a full-scale study of such quotations to discover regularities among them to guide future computerized indexing.

### DESIGN OF A USER-ORIENTED LIBRARY INFORMATION SYSTEM

This section presents a model of a user-oriented library information system. The major components of such a system are users, libraries, publishers, and authors, of which users are the most important since they drive the entire system. Studies to determine the specific information that users obtain from library materials is an absolute necessity for designing a new system; such rationalized solutions as "full text retrieval" are useless. If the informational use of "all" kinds of library materials is included in such studies, presumably all demographic and occupational types of users will also be included. It cannot be overemphasized that users and their uses of the library are the fundamental component of any user-oriented library information system.

Libraries, as the brokers between suppliers and users of information, will have a new function; in the words of the British Library study previously mentioned, they "will emphasize access to information over holdings." The study adds: "The more active and better resourced parts of the *public library service* are likely to see their most significant role as information management and delivery..." (*Information UK 2000*, 1990, p. 32), but that:

*Academic libraries* will be under increasing financial pressure, and the numbers of full-time staff will continue to decline, by about a third on 1980 levels. Departments will have to finance their own electronic access to databases, and academic libraries may gradually become marginalized and consequently downgraded to "swotting sheds." (*Information UK 2000*, 1990, p. 33)

However, it is the author's hope that this "downgrading" can be avoided by an arrangement whereby academic libraries will possess access to databases facilitating access from home and office computers to huge central "libraries" of books and journals in machine-readable form, thereby readily providing faculty and students with access to needed information. Or, as the British Library saw: "Towards the end of the decade we may be able to browse electronically in a *remote library* offering electronic borrowing and tele-delivery" (*Information*

*UK 2000*, 1990, p. 33). The time for such a system seems to have already arrived, for a survey of public library users carried out in the United States in 1990 revealed that: "More than two-thirds of the American public—representing more than 125 million people—said that if they had a home computer, it would be either 'very valuable' or 'somewhat valuable' for them to obtain online information from the public library or a nonprofit service" (Westin & Finger, 1991, p. 4).

The local access databases will be user oriented in design and will cater to the user's information needs and the user's description of his needs and will neutralize such user shortcomings as spelling errors. There should be no charge for accessing this local informational database just as there is no charge for a user to consult the local library bibliographic catalog; similarly there should be no charge to the user for information tele-delivered from a central site, just as there is no charge to withdraw a book from a library.

Access to information at the central site will be provided by various information indexes in the local access database that provides both subject and known-item approach. Information indexes will be constructed for poetry, short stories, novels, as well as for nonfiction works. In the case of nonfiction, some now lack indexes necessitating the generation of one; some have partially effective indexes, which will need to be enhanced; and some have such ineffective indexes as to make it necessary to replace them.

The technological hardware and also much software seem to be available for the operation of a library information system, but it is more than likely that the initial system design will reveal gaps—negative entrepreneurial gaps, so to speak. Much of the time, however, the entrepreneur should know about missing information before undertaking the program planning that precedes the actual system. In the case of the model being presented here, it is already evident that too much is unknown about the identity of information that library users use. Arthur D. Hall (1962), author of what some call "the bible of system engineering," has written a description of program planning:

a broad range of environmental factors is investigated....Two aims are pursued....The second aim is to create an extensive background of information...this may involve research in a particular field of general systems theory, such as traffic (or waiting-line) theory. Or it may entail a brief study to assess the broad implications of an item of new technology.... (p. 8)

Indeed, when the author was beginning to design the McBee Keysort circulation record system in 1937, it was necessary to carry out a study to determine that reduction of the circulation period from one month to two weeks (required by the configuration of the McBee card) would enhance rather than reduce availability of materials, as turned out to be the case (Kilgour, 1939, p. 10). But it is the totally

unanticipated gaps that pop up during development that either convert a designer into an entrepreneur or consign the project to the waste bin.

Publishers, the third important component of the system, are already making innovative advances in their delivery of information. Half the books printed in the United States are prepared in machine-readable form for processing by computerized photocomposition systems; as for serial publications, *Fulltext Sources Online* lists over 2,500 journals, magazines, newspapers, and wire services. Some publishers are also building databases of their publications in machine-readable form so that they are able to publish various versions of their materials; McGraw-Hill's customized textbooks are examples. Parenthetically, it might be noted that the first commercial printing of every book and journal is an act of entrepreneurship.

