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The Anatomy of Failure in Library Applications of Computer Technology

THIS PAPER IS AN analysis of a community college district's attempt to introduce computer technology into the operation of its five libraries. In spite of the fact that the conversion from the Dewey Decimal Classification system to the Library of Congress Classification (LCC) system, which initiated the effort, began about nine years ago, the basic causes of failure are as relevant today as they were then because they are rooted in the minds of those responsible for them: librarians, computer specialists and institutional executives. Involved in the project were five libraries serving the district's five campuses, a centralized acquisitions and processing unit (referred to here as library technical services or LTS) responsible for ordering and cataloging materials for the district's five libraries, and the district's computer center.

The efforts to convert to the LCC system, produce new catalogs for the district's five libraries, and automate the cataloging process were in every respect an unmitigated disaster for the 30,000 students in the district, the faculties of the colleges, and the taxpayers who unknowingly poured several hundred thousand tax dollars into the project and had nothing to show for it. The impact of the failure was particularly severe on the newest of the five campuses, which accepted its first class of students about a year after the Dewey-to-LCC conversion project began and entered its third year without a usable catalog to its collections and little hope of having even a minimally acceptable tool for at least another year. The only ones able to ride serenely through the lamentable episode were,

of course, the administrators in the district headquarters who knew nothing about libraries as either technical or educational institutions, and who were unwilling to heed the advice of those who did, even after paying handsome consultant fees to obtain it.

This story is based entirely on documents produced by the individuals and groups involved in the conversion project. These documents include minutes of meetings of the planning group, project status reports, miscellaneous memoranda related to the project, and two consultants' reports, one commissioned before the conversion project got underway, and the other after its failure could no longer be ignored.

The story begins on February 19, 1969, when, after more than one and one-half years of argument and discussion, the instructional materials committee (IMC), composed of the heads of the four campus libraries,¹ the head of LTS and the vice-president for academic affairs, finally agreed to recommend the adoption of the LCC system to the president and governing board of the community college district. Since hundreds of libraries had previously followed this same path, the committee's recommendation was hardly noteworthy except for the unconscionably long time it took to produce it. Several factors, however, made it the equivalent of opening Pandora's box.

In the first place, the decision to adopt LCC was not really the result of a critical assessment of its merits as opposed to those of the Dewey Decimal system, but was rather an act of desperation, the roots of which lay in the failure of LTS to acquire and process library materials in a manner congruent with the needs of the four campus libraries—or of any library for that matter. The heads of the campus libraries and the academic vice-president believed that shifting from the Dewey Decimal system to LCC would somehow compensate for the lack of management and technical expertise which had crippled the operation of LTS since its inception.

The reasons for LTS's failure are all too common to the history of such organizations. The director had no authority to develop and enforce standardized systems, procedures and products. Everything the unit did had to be unanimously approved by IMC, which meant it had to cater to the idiosyncratic practices of all four of the libraries it served. In addition, the quality of the work produced was seriously deficient. For instance, when the librarian for the newest campus in the system arrived on the job, she found that books had been ordered for the "turnkey collection" solely on the basis of whether or not three of the four original libraries already held them, with no regard for changes in curriculum, or outdated or superseded material. She further discovered that all books ordered for the new library had their file access point determined by untrained student

assistants, which resulted in multiple copies (e.g., one copy ordered under *editor*, two or three under *works*, and one under *publisher*) and that in creating the collection, no thought had been given to standing orders or to the need for back runs of journals and serials.

