ADMINISTRATIVE AND ECONOMIC CONSIDERATIONS
FOR LIBRARY AUTOMATION

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This paper might well be entitled Profile of Decision, for it is concerned with the decisions relating to the introduction of automation in a library. Indeed, several hard decisions are necessary before a library becomes involved with automation. A recent article in Library Journal pointed out that one of our Australian colleagues feels that we talk more about automation than make decisions to initiate programs.[1] Perhaps he is right: the decisions do not come easily.

The easiest decision for an administrator to make is not to automate; after all, the traditional methods have worked for years. We are all aware that some of our most able library administrators have carefully avoided automation. Whether their decisions are right or wrong is immaterial, but it is the easy decision and it is a single decision. The decision to automate comes only after a long series of other decisions in regard to specific problems.

The decision not to automate often will have the support of a large number of library users. It is obvious to them that automation of even the routines of library operations is the first step toward destroying the book. This view, of course, is unknowingly supported by some of the most vigorous advocates of automation. In a publication of the Educational Facilities Laboratory, Sol Cornberg, consultant on the programs for Grand Valley College (Michigan), indicated that reading and libraries are inefficient.[2] He goes so far as to state that reading and writing will become obsolete skills. With such quotations available in the literature, it is easy to decide that automation is not the answer for our libraries.

The uncertainty of the cost of automation, even more than tradition, is another reason to resist the machine age. As purveyors of the human record, we have failed to record the cost of automation. If dollar figures are included in the reports and articles, they are all too vague as to their meaning. The only terms that seem to have credence

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to the administration are "too much," "more than you spend today," "unreasonable," or other such figures of speech that are too often true.

Even if operational costs can be determined and funded, the administrator still has another easy out because of the problems relating to the conversion of records. Until such time as scanners are available that will read varied type-fonts, and even non-Western alphabets, the process of converting records seems impossible. And then there is the matter of what record to convert. If we were to wait on standardization of format and study of the conversion record, nothing would be done with the present generation of computers. As long as the doubts exist, however, they furnish still another reason to make the easy decision and forestall automation.

If costs of operation and conversion are unknown, other information needed to make a decision is equally lacking in details. We have all faced the salesman from company A-B-C or D-E-F who has all the answers to all the problems of our library. His equipment, and only his, will store, index, and copy everything needed. He is eager to show you a documented program of a "library" (and I use the quotation marks advisedly) of 10,000 reports that is growing at the rate of 888 reports per year. This is just the sort of information that the administrator of a large library needs: that is about how many serials he is receiving daily.

Confusion regarding automation is spelled out in College & Research Libraries on the case of circulation at Hawaii. You will recall that in the original article Cammack made the following statement:

> It [computer based circulation system] was designed to operate at approximately the same cost as the unsatisfactory manual system which preceded it. . . . Machine costs turned out to be considerably lower than expected as a result of unpredictable advantages gained through cooperative use of certain items.[3]

It is obvious that Cammack felt that the new system would be more economical than its predecessor. In a later issue of the journal Ralph Shaw stated that "the net cost of computer charging was found to be substantially more than double that of the old manual charging system, which was no model of efficiency."[4] So for the administrator who is looking for some reason to resist automation, all further arguments in favor of machines will fall on deaf ears.

The arguments against automation are plentiful and forceful. If one is inclined to wait a few years, he is not only in good company, but he might even have logic in his favor. Such will continue to be the case until we compile a core of useful data regarding mechanized programs, or until we develop adequate criteria to measure automated efforts.

In spite of the tendency to make the one easy decision, there are continued pressures on the administrator to find better techniques or procedures to meet the challenges of today's libraries. Not the least of these pressures is the university administrator or the engineer who is conscious that automation has cut costs and produced better information in other paper-oriented industries.

Computers are being used and being used successfully. In the late 1940's it was predicted that fewer than a dozen electronic computers would be able to satisfy the entire computational requirements of this country. At the end of 1966, 39,983 computers were in operation and an additional 23,443 were on order. And some of these are exclusively for library use.