Publishers would increase their profit margins (the difference between revenue and expenses) by participating in a system like the model being sketched, by which publishers could be reimbursed by 20 percent—or perhaps more—from a library's payment of the average price of a book for each title it acquires to add to its local access database. For this revenue, a publisher would save the expense of processing orders, retrieving ordered items from storage, packaging materials, invoicing, shipping, purchasing paper, printing, binding, and warehousing.

From the system point of view, users are the most important element and publishers are indispensable, but authors are the *sine qua non*. In relation to the subject of this article, authors are also entrepreneurs, and they create the data, information, and knowledge that libraries provide to users. Little is known, however, as to why authors publish, and since it is certain that any system that prevents authors from obtaining their objectives will die soon after birth, it is imperative that the system designer know something about authors' motivations for publication. Surely motivations of a novelist must differ from those of a scientist, and we only learned about the rewards of publication to the scientist when Robert K. Merton (1957), the creator of the sociology of science, published his "Priorities in Scientific Discovery." Merton found that authors publish to attain the criticism of colleagues who control the factors of rewards: eponymy, prizes, medals, and mention by historians of science; it seemed that promotion and salary were secondary. In 1964, B. G. Glaser published a "partial list" (Barber & Hirsch, 1962) of forms of recognition in which he added the following to Merton's findings: awards, fellowships, scholarships, honorary memberships, committee work in scientific organizations, editorships, acknowledgment in others' work, professorships, chairs, lectureships, and consultancies.

The last four equate with "promotion and salary." Any system that blocks peer review of a scientist's "publications" will surely collapse as soon as it starts. The same must be the case for other authors, and it would be most helpful to the entrepreneurs of the 1990s if they knew something specific about the motivation of those other writers.

### REQUIREMENTS FOR AN INNOVATIVE SYSTEM

The initial exploratory planning of an innovative system requires of the systems engineer, or entrepreneur if you will, to perform at least six interrelated functions: (1) formulation of the problem; (2) choosing appropriate objectives; (3) defining relative environmental factors; (4) employing ingenuity in inventing new systems and segments thereof; (5) election of the best alternative system design; and (6) communicating the findings.

In general, the test elements to be used in selecting a system include cost; quality, such as quality of information files; flexibility, including future functional expansion; reliability, such as operation for twenty-four hours a day; compatibility, as with other systems; simplicity, as in operation and use; and time required to develop and install the system. Usually these elements appear with more specific test names in a trade-off study—an example can be found in a paper entitled "Selection of a Terminal for Bibliographic Cataloging" (Kilgour & Long, 1970). Cost is an ever-present element in systems engineering and should be kept at the lowest possible minimum consistent with a simple, flexible, reliable system of high quality. Important costs are: (1) cost of operation, (2) cost of development, (3) cost to install, and (4) cost to the user. Most important, if cost to the user is too high, the system will be unused and fail financially.

Since libraries customarily do not make a charge to users, there should continue to be no user charge. Next in importance is cost of operation, because that can be so high as to force failure, particularly when there is no user fee. Development and installation costs are one-time costs and are rarely destructive.

There are several requirements specific to the model system described in this article for which provision should be made. There are a variety of reasons for believing that profits to information providers, particularly to publishers, could be increased. Also, every effort should be made to increase the rewards of authors. Finally, the system should accommodate information from worldwide sources and should possess multilingual access using a single language. This last "requirement" will probably demand greater ingenuity than any other single segment.

## SUMMARY

Entrepreneurial library leaders will have to challenge the status quo of librarianship with innovations hitherto unavailable. During the last century and a half there have been only nine outstanding entrepreneurial librarians that have made major innovative advances; from 1880 to 1970 the only important technical development was the adoption of the user-operated photocopying machine. Today the environment of, and opportunities for, entrepreneurial librarianship have never been brighter, with library users steadily increasing their demands for content information, with publishers steadily increasing the availability of machine-readable texts, with the computer industry steadily producing gigantic increases in powerful parallel processors of information and surprisingly powerful personal machines, all at decreasing prices; and with the telecommunication industry making equally gigantic increases in transmission capacity, also at decreasing prices. Librarianship is surely entering an evolutionary entrepreneurial era.

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