Telefacsimile in Libraries: New Deal in the 1980s

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AT FIRST EXAMINATION, telefacsimile seems an ideal technology for any library: a device that instantly sends a replica of a printed page—complete with text and graphics—to any other facsimile machine that can be reached by conventional telephone service. Unfortunately, as with many technologies, further examination reveals mechanical limitations and financial burdens that limit its universal appeal. Nonetheless, the potential advantages are so alluring that libraries have conducted studies for decades. The 1980s have seen a striking increase in studies, trials, and installations of telefacsimile in library settings. Those unfamiliar with the technology or those who remember it as slow, clumsy, and terribly expensive well may wonder why telefacsimile has become prominent in the literature.

Three major changes have stimulated the library world's interest. Following 1980, a new generation of telefacsimile machines—designated as Group III—became available. These machines adhere to a common international communication standard, unlike the two earlier generations—Groups I and II—which were hampered by compatibility problems between units built by different manufacturers (McQueen & Boss 1983). Group III units can communicate with each other regardless of brand, although slightly faster transmission or enhanced resolution often is possible between two machines from the same manufacturer. Some can even "talk down" to machines of the two earlier groups. This change makes it possible for networks to evolve without coordination. Just as installing a telephone makes a library part of the nation's telephone network, installing a Group III machine makes a library part of the telefacsimile network. A second change occurred in speed of

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scanning and transmission. Group III machines are much faster, scanning a page in less than a minute, as opposed to two minutes with Group II and six minutes with Group I. This decreases long-distance telephone charges, making transmission more economical. The third change is also economic in nature. Like pocket calculators and personal computers, the price of facsimile units has decreased throughout the decade.

The Technology

At the heart of telefacsimile is an operation somewhat akin to dot matrix printing. A telefacsimile machine views a page of text being scanned as a grid of tiny points. It assesses whether each point is dark or light and transmits its assessment over telephone lines to the receiving unit. The receiving unit recreates the grid of light and dark points, producing a dot matrix facsimile of the original page. Unlike computers, telefacsimile never recognizes a character: it only codes, transmits, and decodes patterns of light and dark that configure a shape that we recognize as a letter.

Such a gross oversimplification will be of little use to librarians evaluating machinery, and they will want to turn to several valuable articles. William Saffady (1984) has provided a detailed, yet brief, overview of the central technology of telefacsimile units. Lawrence Robinson (1986), in his book *The Facts on Fax,* surveys the many automatic features available and argues for telefacsimile from a business perspective. Similar information, in more concise form and considered from a library perspective, can be found in *Library Technology Reports* telefacsimile overview ("Survey of Telefacsimile Equipment" 1985). These sources provide reviews of specific telefacsimile units available at the time. While this information demonstrates how features have been incorporated into actual machines, it rapidly becomes outdated as models change. Less detailed, but more current, information is available, for example, in *The Office* which publishes a table of currently available units in its September issue ("Buyers' Guide to Facsimile Systems" 1987, pp. 108, 112, 114).

Library Applications

Most articles advising libraries on telefacsimile stress assessment of need as vital to the success of an installation. Telefacsimile is neither technologically perfect nor insignificant in cost. If the library's users really have no need for the technology's advantages, they may ignore the service and the library may regret its investment. Fortunately, results of many studies are now being published in the literature, allowing libraries to survey applications and profit by the experiences of others.

In most studies, telefacsimile has been applied to interlibrary loan situations. Programs of national scope have been coordinated by the National Library of Canada and the Research Libraries Group, Inc.

(Anand 1987a; Anand 1987b; Smith 1984). Within a region, notable studies have been conducted in the Pacific Northwest (DeJohn 1984). Statewide studies include those conducted by medical libraries in Texas and networks of public, special, and academic libraries in Illinois and in Montana (Algermissen et al. 1982; Mak 1988; Wainer 1986; Brander 1987). A network's service focus can be as small as one city as in the case of a group of major law libraries in New York City (Boss & Espo 1987).