Another source of pressure to use automation in libraries comes from many of our users. Not only are they familiar with automated techniques, many using them in their own research programs, but their information needs have increased at such a fantastic rate that they see automation as the only hope. As an example from my own campus, one of our highly respected professors in the biological sciences informed me that he no longer had time to read anything except Current Contents and one section of the Chemical Abstracts. His question to me was: "What are you going to do about it?" Obviously there is nothing I can do about it using the traditional techniques of librarianship. Yet on a national basis, beginning with the Weinberg Report,[5] but certainly not ending with it, are demands that librarians provide better access to an ever-increasing amount of information. Certainly the technicians will do this job if librarians do not take the initiative to do it themselves.

There are pressures on the administrator to automate placed there by his own library operation. The traditional methods are less and less able to satisfy the increasing demands being placed on the research libraries of today. First among these is the continuing need for more space for both staff and readers. The cost of the space, assuming land is available, continues to increase. If there is any way to save space by using the new techniques, then we are obligated to give them full consideration. Furthermore, the continued increase in the use of printed record is known to all. One might expect some leveling off of circulation statistics, but none seems to occur. The inventory problems facing librarians are truly difficult.

Besides the problem of keeping track of what we already have, there is the other problem of the ever-increasing amount of literature available. A recent report from Purdue University School of Engineering indicated that the number of books published in the United States doubled in the period between 1960 and 1964; that 900,500 documents were generated in the nation's technical report literature in 1965, and this is expected to increase to 1,143,000 by 1970; and that the acquisition rate of science information amounts to 250,000,000

pages annually. If we are having problems today, we can look forward to no let-up in the flood of information that we will have to handle in the next few years.

Compounding the above-mentioned problems is the fact that we do not have enough personnel. Even those libraries that have positions available are having difficulties recruiting. More obvious, however, is the fact that most of our libraries are greatly understaffed in terms of the demand put upon them by the reader and by the user. We must find better ways of using the personnel we have to accomplish our goals.

In our colleges and universities the libraries are demanding an ever-increasing proportion of the total institutional budgets for their operations. If we are to continue to use traditional methods, then we must expect a continued increase in this percentage. We should be thankful that librarians are often equated with God, mother, and country, because if they were not, the faculty and administrators would begin to ask why other programs must be curtailed because of continually increasing budgets for the libraries.

One factor, perhaps greater than all of the others, that is forcing the library administrator to reconsider his position on automation is that of the constant search for better ways to fulfill his obligations to his constituency. No administrator can supply all of the materials that his users will at some time need; but he can utilize more of the information he has in his collections better to satisfy the needs of his clientele.

If there is one thing that led me to consider automation, it was the "frustration factor" involved in the use of our collections. (The frustration factor is the relationship between the items or information supplied by the library as opposed to the unfilled requests.) There is some point in our operations where the students and faculty will not tolerate a higher frustration factor. Hopefully, automation will prevent us from reaching this point.

If one needs further motivation to automate his resources, all he has to do is re-read his Library of Congress report on automation. The committee's letter of transmittal in this report, addressed to the Honorable L. Quincy Mumford and dated December 1, 1963, begins: "We are pleased to be able to submit to you a report in which the automation of major operations within the Library of Congress is shown to be both desirable and feasible."[6] With these words the library profession was presented with a new challenge. Our previous excuses not to automate would no longer be heeded.

If it were as simple as mustering the arguments pro and con, most libraries would still be debating the point. Unfortunately, problems do not wait for us to solve philosophical differences. It was a current problem, or problems, that put us on the side of the machines.