It is conceivable that inspired and competent management might have overcome to some extent the constitutional weakness of governance by a committee, but these qualities were sadly lacking at the time the conversion project was undertaken. In the face of these conditions, it is not surprising that at the time it was decided to adopt LCC, the unprocessed backlog in LTS was approximately 11,000 volumes² and the average time between placement of an order by one of the campus libraries with LTS and receipt of a fully cataloged and processed document was an unbelievable 502 days.³

Given this chaotic situation, and the magical qualities attributed to technology by the uninitiated, it is really not surprising that as IMC moved toward its final recommendation to adopt LCC, the computer loomed larger and larger in discussions of how to handle the conversion project and ongoing technical services operations. Thinking in this direction had certainly been stimulated by the district president, who had communicated to IMC his interest in exploring the use of the computer to upgrade library services to students and faculty.⁴ As IMC studied the problem of reclassifying 104,000 titles representing approximately 129,000 volumes, the computer began to emerge as the *deus ex machina* not only for creating the necessary new catalogs, but for overcoming the undeniable performance deficiencies of LTS. The willingness to believe that it is possible to superimpose sophisticated computer technology over basically inefficient manual operations and achieve anything other than chaos has probably caused more "computer failures" than any other variable; what emerged in the case under discussion is a perfect example.

Several weeks before IMC finally decided to undertake the reclassification project, the committee chairman had, in the course of a trip through California, spent "a few hours"⁵ in the library of Foothills College, which had recently completed a reclassification project of 50,000 volumes. The project had taken just thirty-seven days and the computer had been used to produce book pockets and spine labels.⁶ In a memorandum to the district president on his return (which in many respects is the key document in this case study), he noted that his visit to Foothills College "began to open the door to a new look at the conversion project utilizing the computer."⁷ It also opened the door to ultimate disaster. A project which for so many months had seemed complex and costly suddenly appeared simple and cheap. The typists in LTS would be trained as keypunch operators. The shelflist would be punched on tab cards. "Then," he continued euphorically, "the computer will enter the picture and provide

us with conversion labels, catalog cards, book catalogs and any other service we may require. The actual conversion of our present holdings . . . will be done between semesters in the year 1969/70. . . . With the libraries closed (during the summer) and with adequate student help, we should complete the process in a crash program [before the start of fall semester]."⁸ This reference to the use of student help is significant. After the conversion process actually got underway, both students and clerical help were employed to convert bibliographic records into machine-readable form without adequate training, supervision or checking operations. The result was that even had LTS and the computer center been able to solve the programming and hardware problems which plagued the conversion project, the quality of the resultant catalogs would have been so low as to make their production an exercise in futility insofar as the needs of librarians or library users were concerned.

Attached to the memorandum from the chairman of IMC to the district president recommending the conversion project was a tentative cost study of two alternate methods to produce the new catalogs for the campus libraries, one using xerography and the other the computer. For the former, the estimated cost was \$92,000, for the latter, \$24,000. Significantly, the figure for the computer-based alternative did not include the costs of software development, testing, debugging or computer time, and neither approach considered the costs to the campus libraries for such things as gluing on book pockets and spine labels and inserting book cards.⁹

Enthusiasm for the computer alternative permeated the entire memorandum. Not only would the computer produce byproducts not possible if xerography were used, but the unit cost would be approximately twenty cents per volume as compared to approximately seventy-one cents. The chairman of IMC had caught a glimpse of the best of all possible worlds. A computer-based project would not only be better in terms of overall benefits, but it would also be cheaper.

These cost estimates are a perfect example of the willingness of the naïve to believe in miracles. Less than a month before they were transmitted to the district president, IMC had rejected as unrealistic the per-volume conversion cost of fifty cents reported by Daniel Gore in the May 1968 issue of *College and University Business*.¹⁰ However, once the computer moved to center stage, almost anything seemed possible—even a per-volume cost that was half what Gore reported. Later cost estimates eventually produced a budget for a computer-based conversion project of almost \$65,000.¹¹ This figure, however, like the previous estimates, did not include either computer center or campus library costs, and it still projected a unit cost which IMC had previously rejected as unrealistic.