In a similar application, telefacsimile is used for moving documents from large supplying libraries to smaller units. This pattern of service has been much explored in medical settings where information must flow as rapidly as possible from large research collections to hospitals or other medical facilities. Such situations have been reported by the College of Physicians of Philadelphia, the Health Science Library at the Texas College of Osteopathic Medicine, and the Montana Health Sciences Information Network (Aguirre 1988; "Libraries Begin to 'Think Digital Facsimile'" 1983; Kaya et al. 1987). A similar situation, but with generally less urgent speed requirements, was explored in a trial conducted by the National Agricultural Library. In this study, documents moved from the National Agricultural Library and a network of Land Grant University collections to smaller regional libraries of the USDA's Agricultural Research Service (Brown 1986). An extreme example of one-directional document flow occurs at DePaul University. DePaul's O'Hare branch campus has no permanent collection so rapid access to journal articles is offered by means of a telefacsimile link to the main campus (Brown 1985).

Telefacsimile also is used outside of document delivery. When the Denver Public Library was forced to cut back on reference staffing, it installed telefacsimile units to move reference queries and answers swiftly between the central library and the branch libraries. Denver also reports that the system has proved to be an excellent internal communication option ("Libraries Begin to 'Think Digital Facsimile'" 1983).

These and other studies provide information about the needs that libraries have addressed with telefacsimile. Many of the articles also provide information about the questions that should be asked in considering implementation: can telefacsimile speed up operations significantly, is it too expensive, will the user be satisfied with the document supplied, and will the impact on the library operation be positive or negative?

Speed Improvement

There is no question that telefacsimile can move text immediately from one location to another which is performance only electronic mail can match. Indeed, Lawrence Robinson (1986) argues that telefacsimile should be viewed as a type of electronic mail, one which can often eliminate the time needed to rekey a message in conventional electronic mail systems (pp. 5-8). The technology, when applied to conventional

document delivery situations, only eliminates the time needed to send requests and documents through the mail. Studies indicate that such time savings are noted by users although they do not always feel that the savings are important to their work. When users can be satisfied with delivery by mail, telefacsimile is an unnecessary expense.

When next-day delivery is adequate, there is the possibility of using courier delivery services. This may be a cost-effective alternative for libraries with only occasional need for rapid delivery; however, such services are costly and are not available in all areas. If courier services are frequently used by a library, it should seriously consider the speed and cost advantages of telefacsimile. Where delivery speed is of the greatest importance—as in medical settings—policies may be set to give priority treatment to requests. In 1987, for example, the National Library of Medicine initiated a program whereby requests designated as needed for "clinical emergencies" will be processed, if possible, within two hours ("NLM Begins Telefax for ILL" 1987). Such handling realizes the full potential of telefacsimile but demands a huge investment of staff time.

Cost of Service

Cost has been the central focus of many telefacsimile studies. Cost estimates are usually expressed in terms of cost per page transmitted, but not all libraries have calculated this figure in the same way. Several factors may or may not be involved in such a calculation—i.e., telefacsimile purchase price or rental fee, maintenance plan cost, telephone line cost, long-distance telephone charges, supply costs, and labor costs.

Calculations can be greatly influenced by fixed costs if they are figured into the cost per page. Because fixed costs are constant, regardless of how much use is made of the machinery, these costs greatly increase the per page figure in a low-volume operation. The fewer pages sent during a month, the greater the share of the fixed cost burden each transmitted page must bear. Fixed costs include telephone line charges and telefacsimile machine costs. Most libraries will want to have their telefacsimile unit ready to receive and transmit at all times; thus they will have to pay a monthly charge for a dedicated telephone line. Some libraries lease their telefacsimile machinery, incurring rental fees. This leaves them free to upgrade machinery if the technology improves. With falling purchase costs bringing high quality units into the $2000-$5000 price range, however, machine purchase appears increasingly attractive. The purchase price of a machine, amortized over its life, certainly has much less fixed cost impact than monthly rental charges. If a library has carefully estimated its needs and has found a machine that will give adequate service for some years to come, it should seriously consider the purchase option.

Purchase does add the fixed cost of a maintenance agreement. Considering that telefacsimile units are generally reported to be quite reliable, the price of such agreements seems high. Richard Boss and Hal

Espo (1987) report that these contracts can cost between $200 and $1100 annually (p. 39).

The remaining cost factors all vary with amount of use. Of the variable expenses, long-distance telephone charges have the greatest impact on cost except in cases where the bulk of a network's telefacsimile activity takes place in the same local call zone. Long-distance charges are also one of the most elusive charges to predict. Like voice calls, the total cost will depend on the location to which the call is placed, the length of time spent on the line, and the time of day. Since the first minute of a long-distance call is the most expensive, there is a cost advantage if transmissions contain large numbers of pages. Considerable savings also can be realized if transmissions are made at night when discounts are offered on long-distance calls (Brown 1986, p. 51). Unfortunately, delaying transmissions to achieve these savings may undercut the rapid delivery which makes telefacsimile attractive in the first place. Charges can be much diminished if a special long-distance arrangement—such as a WATS line—is available.