To return to the profile of our decision at Michigan State University, it is necessary to give some history of our circulation system. In the 1959-60 school year, circulation of materials both for home use and assigned reading was decentralized in five divisional libraries. A student might well proceed to one, two, or even five different areas to charge out books for home use. After two weeks he was asked to return the books to the rooms from which they were borrowed. In extreme cases, there could be five books from five locations, five charge slips, five identification showings, five returns, five overdue slips, five fine notices (and the mail notices were not all sent at the same time), and five thousand unhappy students. In an early attempt to develop a program budget, we determined that our costs for circulation, exclusive of the students' own time, were 29 cents per transaction.

The initial solution to our problem was to centralize circulation at one point. The student would still go to five rooms to retrieve his books, but all transactions and returns were centralized in one location. Not only did this change make for a more efficient system, but our costs were reduced to 20 cents per transaction.

Centralization solved some problems but created others. As enrollments grew, and as per-student use increased, the traffic at the circulation desk grew beyond the point of diminishing return. There was limited room for staff on one side of the desk, but there seemed to be unlimited room for students on the other side. As each semester progressed, the circulation crisis increased. At peak times, especially the two weeks prior to finals, we were flooded with returned books while out-going materials still remained at their high level. Books returned two weeks prior to finals were still in demand for term papers, but they might well still be unshelved during registration for next term. The semester-end clean-up would barely be completed before the next onslaught began.

We did not need a consultant to tell us we had a problem. There were many suggested solutions, and most were tried. In our conventional wisdom, to borrow a term and a meaning from Galbraith's Affluent Society, all of the familiar and established ideas were considered. Most obvious, of course, was to hire more students to slip the books. Unfortunately, the files were in full use for renewals, charge-outs, fines, and more filing. There seemed to be no appropriate time to discharge materials. A late shift and an early Sunday morning shift were our only salvation, after a fashion.

Not so much from conventional wisdom, but more from the wisdom of our colleagues in public libraries, we even tried the use of transaction numbers. The purpose of this move was designed to cut down on filing time and discharging time. The disadvantages were that we could not report to students and faculty when a book would be returned, nor could we reserve specific titles. The advantages, we soon discovered, were tempered by the fact that fully one half of the

books were not returned within two weeks. Since our transaction file was to be limited to two weeks, with the remaining slips to be placed in the files in shelf list order, our savings in filing time did not offset the stated disadvantages of the system.

At this point we knew that the traditional methods would most likely not provide us with the type of control we felt was needed. A possible solution seemed to be with data processing techniques. One might even conclude that we did not seek out automation, but rather that we turned to it as the last resort. At any rate a decision was made—not a decision to automate, but rather a decision to consider this as yet another possible solution.

A special point should be made at this time that our primary interest was in control of the collections. No consideration had been given to cost or to a total system approach. We had an inventory record problem with circulation and we were seeking a solution. With a cost of circulation of less than 20 cents per transaction, we did not see that we could find a more economical solution.

The next decision to be made was who would do the automation. Dake Gull in a speech at Purdue pointed to four approaches: (1) the librarian himself, as personified by Ralph Parker at Missouri; (2) librarians with assistance from data processing personnel and equipment manufacturers, as at Purdue and University of California at San Diego; (3) a local team of librarians and clientele, as at the National Agricultural Library; or (4) by contract to a consulting firm as was done by the National Library of Medicine. We opted for the second choice of using our staff along with the analysts and programmers from our Data Processing Center. Even if this were not the best choice for M.S.U., others would have been rejected because I am not a Ralph Parker, the N.A.L. scheme is still more talk than program, and we did not have the funds to call in a consulting firm as was done at N.L.M.

Members of our staff were encouraged to read up on automation and to become familiar with its potential. This admonition was given generally to the staff, not just to those concerned with circulation. It seemed rather obvious that problems similar to circulation's were developing in other areas, but that they had not yet reached the critical stage.

