

ASIDIC newsletter

No. 58, Spring 1989

ASSOCIATION OF INFORMATION AND DISSEMINATION CENTERS

Spring Meeting Discusses Information's Value

ASIDIC returned to the historic and beautiful city of Charleston, SC for its Spring, 1989 meeting. The topic was "Value—Added, Given, Taken: Information's Three-Sided Coin," or, "Giving and Taking Value—The Impact of New Forces on the Information Playing Field." There was lively interest in the topic, with several controversial discussions, one of which suggested the topic for the next meeting. The technical program was arranged by Jeff Foreman (IBM) and chaired by Randy Marcinko (Dynamic Information); local accommodations were ably and capably coordinated by Dave Grooms (Patent & Trademark Office). The technical program is summarized later in this Newsletter.

As customary, there was an opening reception the evening before the formal program opened, and there was a Monday evening dinner and dance at the Old Dungeon where attendees were taken to the dungeon and told about some of the more colorful events in Charleston's history. The quality of these events was especially noteworthy, especially the bountiful amounts of delicious local seafood.

Committee Reports

Treasurer (Gloria Moline): The 1988 annual balance sheet and Treasurer's Report were presented. With the change in accounting period as reported at the last meeting, figures for the entire year were available. At year end, ASIDIC's assets were \$22,676; excess of revenue over expenses for 1989 was \$1,445. Dan Wilde (NERAC) praised ASIDIC for continuing in consistent strong financial health, in contrast to some other organizations that go through financial cycles. He urged the Executive Committee to maintain a vigilant eye on the finances and not to take anything for granted because disasters can happen with astonishing suddenness.

Membership (Taissa Kusma): There is only one new member since the last meeting (Bedford Advisors); its representative was present at the Charleston meeting and was warmly welcomed by the membership.

Nominations (Marjorie Hlava): At the upcoming Fall meeting, there will be three vacancies on the Executive Committee: Member-at-Large, Associate Member, and President. Anyone wishing to run for these offices or wishing to suggest candidates is urged to contact any member of the Nominating Committee.

Executive Committee (Dennis Auld): Though ASIDIC's finances remain strong, cash flow has been a problem recently, with expenses for the previous meeting having to be paid from the registration fees for the following meeting. To alleviate this problem, \$2,800 was moved from the Certificate of Deposit to working capital when the CD was rolled over at its last maturity. Meeting costs and annual operating costs will come under special review in the coming months. To lower costs in another area, the mailing list will also be reviewed, and inactive names removed. The procedural manual is undergoing its final round of revisions and should be ready for distribution at the next meeting.

Fall Meeting

The Fall 1989 meeting will be held September 24-26, 1989, in Bar Harbor, ME. Arrangements are being made to hold the meeting at a lodge with an ocean view. The topic will be "The Great Government Information Giveaway: How Will the Private Sector Survive?" There will be many attractions, including the beautiful New England fall foliage, so be sure and reserve the dates on your calendar now.

Future Meetings

Future meetings will be held in Ft. Lauderdale, FL (Spring 1990), Alexandria, VA (Fall 1990), Louisville, KY (Spring 1991), and Boston, MA (Fall 1991).

Retirement of J. Ron Smith

Dan Wilde read the following statement at the close of the Business Meeting:

"It is my duty to report to the membership of ASIDIC the impending retirement of Mr. J. Ronald Smith, Director of Research at Biosciences Information Services, Inc. (BIOSIS), Philadelphia, PA. As you know, BIOSIS is a long-time ASIDIC member and produces *Biological Abstracts* and other related databases.

Ron is truly one of the key pioneers of our business. It can be said that he was one of the pathfinders who helped show us all the way during the early days of mechanized information retrieval.

My first knowledge of Ron's contributions to our field goes back to the 1960's when he became Manager of Database Activities at the INSPEC Division of the Institute of Electrical Engineers in London, England. Those not familiar with INSPEC should understand that they were an early leader in the application of a computer to the production of published journals and machine-readable databases.

With success in hand, Ron was asked by BIOSIS in the early 1970's to commute to Philadelphia to assist with similar efforts. Ron continued his "pond hopping" for several years and then moved to Philadelphia so that he could work full time at BIOSIS developing what has become one of the world's premier computerized database production systems. Given the fine reputation that BIOSIS enjoys today, we can all appreciate Ron's many contributions to the field of mechanized information storage and retrieval.