Lost in the IMC chairman's idyllic vision was any remembrance of

the difficulties reported by the head of the Foothills College library with the computer aspect of its conversion project, which among other things forced the abandonment of the original plans for the book catalog. In a long description of the project sent to the chairman of IMC's Subcommittee on Planning and Development, edited here for clarity, the librarian wrote:

Computer problems? They are impossible to enumerate. You name it and it happened. The programming was inadequate and the computer continually stuttered. The Dewey control number was used for producing the spine labels [book pockets and book cards]. At times, the computer would tear madly on for 100 labels printing an identical Dewey number with different LC numbers. If .5 was a good decimal, why not double it and make it .5.5? The big problem at Foothills was that the IBM people simply did not understand library terminology or needs, and they were more interested in what they thought they could do than in producing what the library said it needed.¹²

This last comment, born of firsthand experience, echoes a standard joke among computer users about IBM, which paraphrases John F. Kennedy's well-remembered plea in his inaugural address, "Ask not what IBM can do for you, but what you can do for IBM." Unfortunately, its implicit message to the neophytes in IMC about to undergo their first encounter with the magic machine went undetected.

Captured in the communication of the IMC chairman to the district president outlining the potential of the computer, and in the words of warning contained in the letter from the head of the library at Foothills College, are the primary causes of what is called, in a totally illogical way, "computer failures"; they are not computer failures at all, but the failure of human beings to use technology effectively. In spite of the fact that almost two decades have elapsed since the first large-scale attempt at Florida Atlantic University (FAU) to link computers and libraries, the attitudes which produce the human failures continue to exhibit a disturbing vitality. On one hand, there is the groundless enthusiasm exhibited by the IMC chairman with respect to the complexity and costs of computer-based library systems; and on the other hand, there is the equally naïve arrogance of the computer specialists who often promise more than they are ultimately willing to produce. To combine these attitudes with managerial and technical incompetence, which was the case in the example under discussion, will yield the inevitable result—unmitigated disaster.

About a year before the die was cast to opt for a computer-based

conversion project and an ongoing automated processing system, IMC recommended that a team of consultants be hired. The recommendation was approved and a contract was signed with Donald W. Johnson, Assistant University Librarian, Arizona State University, and James M. Turner, Jr., Systems Analyst, Wisconsin State University at Whitewater. The consultants were charged with evaluation of "the [district's] processing center together with the possible applications of electronic data processing methods not only to the operations of the Center, but also to the member Libraries."¹³ In May 1968, the consultants submitted their report. Had the district followed its major recommendations, it is possible that not only would a successful reclassification project have resulted, but a solid foundation might also have been laid for an eventual transition to some kind of computer-based processing system.

Although the consultants attempted in every way possible to cushion the impact of their findings, these were of such a nature as to make it impossible to do so. Their conclusions were as follows:

1. That the conversion could not be undertaken with any hope of success without a complete administrative reorganization of LTS.
2. That entirely new manual processing systems and procedures had to be developed with the necessary manuals in order to clear out existing and prevent future backlogs.
3. That a new head of LTS should be recruited nationally rather than from district personnel, and that this person be given authority congruent with the responsibilities of the position.
4. That only after all of this had been achieved should the conversion project be undertaken and planning begin for the eventual automation of the processing system.
5. That xerography should be used in the conversion project for the creation of the new catalogs for the campus libraries.

Insight into the depressing situation which the consultants found in LTS can be seen in one of their summary comments. "The picture we have painted," they wrote, "attended as it is with a host of recommendations, could incline the reader to the view that everything is now in such a mess as to be hopeless."¹⁴ This turned out to be an extremely prophetic statement.

None of the consultants' major recommendations was acted upon. IMC, stung by having the deficiencies of LTS (and by implication, its own) clinically revealed, pulled into a defensive shell. Its appreciation of the report, forwarded to the district president on June 6, simply noted the desirability of beginning the reclassification project on September 15, 1968. Nothing was said about the method to be used.¹⁵ Nine months

elapsed between the submission of the consultants' report and the final decision to reclassify the collections and produce new card catalogs from an automated cataloging data base. It was during this period that the chairman of IMC visited Foothills College and came under the spell of the computer. The recommendations in the consultants' report (regarding the necessity of complete reorganization of LTS before considering the possibilities not only of automation but the reclassification project itself) were forgotten, and on March 5, 1969 the countdown toward disaster began. The budget for the project was set at \$64,677 and the target date for completion—January 1, 1970.