At Michigan State we were in the happy position of having a staff in Data Processing who were sufficiently intrigued with our problem to want to assist us in finding a solution. Other libraries may not be so fortunate. If not, the funding for the exploratory study will be more difficult. If you cannot convince your administration to support your study, or if you cannot find some outside funds, then you must rely on equipment salesmen. Although some of my best friends are salesmen (or representatives), their motivation is somewhat different than ours. Still, we are fortunate that the representatives in automated data

processing equipment are as talented as they are. At a minimum they can give you the basic cost figures you need; and more often than not, they can and will help in the design of a system. Acceptance of their recommendations must be tempered only by recognition of their motivation.

The final design of our system at Michigan State University is of little importance at this time. Suffice to say that we have used a form of the usual mechanized system with which you are all familiar. Our major adaptation was to use the Friden Collectadata-30 system, which we thought would give us more flexibility for input.

In the process of designing our system, one of the important decisions was the extent of our program. A recurring theme of our discussions with the Data Processing personnel was, "Where does the design of this system end and others begin?" It seemed that when we made a decision that would affect favorably our problem in circulation, we would hinder future automation of acquisitions or cataloging. Many times we even went so far as to discard the system and start over with a total systems approach. As time went on, and as books continued to pile up in the Circulation Department, it became apparent that we had to make a decision related to the problem at hand. Hopefully we have been wise enough to design the system so that later automation of acquisitions, cataloging, and serials can be accomplished within the design. Likewise, the system has the capacity to be adapted for on-line use of computers.

Related to the extent of the system within the library are the problems of a total university-wide data processing system. The university is concerned with all aspects of data processing on campus. Although individual departments are free to design their own systems, the Data Processing personnel attempt to keep all programs compatible. A case in point is our use of the registrar's tape for student addresses. Further analysis of library use will rely on other tapes available in the Center. Likewise, all library tapes (master book tape, use tape, etc.) will be available for other legitimate uses on campus.

Other decisions were needed that related to conversion. Would we convert only those books that had expected circulation? Would we need more information than just the call number, as at Southern Illinois? If we were to convert something other than call number, what information would be needed? All of these questions, and many more, had to be answered.

In our final design we decided to convert the call number, at least a portion of the author's name and title, and the date of publication. Also, we determined that the entire shelf list record should be converted, even if we did not put book cards in all volumes. By having the above information in machine-readable form, we could create a master book tape that would have uses beyond our circulation

program. Primarily, however, we though that all this information would be necessary to maintain our circulation control.

Once the system was designed, the university's Data Processing department gave us an analysis of the cost. Although it could cost the operation, it was of little assistance in defining the extent of conversion. At this point we applied to the Council on Library Resources for a grant to test three different methods of converting records. We were concerned with verifying the statements of the various salesmen regarding their own equipment. Verner Clapp agreed to finance our study, so that we could get cost information on converting records to machine-readable tape via key-punching, paper-tape typewriter, and by scanning on a service bureau basis. More will be said on the cost of this operation later. Any analysis of the cost at Michigan State University for computer time and programmers would not necessarily hold true for other libraries. It soon becomes apparent that each university has a different manner of charging for data processing services.

The next decision related to the selection of equipment for use in the testing program. As stated above, we have gone to paper-tape for collecting our data. All other equipment was that in use by our Data Processing Center. A problem arose in that the Center did not have a paper-tape to magnetic-tape converter. Since our decision was to use paper-tape rather than cards, however, an additional converter to handle tape-to-tape has been acquired. After having equipment installed, we were able to have a trial run in parallel with our manual system. Much to everyone's surprise, the system worked.

Once the system was designed, it was necessary to evaluate it and make the major decisions regarding automation. How could we evaluate the projected system, with the projected cost, in terms of the problem we had at Michigan State University? A search of the literature soon revealed that no criteria had been established against which to measure the possible success of an automated program.

With some advantage of experience, it now seems possible to define six criteria, most of which should be met before a system is accepted. At times only some of the criteria might be met for the program to be successful; in other cases it will be desirable for all six criteria to be satisfied. If the criteria can be applied to both an automated and a manual system, in relation to a problem, the decision-making will be easier.