Much of the long-distance cost will depend on how quickly a unit can scan a page. In general, manufacturers quote figures based on office correspondence rather than on dense text involving complex illustrations. Nonetheless, transmission time of less than a minute seems to be the rule in library studies. Although a page may be transmitted in far less than a minute, it is necessary to realize that there will be a pause of several seconds between each page scanned as the machine reassesses the quality of the connection. Also, if a Group III unit is communicating with a Group I or II unit, the transmission will occur at the older machine's rate.

Many machines feature two or three scanning resolution settings. If the material being transmitted is very detailed or if the telephone connection is poor it may be necessary for the machine to scan at a higher resolution, creating its electronic picture of the page with a much finer grid containing many more points. A higher resolution scan thus contains more data and will take longer to transmit. Some machines will automatically adjust to finer scan levels if a telephone connection deteriorates.

One unexpected telephone factor found in the National Agricultural Library study was the cost of broken connections. Because of telephone service problems or mechanical problems with one of the telefacsimile units, connections would often be broken. This would necessitate making an extra telephone call to complete a transmission, incurring a second premium charge for the first minute.

Supply costs for telefacsimile machines are very moderate compared to telephone costs. With many machines the only supply required, besides electricity, is paper. In the National Agricultural Library study, the cost of the thermal paper used in the telefacsimile machines was found to be less per sheet than the cost of photocopies.

Because the machines offered the optional capability to copy documents, money was saved by copying transaction records on the telefacsimile unit. Paper costs will differ from manufacturer to manufacturer and users are warned that maintenance problems may arise if unauthorized paper is used (Pocius 1986). Thus a library may be locked into one paper supply price when a machine is chosen. It should be noted that some machines use a system that requires both toner and paper.

Labor costs are difficult to calculate in a telefacsimile study because the work is usually integrated into regular operations. Telefacsimile machines are not difficult to operate and can be enhanced with a variety of time-saving automatic options. Because telefacsimile machines only accept single sheets of text, the laborious work of photocopying and proofing requested articles is still necessary even if the photocopies are thrown away following transmission. Malcolm Smith (1984), in his Research Libraries Group study, concludes that attending to the telefacsimile machine and dealing with transmission problems takes more time than is saved by not having to package and mail the photocopies (p. 145). In some studies, recipients of telefacsimile copies have wanted to have the photocopies mailed to them for their permanent files, which of course cancels out any savings of postage or processing time.

In spite of the differant ways that costs can be determined, most of the studies cited earlier found that per page costs averaged under $1 and were well under $1 if there were no large fixed costs for equipment. Richard Boss and Hal Espo (1987) calculate that libraries should be able to transmit for less than $l per page, even with equipment costs included if they transmit over 200 pages per month. They further estimate that sending more than 350 pages per month will bring costs down to $.75 per page and that transmitting over 1000 pages per month can bring the cost down to $.50 (p. 41).

User Satisfaction

Copy recipients in most studies are well satisfied with the time savings that can be realized with telefacsimile; but recipients are not always so satisfied with the quality of the copies received. Under the best transmission conditions, the telefacsimile process will distort the type very slightly. Text, nonetheless, is usually judged quite acceptable and legible by the recipient. If the article's type is small, however, there may be legibility problems. Even if the text is legible, the slight blurring may become irritating if many pages must be read.

Nonalphabetical elements, such as numbers or mathematical and chemical symbols, can provide legibility problems especially if they are printed in smaller type. Such symbols can constitute the most important part of a science article, being especially vital if the text is written in a language the requester cannot readily understand. Graphic materials such as drawings, graphs, and photographs, are particularly vulnerable to distortion. The fact that they often do not photocopy well com-

pounds the problem, although there are rare cases where the telefacsimile process will enhance a poor copy.

Telefacsimile units that can accept pages of unusual width usually transmit them with text reduced in size. This allows them to be printed on standard width paper on the receiving machine, but it can also mean that the facsimile received is unreadable.