The monthly status reports from the head of LTS to the district president and the governing board began on a predictably optimistic note and, just as predictably, progressively degenerated into a litany of mounting problems and extended deadlines, ending with the final collapse of the project two and one-half years after it was launched. At the end of the first month, the head of LTS happily noted that "no problems have arisen to alter plans for producing the card catalogs for the campus libraries between the first and second semesters of the academic year."¹⁶ In the report covering the project through the month of August, note was made of the first problems with developing the necessary programming, and the district president and the governing board were prepared for the first extension of the January 1, 1970 deadline. The September report read:

As we noted last time, our programming has been falling somewhat behind. Partly this has been because of the problems we have had in fully utilizing the "talent" at the Arizona State Prison . . . [nevertheless] at this point in the project, we still continue to move reasonably well and there seems to be no compelling reason why we cannot meet our calendar requirements of physically converting all present book holdings between semesters. The next three months will be critical, however, and there is always the possibility that we may have to change to the alternative plan of converting at the end of the second semester.¹⁷

The reference to utilizing the talent in the state prison refers to the fact that there were insufficient keypunchers in LTS and an effort was made to have some of the work done by the inmates enrolled in an ADP training program. The idea had merit, but only if the proper training, supervision and checking were supplied by LTS. These basic elements of an efficient processing system, as Johnson and Turner had pointed out, were, however, missing in LTS's own operations. Consequently, the prison keypunching operation only compounded the bibliographic chaos being created within LTS itself.

Within another month, the head of LTS expressed serious concern over not obtaining sufficient computer time to complete the project on schedule. After five months of the project, it was estimated that the printing time alone for spine labels, book cards and catalog cards would come to 318 hours, and that getting that much time on a multipurpose computer serving the needs of an educational establishment of over 30,000 students was going to be a major problem.¹⁸

The December status report confirmed the earlier hints of a rescheduling because of programming problems and the unavailability of computer time. The completion date for the project was reset at June 1970. Somehow, extending the deadline six months seemed to create the impression that the problems hounding the project would dissipate and the report ends on a new note of optimism: "As matters now stand," wrote the head of LTS, "everything is proceeding smoothly. . . . We should be ready on time."¹⁹

Three months passed and anxiety once again replaced optimism. The status report for March 1970 warned that "strenuous and extensive efforts" would be needed to meet the new deadline. This document is unusually significant in that it unconsciously reflects the growing sense of panic on the part of the head of LTS, the chairman of IMC, and the head of the computer center over the status of the project. In a budget summary at the end of the report, mention is made of planning for "disaster-averting contingencies" and the probable availability of funds to compensate for "legitimate disasters."²⁰ This latter phrase is intriguing. In mentioning the possibility of a "legitimate disaster," perhaps the authors viewed themselves cast in the role of the Greek tragic hero—good men doomed to destruction through no fault of their own. In any event, the concept presupposes that there are illegitimate disasters as well as legitimate ones produced by the attempt to unite computers and libraries, and that it is somehow possible to distinguish them. However, it is probably best to leave this kind of philosophical speculation to John Kountz, whose specialty is dealing with such semantic enigmas.

In June 1970 the project had entered its second year and the deadline for completion had to be extended again. This time it was set for the break between summer and fall semesters. The status report for the month also noted that the processing of current acquisitions (which had ceased a year before when the conversion project had begun) would soon be underway again and that the campus libraries could expect some completely processed material by the opening of school in September.²¹ The librarians were to be as disappointed in their hopes of this as they ultimately were for the successful completion of the conversion project. As a matter of fact, the conversion project and its mounting problems absorbed most of the limited energies of LTS for the two and one-half years of the project's

existence, and during this period, the flow of current acquisitions to the campus libraries was slowed to a trickle.