Seeing how ASIDIC could contribute to and speed up the progress of our field, Ron became an active representative of his member organization. He has held the positions of Secretary/Treasurer and President. While Secretary/Treasurer he led the effort to rewrite our Constitution allowing us to make a transformation from a small user group to an organization with representation from all facets of our industry.

Ron has a personal style that draws people to him. While he was President, he ensured that all new members and first-time attendees were made welcome at all ASIDIC meetings. He insisted on full member participation and encouraged new member representatives to assume committee responsibilities. It was at his encouragement that I became active in ASIDIC. During my tenure as President, Ron actively continued his participation by serving as Chair of the Planning and Development Committee.

Truly it can be said that many of us in attendance today are here because of the efforts and contributions made by J. Ronald Smith.

I move that the Board of Directors send Mr. Smith a warm message of appreciation and the best wishes of all members of ASIDIC and that our appreciation be published in the next issue of our Newsletter. In addition, I move that the members of ASIDIC approve the preparation of a "Certificate of Appreciation" to be presented to Mr. Smith at his retirement dinner to be held later this month."

In Memoriam—Charles Merek

Harry Allcock (IFI/Plenum Data) reported that Charles Merek and his wife, Patricia, were killed in a helicopter accident while vacationing in Australia on February 14, 1989. Charlie was the co-founder of Rapid Patent Service, a patent information firm. When Rapid Patent was acquired by Research Publications, Charlie became Vice-President of Research Publications, in charge of the Washington, DC office. He was well known to many ASIDIC members and had attended several of the last few meetings.

New Member

ASIDIC welcomes the following new member:

Bedford Advisors, Inc.
60 State St.
Boston, MA 02109

President's Column

by Dennis Auld

As our industry is presenting more and more new products and services to the marketplace, we listened to several speakers address the issues of whether or not we truly have been adding, giving, or taking away value to our customers. Just as the industry, this Association faces the same concerns.

The purpose of ASIDIC is to provide a forum for the various members in the information chain to discuss issues such as the one just mentioned. In a sense, therefore, the ultimate "customer" of ASIDIC is the user of information. But, practically speaking, the real customer is you, the member. To parallel the Charleston model, ASIDIC is also a three-sided coin—the program, the member, and the organization structure.

As reported in the business meeting, ASIDIC is in healthy financial shape. Although membership dues are very inexpensive, they have been enough to cover the basic operating costs. Conference fees have traditionally covered the meeting expenses, with the exception of a recent few. Although there is no cause for alarm, we are taking steps to ensure that the third side of the coin, the organizational structure, is doing its part to keep ASIDIC operating in the black and ensuring that the Spring and Fall meeting programs are well prepared and presented.

Like all educational associations, ASIDIC faces increased competition for the available dollar. We can ensure viability by making sure we understand the issues that need to be discussed, create a good program to promote discussion, and operate the behind-the-scenes mechanisms effectively to guarantee that the dollars invested in the programs return enough to cover meeting costs and contribute to overall operating costs. Although we have not been doing a very good job in this area recently, many good people have focused their attention on the situation, and I believe we are back on track in producing profitable as well as stimulating meetings.

Back to the original three-sided coin. Did you have one of three impressions of the program—added, given, taken? There certainly was a lively discussion at the meeting, and follow-up discussions indicated a positive response. Let us know how you feel about the programs and what you would like discussed. Without input from you, we face difficulty in determining what needs to satisfy.

One issue that emerged at the meeting was concern about the evolving role of government. The topics explored resulted in a lively discussion of the Program Committee at the conference conclusion. The result is that we are going to explore this subject more deeply from the appropriate environs of Bar Harbor, ME on September 24-26. Be sure to mark your calendars and don't let the picturesque lodge dull your questions for the panelists. This one could be a real barn burner!

Committee Column—The Membership Committee

by Taissa Kusma

The Membership Committee has an easy and pleasant task: to describe ASIDIC to those not familiar with this unique association and to invite them to join. The Membership Committee welcomes non-member attendees at ASIDIC meetings and introduces them to ASIDIC officers and members. The Committee also speaks to prospective members at other information conferences, inviting them to join. The Secretariat sends ASIDIC brochures to those who request them.

ASIDIC is an institution organization: each member represents an organization. There are no individual members. An institution can join as a full or an associate member; annual dues are \$50 for Full Members and \$30 for Associate Members. Institutions qualifying for full membership are either producers of publicly available databases, database vendors, or users of databases performing a certain number of searches a year. Any institution interested in information issues may become an Associate Member of ASIDIC.