The first criterion, and they are listed in no particular order of importance, is that of cost. Will the system be more economical than the manual system it is replacing? Will the system save space which can be translated into dollars? Will the system save time for the user? Although these latter dollars are not budgeted by the library, they should be considered.

In applying this criterion, one should consider future costs as well as the cost of today's operation. Most automated systems have a high ratio of fixed costs to variable costs. The cost of a circulation system with 1,000 transactions per day might be only slightly less than one with 10,000 transactions. If this is so, and if the projected number of transactions will increase, the savings all might be in the 1970's rather than the 1960's. The decision, then, is one of timing in relation to present costs. Consideration should also be given to the fact that a system may be more expensive in its first few years of operation than it is later. Experience with data processing tends to decrease costs.

In applying the criteria to a proposed program, little consideration should be given to the cost of conversion. This is a decision which will have to be made later, but the system should be considered only on the cost of installation and operation. Conversion can be prorated over a period of time, or it can be considered and budgeted as a one-time cost. It seems that changing to machine-readable record is not very different from changing from Dewey to LC classification. It is a cost brought about by the changing nature of our libraries and the information they contain.

Another criterion against which a new program should be measured is its capacity to handle an increased load. This criterion is closely related to the cost criterion, but it is sufficiently different to be considered separately. If there is one thing we know about libraries, it is that they continue to grow: more books are acquired, the birth rate of new serial titles is exceedingly high and is reflected in the growing list of serials, circulation refuses to reach the point of no return, and there is a seeming insatiable demand for new services. The record of growth of research libraries reveals that any new system must have provisions for growth; and we should probably consider geometric growth rather than arithmetic growth.

The third criterion relates to the better utilization of resources, specifically the use of library materials. Will the system permit us to utilize more fully the resources available? In the case of the M.S.U. circulation department, the automated program makes it possible for us to have books back on the shelves in a fraction of the time that was possible under the manual system. Since the books in circulation tend to be the same ones that other students need, we will receive much fuller utilization of our resources than under the manual system.

Other automation programs, and future automation programs at M.S.U., offer more startling examples of the utilization of resources. Depth of indexing, permutation programs, and retrieval systems are outstanding examples. Printed catalogs, and even the potential of printing sections of the shelf list from our master book tape, will make collections more readily available to the library user.

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The fourth criterion is that of more complete and/or additional reports. In most cases of automation, libraries have ended up with more reports about more aspects of their operation than they had ever thought possible. We may find out too much, of course, but we are better off with too much than with too little information.

Operations research workers are closely associated with automation. Information from automated programs, in their hands, yields most interesting results. They have done much of their research without our automation, but the more information we give them, the more they can do. For example, by applying queuing theory to circulation, they have found that if a book circulates for two weeks, to eight different people in one year, then two of the eight users will be seeking the book when it is off the shelves. What does this say to us in terms of duplication? Can we program our computers to tell us when a title has X number of circulations in a period of months, so as to decrease the frustration factor? How useful is such information in relation to cost of the program? We might be wise to accept a system that costs $20,000 a year more than the manual system if it provides us with enough additional information. Since we are unaccustomed to having such information, we find it difficult to equate it with dollar value.

Better reporting for day-to-day operations is one of the noticeable aspects of automation: books in process, outstanding orders, acquisition lists, books in circulation, overdues, and many other aspects are the subjects of standard reports in automated systems. Decision-making and operations are made easier by having this information. A system designed with too many reports can be adapted more easily than one with inadequate reports.