The months rolled by and in April 1971, two years after the conversion project began, the district president sent a memo to all concerned congratulating them on its successful completion. At an IMC meeting several days later, the representatives from the campus libraries demanded to know the reason for these congratulations, since they were still without usable catalogs and had no hope of receiving them in the near future. The head of LTS acknowledged that he had written to the president informing him that the project had indeed been completed, and he considered this to be so since the union shelflist was in the computer and three of the five libraries had recently received new individual shelflists. In his view, the catalogs for the campus collections were immaterial and besides, they would arrive in due time.

Obviously, the heads of the campus libraries could not accept this kind of self-serving sophistry and they expressed the view that it was incumbent on the head of LTS to clear up the misunderstanding which he had created in the president's office.²² Since he was not inclined to do so, they were forced to take their complaint directly to the district president. They pointed out that not only were the campus libraries still without usable catalogs, but that even if all of the technical problems which plagued the project could be overcome, producing the catalogs from the unedited, error-laden data in the computer would be nothing short of a Pyrrhic victory. The district president was unmoved and supported the view of the head of LTS that the project had been completed; the fact that the campus libraries were still without catalogs was beside the point. (This incident in some ways is reminiscent of Art Buchwald's solution for ending the Vietnam War. All that was needed, he said, was for the United States to choose a propitious moment to declare itself the victor and then march off the field of battle.)

Nevertheless, it is probable that the complaints of the campus librarians had some impact, because shortly afterward, the district president invited Dr. Robert Hayes of the consulting firm Becker and Hayes, Inc. to audit the project. Dr. Hayes spent one day in LTS and submitted a report on June 4, 1971, stating that: "It is unlikely that the conversion project of your LTS division as presently scheduled will be completed as of the beginning of fall semester, 1971. The completion of the catalogs will probably require six months or more."²³ He proposed that the community college district engage his firm for a period of six months during which it would produce a "management program for delivery of catalogs, completion of backlog cataloging and management of LTS operations."²⁴

Hayes's proposal is a particularly bothersome aspect of this case

study. It is possible that his firm could have provided the management and technical expertise to produce the new catalogs within six months, but the question of whether or not it was worth doing was never addressed in his report to the district president. During his one-day site visit, the campus librarians had documented the unsatisfactory quality of the bibliographic data in the computer. Yet, in spite of this, he recommended producing the "base catalogs from the files as they now exist with corrections as they now are known."²⁵

Several explanations are possible for this recommendation which ignores one of the fundamental weaknesses of the conversion project—the unreliable data going into the computer. The most plausible explanation, however, is the tendency of the computer specialist to believe that anything technically possible is always desirable. A similar situation occurred at FAU where numerous postmortem sessions with the director of the computer center failed to convince him that the technical accomplishment of producing the first computer-based university library catalogs was completely negated by the miserable quality of the bibliographic data they contained. The district did not accept Hayes's offer, and it is just possible that some perception of the soundness of the adage "garbage in—garbage out" had developed from the district president's confrontation with the campus librarians. Perhaps someone belatedly remembered the Foothills College library director's warning that computer experts are often more interested in what they can do than in producing what a library needs.

In any event, another year went by before the pretense that the conversion project and LTS itself were anything but a shambles was finally relinquished. By July 1972 the district had initiated a pilot project for purchasing book-processing kits from 3M Corporation and Richard Abel Company in an attempt to reduce the accumulated backlog of unprocessed material.²⁶ In addition, the largest library in the system was ordering its books directly from vendors instead of through LTS, and two other libraries were using the catalog of a nearby university library in order to correct the mistakes on the card sets supplied by LTS. In short, centralized acquisitions and processing for the five campus libraries had totally collapsed under the impact of the computer-based conversion project.