The Membership Committee reviews applications for membership, establishes contact with the applicant by telephone or letter, obtains additional information, and submits a recommendation for approval by the Executive Committee. During the semi-annual ASIDIC business meetings, the Chair of the Membership Committee announces newly joined organizations and introduces their representatives. New Members are also announced in the Newsletter.

TECHNICAL PROGRAM SUMMARY

Session 1: *Mergers and Acquisitions—Do they increase the opportunity to use new technologies or do they reduce choices available.?*

Moderated by Gloria Moline (Engineering Information, Inc.)

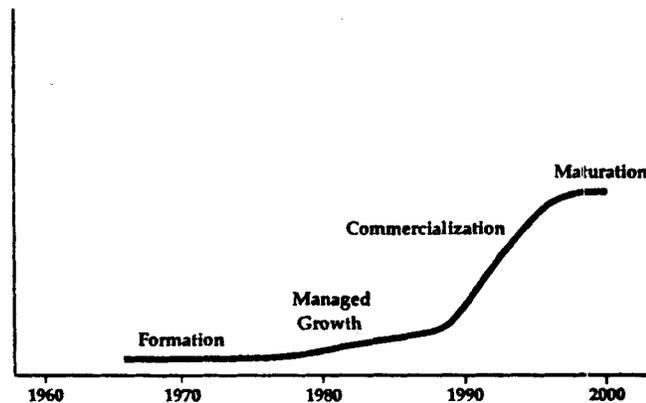
Jim Terragno, Maxwell Online, Inc.

Maxwell Communication Corporation was formed in 1989 after the purchase of BRS. Robert Maxwell, a journal publisher for 32 years, has recently embarked on an aggressive acquisition program in the information industry, beginning with InfoLine in 1980. Most of his acquisitions have been made since 1986 when the ORBIT search service was purchased from SDC. Maxwell's present revenue is 10 times what it was in 1980. In one week, Maxwell spent \$3.5 billion to purchase Macmillan Publishing and the Official Airline Guide.

The BRS and ORBIT search services are now separate divisions of Maxwell Communications Corporation and, along with InfoLine, comprise Maxwell Online, Inc. During 1987 and 1988, InfoLine and ORBIT were integrated; present activities center on the integration of BRS into the online system. New technology plays an important part in Maxwell's systems, including phototypesetting, direct access disk storage, packet switched networks, personal computers, CD-ROM storage, and programming efficiencies.

As shown below for the online industry, there are four stages of growth in an industry: formation, managed growth, commercialization, and maturation.

Four Stages of Industry Growth



Up to the present, growth has been slower and profits lower than expected. Online retrieval is a low margin business; it must change to start the commercialization process. Mergers and acquisitions will allow the effective use of economies of scale and will provide the resources for innovation. The industry infrastructure must change so that there are fewer players but more resources for each one. Acquisitions provide the opportunity to use a full range of technologies, drive the market, and use the expertise gained.

Innovation will bring technology to the marketplace using a competitive and creative environment, access to research, an entrepreneurial atmosphere, and resources. Integration of information and access technologies requires PCs, CD-ROM workstations, and gateways. Other system enhancements include end user access, faster access rates, added command capabilities, more full text searching, and graphics.

Scott Kostenbauder, IBM.

Users have five main reactions to mergers:

1. Curiosity. They want to know how, who, why, and when.
2. Fear, uncertainty, and doubt. They are concerned with what the merger will do to them or for them.
3. Confusion. As the merger occurs, users do not know who to call, what contractual terms have changed, what prices remain in effect, etc. They may have been a valued customer of one of the parties; will they continue to be as valued after the merger?
4. Fact finding. Users want to know who they will work with in the new organization.
5. Strategizing. They plan how to cope with the changes in their business and how to deal with new IDs, contracts, bills, customer service, search protocols, help desks, documentation, and many other issues.

Mergers can be either good or bad for users, depending on the smoothness of the integration and how well the merger was planned. Coverage enhancements, politics vs. business decisions, rumor control, cultural differences of companies, and the degree of customer dependency all have an effect on how the users view the merger. Mergers and acquisitions may mean that users will be exposed to new technologies, which will also affect their reaction. Technology must offer the user an advantage, have good human factors, show clear goals, and be available on time. Every case of merger and acquisition is different, and each impact is unique.

Dan Wilde, NERAC.