Whether or not users will accept the quality of telefacsimile copies is hard to predict. Most studies report that users are pleased with the quality, despite occasional legibility problems. Even in medical settings, where science-oriented materials filled with symbols are used, users seem satisfied. This is perhaps because of the vital importance of speed in their work. In the National Agricultural Library study, users were found to be more critical of copy quality, perhaps because they generally were reading large numbers of telefaxed science articles and were accustomed to fairly rapid service from local research libraries. Even though critical of the quality of copies, most of the recipients in that study wanted telefacsimile to be available for transmitting materials in rush situations and for sending requests for documents.

Copy quality can deteriorate because of bad telephone connections. Although some machines automatically or manually adjust to higher resolution scanning to compensate for a poor signal, the compensation can be inadequate. Distortion can range from moderate blurring to total disintegration into streaks. Such problems are not common over a good line, but some lines simply cannot support transmissions during certain hours. In the National Agricultural Library study, transmissions to Berkeley, California, almost always were impossible during daytime hours.

With such distortion occurring, sensitive proofreading is necessary at the receiving end. This creates a burden for the receiving library that does not occur with mailed photocopies. The receiving library must be willing to request that pages be retransmitted, but this can be done quickly with a note transmitted back to the supplier.

Although it is a minor factor in studies, some recipients dislike the paper on which their facsimiles are printed. Thermal paper, used in many units, strikes some as unpleasant to the touch, discolors if exposed to intense sunlight or heat, darkens if colored with a highlighting marker, and may not be as permanent as regular photocopy paper. It should be noted, however, that copies made on thermal paper three years ago and stored in a filing cabinet are perfectly legible today.

Impact on Library Operations

Need, cost, speed, and user satisfaction are the factors which a library will examine to determine whether or not to implement telefacsimile. If it is to be implemented, the library must consider the impact upon library operations in order to choose the right features and assure the smooth integration of the technology.

At the beginning, the location of the machine should be carefully chosen for convenient access. Manufacturers' brochures, based on office use, can create the impression that the machines require very little attention. This impression rapidly dissipates in a high-volume operation where transmission problems can disrupt the workflow with surprising frequency. In such a situation, easy access becomes vital to staff acceptance of the technology. Telefacsimile machines vary in size; thus the location for the machine must be considered in choosing a unit.

Once location and machine are selected, getting a unit into operation can be simple if your vendor meets promised deadlines. Telefacsimile is turnkey technology—once connected it is ready for business. Libraries seem to have more problems with the installation of the dedicated telephone line than with the installation of the telefacsimile machine itself.

Telefacsimile machines are easy to operate and their use requires little training. Several of the automatic features, alluded to earlier, can greatly ease the operation of a unit. An option of major importance in library applications is automatic receiving. This feature allows the receipt of a transmission without any action on the receiver's part beyond keeping the machine supplied with paper. With automatic receiving, documents can arrive during late hours when long-distance tolls are low, even if the staff has gone home for the night.

Automatic document feed is necessary for a document delivery operation of any considerable volume. With this feature, an entire document is placed in a hopper on the machine. Once the telephone connection is made, each page is pulled through the scanner and transmitted, saving the time and trouble of hand feeding. This feature, though very valuable, can be a source of trouble. Pages can jam, causing the telephone connection to be broken; or two pages can feed into the scanner at the same time, with only the page on top being scanned. Staff will need be watchful for such developments, and it is probably best to have someone working in the area during transmission. Library users have speculated that jamming could result from the chemical coating on photocopies or static electrical charges on text pages. Others have felt that there was a relationship to humidity.

Unfortunately for libraries, automatic feed systems are made to hold only twenty to fifty sheets of text. Many users report that machines jam when they try to use the feed hopper at the manufacturer's stated capacity. This may be because libraries usually are scanning photocopies, while manufacturer's claims may be based on common paper. Even the manufacturers' claimed capacity is too limited for many document delivery applications. In some cases extra pages can be added to the hopper after several pages have fed through, but this can lead to a paper jam and a broken connection unless done delicately.

Programmable dialing systems are available that will store frequently called numbers, automatically redial a busy line at a later time,

and permit advanced programming of calls so that the machine will make a transmission unattended. Combined with automatic feed, the dialing option allows a properly prepared machine in a deserted library to transmit text to a machine with automatic receiving in an equally deserted library.