Acceptance of a system by the user, and even by the staff, is another criterion to be considered. We are all aware of SCUM (Student Committee to Undermine Machines), and I even consider joining when I see some systems—especially those that generate demands for payment. The influence of SCUM can be ignored, but not what it signifies. The best-laid plans of any automated system can be hampered by the users. They do not have to love the computer, but they should accept it. In order to meet this criterion, a system should be designed so as to provide the user with more information or better service. If possible, the user should be informed as to why automation is being installed and how it will work. With our circulation system we had almost instant acceptance because the user no longer had to fill out call slips with call number, author, title, name, address, and student number (a process which consumed over 4,000 student man hours last year). Secondly, as important as acceptance by user is acceptance by staff. If the system does not meet their expectation, or if they do not understand the routines for operating the system, then a wise administrator should proceed with caution.

The last criterion to apply to a system is that of accuracy and currency. Will we be provided with more accurate and more up-to-date records? A system with accurate records that are not current cannot meet this criterion. A printed catalog, for instance, that cannot be up-dated as often as required would not meet this criterion. The Hawaii circulation system as described by Shaw, taking an average of 3.3 days to get a record into the computer file and in some cases up to two weeks, would not meet the criterion.[4]

If this criterion were applied to our manual systems, and if we examined the current serial records of large libraries, it is likely that few if any of them would meet a proper standard of accuracy and currency. The lack of accuracy in our manual systems was brought before millions of readers recently in *Life* magazine's story about the lost notebooks of Leonardo da Vinci, which stated: "It had been known for years that the notebooks had belonged to the library, but they were miscataloged a century ago and numerous searches failed to turn them up."[7] Such a statement makes us wonder how many "lost" items are in our own catalogs.

In applying these criteria to new automated systems, it is impossible to devise a formula or to give scores rating each of the criteria in order to arrive at an objective evaluation. Each situation, each problem, and each system must be judged subjectively. At the same time, however, it is necessary to apply the criteria to the present manual system. It is best to weigh both systems against each criterion before reaching a decision.

It is obvious that knowledge of past history and projections for the future are necessary to make a judgment. What are the current costs for circulation, acquisitions, or cataloging? What is the projected scope of the operations? Can costs be projected on a direct ratio, or is there a point beyond which present systems cannot be expanded? These are questions you must ask and must answer before becoming too involved with automation.

Once the proposed automated system has been measured against the criteria, the decision to proceed or not must be made. All decisions to this time have been preliminary. If this paper were being flow-charted, we would now have the decision box with a plus and a minus. If we opt for the latter, we can stop; if for the former, there will be more decision boxes.

The first decision that has to be reached after one decides to continue with automation concerns conversion of the records. In our case we had to decide whether we would convert only the call number, a partial bibliographical record, or a complete bibliographical record. Southern Illinois had completed its conversion for circulation by using a mark-sensed form on which call numbers were indicated. These forms were then sent to a service bureau to be transcribed and to have book cards produced. This seemed to be a very inexpensive and effective way of doing the project. The disadvantage of the

system is that the only information given in machine-readable form is the call number. Overdue notices and other communications with the user are strictly with numbers. It was our decision that we needed more information than the S.I.U. procedure would allow. Not only would we want to communicate with our students by title and author, but we could see further uses of information in a total library system.

At the other extreme from Southern Illinois is the project that is now under way at the Library of Congress. The MARC project will provide complete bibliographical information. At the time of our decision, no national program had been developed, nor was information available as to what would be put in machine readable form for the L.C. project.

At Michigan State University, we allowed 35 spaces on a card for call number and copy, four spaces for publication date, and 40 for the author. In most cases we can get the complete name, but in cases of corporate author we ended up with only the first 40 characters. A second card was keypunched, or the tape was extended, with a repeat of the call number and the first 44 characters of the title. We felt that this information was not only necessary for circulation, but that it had some other uses. Specifically, we had the capability to print out portions of the shelf list as demanded by users. We could even print out some sort of an author list, or all of our holdings, if we so desired.

The next decision made by us was whether we should key-punch, use paper-tape typewriters, or find another method of converting the records. Each of the salesmen had convinced us that his method was absolutely the most economical. As mentioned above, we received a grant from the Council on Library Resources to test three methods. It is with some hesitation that I give you a report on our findings. Since the final results will not be known until later in the year, the following must be accepted for what they are: preliminary.