As mergers and acquisitions occur in the information industry, companies are growing. Larger sized companies allow both vendors and users the opportunity to use new technology because the vendors will have resources to offer experimental services to their users. Large companies tend to be less responsive to change because their momentum makes it difficult to change course; smaller companies can innovate quickly and move the market. Fewer players in the marketplace means decreased competition, and with fewer online hosts there are fewer places to mount databases. This is good because users are not willing to pay for databases everywhere; they have too many choices to make now.

Acquisitions can be good for users. Most users do not like to be forced to learn multiple searching languages or indexing systems. Many databases mean that users have to spend extra time and money searching several sources for the desired information. With fewer vendors, there will be fewer copies of databases, fewer CPUs, and therefore storage charges, programming costs, and overhead all will be lowered. Lower costs will lead to more searches and more revenue for all players in the information chain, so charges to users can go down. Users may feel compelled to join forces to bargain with vendors; ASIDIC's origins are in this area.

Session 2: The Federal Government—Does it fill gaps in the spectrum of commercially available information products or does it preempt markets?

Moderated by Peyton Neal (PRN Associates)

Walter Finch, NTIS.

The Office of Management and Budget (OMB) has recently issued Circular A-130, stating the role of the Federal Government in information dissemination. There have been two general reactions to the Circular:

- Information is for the public good, and the Government should have a primary role in its dissemination.
- The marketplace should decide which information is needed; the Government should not be involved.

In reality, there is a role for both, and balance is needed. The job of the private sector is to develop and sell goods and services, but that does not mean that the Federal Government cannot help. Circular A-

130 was issued to clarify the roles of the Government and the Private Sector; it covers the following subjects:

- Dissemination of information required by law or necessary for the proper performance of agency functions,
- Avoidance of duplication,
- Provision of adequate notice to the public,
- Provision of the public with reasonable ability to acquire the information,
- Cost effectiveness of information dissemination to the Government and the involvement of the Private Sector,
- Recovery of dissemination costs, and
- Periodic review.

OMB's proposed revision of Circular A-130 was published for public comment on January 4, 1989 in the *Federal Register*. Comments received suggest that the Information Industry Association (IIA) generally supports the proposal. Librarians and other information groups criticize it as an abdication of Government responsibility to provide citizens with information. A more balanced view is needed, one that treats Federal information more as a public good, but sets some limits on the role of Government.

Bill Lawson, Patent & Trademark Office.

Tension is growing between the Government and the Private Sector over information policy. The Government has a responsibility to furnish the public information that has been paid for with public funds, and the information industry is seen as one way of doing this. Each agency has a different view of its role, which changes with time. The information industry is therefore anxious.

Government efforts to improve the flow of information have met with mixed success. Circular A-130 is another effort by the Government to bring some order out of the present chaotic position. The Federal Government is the greatest source of low cost information, and it is moving heavily into technology. The Patent and Trademark Office's project using CD-ROM has been a success; its savings of \$300,000 per year will more than pay for the hardware.

Information users, hungry for low cost data, will get it from the Government, so commercial producers will be affected and could lose revenue. The Government can save money by publishing data electronically; it has information that has never been available before. Technology is making electronic publishing so cheap that it will soon be hard for Government agencies to justify not using it. Proprietary software and the necessity to pay royalties inhibits its wide dissemination; if the Government produces its own software and puts it into the public domain, commercial software houses will be much different than they are today.

Suzanne Fedunok, Columbia University Libraries.

The provision of Federal information may be a growth opportunity for online vendors because the Government is on a course of making more databases available instead of improving existing ones. Federal agencies are continuing to issue raw data, but they do not analyze or translate the material by producing charts, indexes, and analyses.

Librarians are not convinced that this policy is the best way to disseminate Federal information, so some library organizations have decided to oppose the Government's plans. They argue that the range of information available to the public will diminish as companies seek to market only those files of interest to researchers and other wealthy customers. They fear that computerized information will create a dichotomy between information-rich and information-poor citizens, and they argue that the Government is abdicating its responsibility to deliver information to the public.

The Government's mandate is to deliver information to the public. Is the Private Sector preeminent? Does it have a right to this market? The American Library Association (ALA) has passed a resolution urging Congress to guarantee ready access to public information. Libraries prefer to provide raw information to researchers so that the researchers can analyze it themselves. They do not want to pay higher prices for information by buying it from vendors who have already paid the Government for it.

Libraries feel that information should be made available to the public as cheaply as possible.

Gerald Yung, Mead Data Central.