Although night transmission is very desirable from a cost standpoint, it is hampered by the limitations of automatic feed systems. Some telefacsimile machines overcome these limitations by offering an electronic memory capacity. With such a machine—known as a store and forward unit—staff members can scan hundreds of pages of text into the memory during daytime hours and then use programmable dialing to cause the machine to transmit the stored data at night. Since the scanning is not being done during transmission, there is no need to worry about paper jams breaking telephone connections. The one possible drawback to the system, besides the extra cost added to the unit, is that the machine cannot switch automatically to higher resolution scanning if a connection deteriorates. Such a problem, however, would be unlikely to occur during night transmission; during the day it would result in requests for resupply of pages. When library-based studies of these systems appear, they probably will reveal that the store and forward unit's ability to solve problems of large-scale transmission outweighs any quality adjustment limitations.

Staff members transmitting documents should be aware of the legibility difficulties that can be encountered. It is hoped that they will be able to spot potential problems and judge whether or not to shift to a finer resolution. Some machines can produce copies of a page, as well as transmit its image. Since these copies are made by the same scanning process that is used for transmission, a copy will give some idea of how the facsimile will appear at the other end. Making such assessment copies can help new users develop an ability to judge when articles will require higher resolution transmission.

If libraries use telefacsimile to transmit interlibrary loan requests, loss of legibility will restrict the number of times the facsimile of the same request can be referred from library to library. As mentioned elsewhere, even an excellent telefacsimile copy will suffer some trace of distortion in its characters. When a request received by telefacsimile is transmitted on to another location, the second transmission's distortion compounds that of the first. Deterioration continues with each transmission. In the National Agricultural Library study, typical requests were illegible after the third transmission.

A library implementing telefacsimile will need to consider its impact on service policies and work flow, both to avoid confusion and to maximize the technology's speed advantages. For requests received from other locations, libraries will have to consider what speed of processing will be offered for "rush" requests. Will premium service require premium supply fees? One of the complications of telefacsimile

is that the supplying library will be charged for the long-distance charges. Will these telephone costs be recovered and, if so, how will charges be calculated when the precise cost may not be known until the telephone bill arrives? Can some sort of standard equitable charge for service be made? Can the library wait to take advantage of late-night telephone rates without counteracting too much of the speed benefit of using telefacsimile?

Libraries will have to decide what charges, if any, should be passed on to users requesting telefacsimile delivery of materials. In many studies users pay, or have expressed a willingness to pay, a small fee. Library users may request that the library transmit or receive personal messages for them. The library must decide whether to allow such access and how to charge for it if they do. The recent appearance of public telefacsimile machines at locations such as public photocopying centers may decrease such requests.

Recent Technological Developments

While libraries try to juggle all of the factors involved in the consideration of telefacsimile, the situation is complicated by the fact that the technology is constantly changing. Given the business community's enormous interest in the technology, it is not surprising that a great deal of energy is going into new developments. Some may have applications to library situations.

Much of the current interest in the business community revolves around interfacing personal computers and telefacsimile units. Some years ago, telefacsimile machines were introduced with ports allowing them to be connected to personal computers. The computers in these systems work as control and data storage mechanisms, duplicating the automatic dialing and store and forward features available on the most sophisticated telefacsimile units. In addition, software makes it possible for characters in the computer's memory to be converted into images that can be transmitted to other telefacsimile machines, allowing them to function as remote printers.

As the graphics capabilities of the personal computer have been explored, the technology has developed to eliminate the separate telefacsimile machine altogether. Recently, expansion boards have appeared that can be added to a personal computer allowing it to duplicate telefacsimile operations. To do this it must be connected to one of the scanners marketed for use in storing graphics and a dot matrix printer. Those who work with computer graphics are excited by this development because Group III telefacsimile machines' communication standards can serve as a gateway for graphics communications between computers. Previously, computer graphics have lacked standards to allow easy communication. These enhanced computers are viewed as having great potential in desktop publishing where there is a great desire to manipulate and transmit graphics. Winn L. Rosch (1987) has

provided a comprehensive overview of these developments, along with reviews of products.