As a reward for presiding over the debacle, the head of LTS was given a sabbatical leave in the summer of 1972 to study for a doctorate in library science, and the head of the computer center was appointed interim head of LTS. His appointment was accompanied with both a mandate to investigate the causes of the inefficiency of LTS and the authority to take whatever steps were necessary to correct the situation. Since he

was one of the important contributors to the disaster, the irony of his appointment was a fitting climax to the entire unfortunate affair. For three years students had suffered varying degrees of aggravation, frustration and deprivation trying to use libraries without adequate catalogs (or in the case of the newest library, without a catalog at all). For three years faculty had been annoyed, inconvenienced and distracted from their teaching. Much time had been wasted in fruitless meetings and probably more than one-half million dollars had been wasted in direct and indirect project costs.

The fundamental cause of the project's failure was incompetence combined with a bad case of narcissism on the part of the administrators, librarians and computer specialists involved. This was evidenced by IMC's rejection of the major recommendations of the original consultants' report which had forcefully pointed out the need to reorganize LTS completely under a new head, recruited from outside the district, before attempting the conversion project. An idea of the unfitness of this unit to acquire and process materials for five libraries may be demonstrated by the facts that, at the time of the consultants' visit, it did not possess a complete copy of the *National Union Catalog*, did not own the latest edition of the *Union List of Serials*, did not subscribe to *New Serial Titles*, did not maintain a subject authority file, and did not even have an automatic edge-gluer.

It is important to remember that the IMC chairman was the academic vice-president of the district who, on his own authority, could have recruited a new head of LTS with the kind of managerial and technical expertise which had been lacking since the day LTS was formed. Instead, he chose to believe that his perception of the situation in LTS and his own knowledge of the technical aspects of buying and processing books was more acute than that of the specialists he had called in as consultants. The same attitude came into play when he disregarded the advice of the head of the library at Foothills College to temper enthusiasm for a computer-based project with a critical assessment of what it would take to make it successful. It should be noted here that in spite of the problems encountered at Foothills College, a determined, hard-nosed, competent librarian succeeded in overcoming them, and that a major reason for her success was the absence of an overarching bureaucracy with the capability of stifling professional competence through its inevitable tendency to prevent anyone from "rocking the boat."

When the folly of attempting a computer-based conversion project without first bringing LTS to an acceptable state of efficiency became evident, it was impossible for anyone involved in the decision to admit it. Consequently, in spite of mounting costs and disastrous results, the

project ground on until it died of its own inertia rather than through administrative action. As a sidelight, it is worth noting that in the summer of 1970, a library administrator and a computer specialist who had been closely involved with the failure of the larger and more complex computer-based library project at FAU joined the staff of a nearby university library. By this time, the conversion project was a little more than a year old and in serious trouble. Yet neither of these individuals was ever consulted about the causes of the failure at FAU or the lessons to be learned from it.

I wish we could say with some confidence that, as we approach the end of two decades since the first large-scale attempt to develop fully automated library systems, experiences such as the one just related are unlikely to recur. I cannot, however, as the attitudes which cause them are not easily eradicated. Of more importance is the possibility that failures in the future, the consequences of which will dwarf anything described here, may go unrecognized.

With the freezing of the card catalogs in the Library of Congress approximately two years hence, and with LC's implementation of AACR II, the era of the automated cataloging data base will finally have arrived. Many would argue that this landmark event in the history of librarianship occurred some five or six years ago when OCLC became operational, but the fact remains that for libraries subscribing to its services, OCLC is primarily a source of machine-produced catalog cards rather than a means of escaping both the escalating costs of maintaining card catalogs and the physical and intellectual limitations such catalogs impose on library users. In a sense, OCLC's brilliant success has had a mesmerizing effect on a large part of the profession by fixing librarians' gazes on the wonders of computer-produced and alphabetized catalog cards when they should be fixed on moving as rapidly as possible toward relegation of the card catalog to its honorable niche in library history. If we fail to move aggressively in this direction, it will be a computer failure born not so much of ignorance, naïveté and incompetence (as in the case study just presented) as of a kind of smug satisfaction and a desire to bask in the warmth of yesterday's accomplishments. However, despite its parentage, a failure of this nature will be no more legitimate than the one whose history has just been reviewed.

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