At this point in time, it appears safe to say there is no appreciable difference between keypunching, using paper-tape typewriter or having the shelf list scanned by a commercial service bureau. The costs of each of these are as follows: keypunching, .0392 cents; paper-tape, .0464 cents; and service bureau, .0575 cents. In the case of keypunching, costs are on the basis of producing two cards; paper-tape includes cost of producing tape and converting it to cards (the tape-to-tape converter has just recently been acquired); and the service bureau figures are for typing, scanning, and production of magnetic tape. All records are placed on the master book tape and a book card (35 spaces for call number, 12 characters of author, 26 characters of title and 4 spaces for publishing date) is produced by the computer.

The cost figures reflect an average cost for a number of operators. There is a notable difference between production of individuals.

One of our key operators, originally trained as a key puncher rather than typist, meets the average cost (.0392) for keypunching but produces paper-tape entries at a cost of only .0375 cents.

We are likely to recommend that anyone who is converting a large number of records should use a service bureau. It is true that there is the disadvantage of the shelf list being off campus for a length of time. The ease with which the project can be completed by a large number of typists employed just for this job more than offsets the two week inconvenience of some records being temporarily unavailable. On a continuing basis, our study will likely show that paper-tape typewriter is the most convenient, even if not most economical, way to up-date your files.

We have often been asked about the economic value of our circulation system as compared to the manual one. This was of primary concern to our budget officers as our records were being converted, because we would need several thousand more dollars to operate the automated system. Since book cards would not be available immediately for all books, the two systems were to run in parallel for a time. Our entire data processing costs were to be new dollars in our circulation budget.

From the beginning, we knew that it would cost us more per book circulated with the automated system. At the same time, we knew that at certain periods of the year we lost complete control of our inventory record. We were more concerned that we have an efficiently operating system than that we have a more economical system which did not work when we needed it most.

All of the criteria listed previously, with the exception of present savings, could be met by the system. And although present savings could not be shown, potential savings could. On a chart of projected costs, with the y-axis being time and the x-axis being cost per item circulated, present costs of manual system start low but rise rapidly as amount of circulation increases; automated costs start higher but then will decrease per item as more books are circulated in future years. Although we will spend more in 1966-67, we expect the lines to cross in 1970. The losses for three years of operation will be accounted for in the future.

At present, about one-third of our circulation is on the automated system. Even this amount has saved us from the quarterly crisis. As we are just now entering the week of final exams, the circulation desk is operating and books are being returned to the shelves. The many decisions have given us a workable system.

It is difficult to segregate programming, conversion, and operational costs of the manual and automated systems. At the present time, however, it is our tentative estimate that the automated program will cost 20 percent more than our manual system. We continue to evaluate the program, to make adaptations, and to change flow

charts. As we gain more experience with data processing techniques, we are encouraged to move into serials, acquisitions, and other library operations.

A high portion of the cost of automation is equipment. Even though we work through the university's central Data Processing department, several dollars are being expended for equipment rental for the library. For efficiency, all equipment should be utilized as fully as possible. We are considering a number of different programs to take advantage of the available equipment. A specific example of equipment utilization is our student payroll. We have one Friden machine available as standby equipment. In the total Collectadata-30 system is a clock. Time cards were made for all 350 of our student employees. The Collectadata acts as our time-clock for each student. Total hours worked are recorded daily on the tape for each student. The paper tape is sent to Data Processing and records are forwarded directly to the payroll office. Not only do we have a more accurate record of the time students work, but it has been accomplished with a 15 percent saving in the time of our payroll clerk.

There will be other decisions regarding automation as we gain experience. It is even possible that the most difficult one of all will have to be made—the decision that automation does not work after all! I hope that if that time comes we have the wisdom and the courage to admit it. In the meantime, we are pleased with the few small steps we have taken.

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