Can the Government preempt the Private Sector in the information arena? It has access to vast resources and often has a natural monopoly on the source of the information. It can undertake projects for which the Private Sector would have trouble attracting capital. The Government often becomes a competitor to the Private Sector. For example, the Department of the Treasury wanted to give customs information to its other regional offices daily while offering it to commercial companies only weekly. The State of New York recently established an online legislation database but refused to allow access to a commercial provider. Only after litigation were the commercial companies able to obtain the data on the same basis as Government agencies. In these cases, the Government was not only a competitor but an unfair competitor.

When there is open access to Government information, the Government and the public benefit in at least four ways:

- The Government will benefit because the Private Sector will help satisfy most of the needs for access (especially electronic access) to Government information.
- The cost will be less than if the Government tried to meet such needs entirely on its own.
- Government agencies will be free to concentrate on their primary responsibilities.
- Finally, the resulting information products will be better, more diverse, and more quickly available than if the Government were the only party attempting to meet the needs of the public.

Private Sector companies are well equipped to help the Government bring its information to the public in electronic form. They have staff, R&D budgets, and experience combining information in several forms and from several sources into a single unified database. Private companies compete with each other to provide the most useful, innovative, and cost effective products; they also constantly search for unmet market needs and seek to fill them.

The Government and the Private Sector can both win by working together. If it had been Government policy in the past to jealously guard and restrict access to information and preempt private authors, printers, and publishers, many library shelves would be empty today. All entities in the information dissemination chain have a role to play together and a contribution to make.

Luncheon Address

For the first time ever, ASIDIC had a luncheon speaker: Lowell Noble, Executive Vice President of R&D, Patent Search Systems, Inc. He provided attendees with a fascinating look into the future of optical storage technology, including some examples of future high compression techniques which will provide faster disk access, retrieval of images *in color*, and three-dimensional displays. Flexible CD-ROMs on thin films and double-sided CDs will allow storage of 2 terabytes of information in a jukebox. Erasable CDs and portable CD players will soon make the electronic book a reality.

Session 3: Restrictive Conditions on the Use of Data. Without them, can producers be bled dry? Are some so tight that users cannot effectively support their constituents? Is there a reasonable middle ground?

Moderated by Art Elias (BIOSIS)

Edlyn Simmons, Merrell Dow Pharmaceuticals

Most database producers place restrictions on how their data can be used. Many restrictions cannot be understood by users and are difficult or impossible to enforce. Some producers seem to base restrictions on the assumption that the customer is an individual searching for his/her own information and not on behalf of others. A database that prohibits copying information for distribution within the customer's organization is not useful to a corporation. Some restrictions are based on how the database is accessed; online use is restricted more than use in other media.

It is difficult for users to track restrictions because they are not published in easily found places. Often it is assumed that all database restrictions are the same. Sometimes a database will have different restrictions on different hosts! Communication between producers and users needs to be improved.

Searchers have no quarrel with the need for database producers to protect themselves against sales to third parties. Problems arise when an information producer seeks to control internal use of the data; they should not attempt to control the spread of knowledge. Some restrictions are so all-encompassing that it is difficult to make any use of the data; as they are written, one could not even read the data from the screen!

Online information saves users the necessity of retyping; if they cannot use the information, they will not use the databases, and the producers will lose revenue. Most companies are not interested in entering the information business and competing with information companies. Producers therefore should trust corporate information centers; they are usually staffed by information professionals thoroughly grounded in the permitted uses of information. Usage restrictions should give the producers basic protections and allow users as wide a latitude as possible in disseminating the information from the databases.

Harry Boyle, Chemical Abstracts Service

The issue of usage restrictions is economic; producers feel that if information is reused, they should be paid. Major uses of downloaded data are editing and reformatting. Most database producers permit the production of one printed copy of downloaded data; liberal policies permit up to 25 copies for internal use. Permanent electronic storage is often permitted for use by the original searcher; nobody permits storage for group or centralized usage.

Usage rules must be different because circumstances differ so widely. Large databases tend to have looser rules because today's technology does not permit capture of large volumes of information economically. Some data has a limited time value and is not as restricted as data which is valuable for a long time.

Producers consider who is using the data when they make their rules. Information professionals have been trained in the copyright laws and tend to respect reasonable rules, so producers tend to be comfortable with their uses of information. End users, on the other hand, may have a hacker mentality and may feel that if they can do it, it is permitted.