Although writers in the computer literature are clearly excited about these developments, it is not clear how much impact they will have in libraries. Bruce Morton (1987) has reported on a current study among Land Grant libraries in the Pacific Northwest which will examine the use of scanners and computers in lieu of telefacsimile units. This study was set up before the telefacsimile imitation hardware was available, but it may provide useful insights into transmission without telefacsimile units. Morton stresses the need for technical support in operating such a system, a point that should concern libraries. Privately assembled systems using components from multiple manufacturers may remove much of the turnkey simplicity from telefacsimile operation. If manufactured telefacsimile units offer adequate capabilities for control and storage, it may not be worthwhile to fabricate a unit from a personal computer. A criticism voiced in the business literature is that assembled units require the use of a personal computer while operating (Voros 1987). Libraries would probably regret sacrificing the use of a personal computer in order to keep the lines of telefacsimile communication open. Unless a system can be assembled that offers all of the features and the simple operation of a sophisticated telefacsimile unit at a much lower price, it is doubtful that libraries will turn to such assemblies.

An interesting use of telefacsimile as a peripheral device is reported by David Hessler. He reviews a system developed by Kirsch Technologies Inc. that combines a microcomputer, a videotape recorder, and a telefacsimile machine. This combination allows an enormous number of images scanned by the telefacsimile machine to be stored on the videotape recorder for later transmission. The system offers other data storage advantages not related to telefacsimile, but it is far more expensive than telefacsimile units with store and forward capability (Hessler 1987).

One of the most common complaints about telefacsimile is its inability to scan anything but single sheets of text. Most libraries regret the cost and effort that goes into producing photocopies of articles to be run through the scanner and then discarded. The British Library has promoted the development of machinery that can scan directly from bound volumes. Such a machine was reviewed in 1984, but at the time it could only produce copies of pages. The review stated that an interface unit was being developed that would allow its scanned information to be sent to telefacsimile machines. Unfortunately, its purchase price would prohibit use by most libraries (Williams 1984).

As the library world examines Group III technology, the next generation, Group IV, is being introduced. This new technology offers high resolution and much higher transmission speeds. Common telephone lines cannot support these improvements; so Group IV technology can only be implemented where there are dedicated high-speed data

lines. This eliminates the economical universal access capability that makes telefacsimile valuable in library networking. Corporate libraries, in settings where such lines are available, may implement Group IV for internal communication (Finlay 1986).

Optical character recognition developments offer the most interesting competition to existing telefacsimile technology. A computer can transmit the ASCII character *a* far more efficiently than a telefacsimile unit can transmit the bits of information needed to create a facsimile of the letter *a*. If scanners that recognize letters and encode them as such in a computer's memory are developed to the point where they are highly accurate with a wide variety of type styles, these scanners will provide strong competition for telefacsimile systems. Even when such systems are developed, however, telefacsimile technology will still be needed for transmitting graphic materials or articles written in non-Roman characters.

At this stage, with Group IV technology out of the reach of most libraries in the near future, Group III technology seems fairly stable. This makes purchase of a versatile Group III machine a logical step for a library interested in telefacsimile.

The Growing Network

One of the limiting factors in telefacsimile's adoption has been the absence of other telefacsimile machines. Equipment that was not installed as part of a specific network could stand unused for lack of other units with which to communicate. This situation has changed rapidly in the 1980s for both libraries and the business community. The current library network is documented in the *Directory of Telefacsimile Sites in Libraries in the United States and Canada,* a geographically organized listing of telefacsimile machine telephone numbers, contact people, and equipment in public, academic, corporate, and medical libraries (Jones 1987). Libraries are included in the *Official Facsimile Users' Directory* which also includes machines in many nonlibrary applications (Greenfield & Maenike 1987).

Regions still exist where library-based telefacsimile machines are rare and where an individual library may hesitate to install the first equipment. In the past, grants from foundations interested in improving information services have been instrumental in setting up networks. Libraries can also take the initiative to develop networks in their areas. For example, the Montana Faxnet Project plans an involved marketing campaign to popularize telefacsimile use within the state (Brander 1987, pp. 73-74). Outside of libraries, telefacsimile equipment is widely used in the business community. Several libraries report that local businesses have been delighted with the possibility of telefacsimile contact with their local library.

Library networks are now complemented by supply services that offer telefacsimile delivery. Chemical Abstracts, the Institute for Scien-

tific Information, and University Microfilms International all offer optional telefacsimile delivery as part of their article supply services. Such optional delivery is expensive, but when budget and need are compatible, it can prove to be a valuable resource.

Network growth testifies to the potential value of telefacsimile to libraries and, at the same time, makes the technology look more attractive to libraries that lack it. As networks and services grow, more libraries will be considering telefacsimile as a communication option. As prices decrease, more libraries will be able to experiment with the technology. And as long as researchers need very rapid access to materials that exist only in print form, telefacsimile will retain its attraction.

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