Database producers rely on copyright laws, contractual terms, and pricing to limit reuse of their data. Prices may be set high to build in assumptions for theft of data. Chemical Abstracts Service proposes the following as a reasonable information usage policy:

- Unlimited reuse of the data in any form is permitted by the searcher or by the recipient of the data.
- The recipient may distribute as many copies of the data as desired in any form to his/her "work group."
- The data may not be added to a central database.
- The producer's copyright message must appear at logon to the online system and on every record.
- Annual printed reminders of the policy should be distributed to all users.

Edith Crockett, Informed Sources.

The Institute for Paper Chemistry (IPC) receives half of its funding from pulp and paper manufacturers. It furnishes information services to its members; originally access was restricted to members only. The Paperchem database was mounted as a private file in 1970 and was made available to the public (except pulp and paper companies who are not members of IPC) on a limited basis. Nonmembers of IPC were limited to 5 hours of searching and 1000 abstracts printed per year; revenue grew in spite of usage restrictions.

IPC recently began using a new fee structure. Full members have unlimited access to the database, as do research organizations paying \$25,000 in advance. Subscribers to IPC's print publication can use the database by paying up-front access fees. Others pay a higher rate to use the database, subject to annual

limits. Associate members and academic institutions have still other fee structures. The result is a large matrix of prices and restrictions.

Online usage of Paperchem is about half from the public and half from members of the Institute; about half the revenue comes from the access fees. Restrictions on database usage are needed because the database is subsidized by IPC members and would not pay its way if it were publicly available without the restrictions and the access fee revenues.

When considering restrictions on database usage, the following are points to consider:

- Be sure the restrictions can be justified and managed.
- Be prepared for adverse user reaction.
- Be sure data is not available elsewhere in any form, or else users will use alternate sources.

Robert Jack, NASA Scientific and Technical Information

We are in a consumer economy where money is exchanged for goods and services. When something is purchased, it belongs to its owner, who should be able to do whatever he wishes with it. Most information services do not take this view, nor do they view all text to be equivalent. The European Space Agency's new pricing system is a move in this direction; they have eliminated connect time as a charging mechanism and base their revenue on citation charges. Database producers should keep prices reasonable and keep their information available so that searchers can use it.

Session 4: CD-ROM Networks, A New Technology: Blessing or Curse?

Moderated by Donald Hawkins (AT&T)

Deb Wiley, Cambridge Information Group

Cambridge's first CD product was introduced in 1984, and a second is now on the market. They have found that most predictions regarding CD-ROM technology have not come to pass because there are many technological complications. Constant service is needed to help users get the product installed.

The biggest market for CD-ROM databases is libraries. Librarians do not use these databases, but they are very popular with end users. At some universities, it is necessary to sign up two to three weeks in advance! Networking to allow multi-user access would greatly improve access and would expand the usage. Four to six users could be networked on one system before response time degraded significantly. CD-ROM networking software is now available; it costs about \$15,000. To link five users would require an investment in software and hardware of \$40,000 to \$60,000; five copies of the database and a site license would cost less. Since large databases will not fit on one CD-ROM disk (MEDLINE takes 19 disks), all users on the network must search the same disk simultaneously to make networking practical.

CD databases are a niche market. They first emulated existing online files, and ignored the power and capabilities of the PC where the software resided. Newest products are moving away from this trend and are providing their own unique features.

It is still questionable whether networking CDs is practical. The money needed to install jukeboxes and a network may be better spent on an online system using tapes because CDs are still not as powerful as online systems.

Helen Wiltse, Georgia Institute of Technology

Even in a heavily online environment such as Georgia Tech, the librarians want CD-ROM databases for back files. Their system only keeps five years of data online; some searches require older data than that. They would like the CDs connected to a file server on their existing system, not installed in their own separate network. There must be uniformity in the software because it is almost impossible to require users to learn a new search language. System response time must be short.

Future information needs well served by a CD-ROM system are full text and graphics. CD networks are still well in the future.

Lowell Noble, Patent Search Systems, Inc.

Most successful CD applications are single user workstations connecting to a commercial online system. In patent searching, a standard method of operation is to get a list of valid patent numbers then use the CD database to retrieve the full text. A jukebox is necessary to access multiple CDs. To minimize response time, duplicate copies of each CD could be put in the jukebox. One jukebox can handle up to four workstations; if more than four are needed, a separate installation should be made.

Once people have used a CD system, they become used to having the full text available, so CDs will become pervasive as costs drop. Thin file CDs are coming out of the laboratory; they cost 10¢ to make and can hold 250,000 pages of information.