Determining Requirements for a New System

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THE REQUIREMENTS ANALYSIS PHASE of a complete systems analysis brings together the analyst (the innovator) and line personnel (who may harbor anxiety toward innovation). Through many hardworking sessions, the analyst is supposed to come to understand the procedures utilized by line staff, to appreciate the problems encountered, and to elicit suggestions for ways to improve things. Line personnel, impressed by the empathy of the analyst, shed their fears, roll up their sleeves and become allies and partners in the process of determining requirements. In a climate of mutual respect and admiration, line personnel and analyst consider not just the desires of the studied department, but the greater good of the whole library. The analyst then departs for a few months, only to return with a perfectly tailored system that is easily installed and works to the immediate satisfaction of all using it. This is certainly close to the picture one gets from the literature, including some of our own previously published works.[1]

Now let us go to the real world. Requirements analysis work, in the classical sense described in textbooks and articles, is seldom done. When it is, it may be hampered by difficulties and fail to achieve desired results. Library analysts, foreseeing the problems inherent in a classical analysis, have devised shortcuts which work, which enable management to make decisions, and which have become commonplace. The remainder of this section will discuss the reasons why departures are made and why studies fail even when the best efforts are made to do an ideally planned study. The following sections of this article will describe the classical approach and contrast it with the authors' per-

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sonal experience and observations of how requirements have been established by real people working in the real world. Then several actual modes of departure from the classical method which offer some hope for success will be summarized. The reliance upon personal experiences and observations is occasionally necessary because of a lack of published information about many actual requirements studies. A survey of the literature yielded several publications on "how to" conduct a requirements analysis and some reports of actual studies. (See Additional References.) The reports on actual studies tended to be the more thorough studies. The shortcut techniques are not often documented.

The requirements analysis may fail because it focuses attention on the need for actions which the concerned library staff really does not want to take. This happens when new systems or changes in existing systems are proposed which may cause librarians more work or require that they learn new skills in areas where they currently have little interest. Involvement in the process of change via the mechanism of the requirements analysis works really well only for those who see their preconceived ideas and goals being integrated into the overall planning. Obviously, with major new systems, all preconceived notions just cannot be incorporated, and a single librarian's expressed discontent can catalyze widespread fear and mistrust of the change-makers and their allies.

Where development costs are high (as is the case for many automated systems) requirements analyses have been expanded in the attempt to encompass multiple institutions in order to share the costs. Attempts to reach consensus on a common course of action involving a significant degree of behavior change in several relatively autonomous organizations invite failure before the discussions even begin. A careful systems analysis often reveals an optimum course of action for the overall operation which produces suboptimum results and possibly, degraded performance, for some or all of the participants. If, like typical defense or aerospace systems development efforts, we were dealing with mechanical systems or groups of people yet to be organized, the problem of suboptimization of some elements of the total system would not be objectionable because there would be no one to object. But that is not usually the case with systems development efforts for our libraries. Intelligent people, working in relatively stable and tradition-based environments, are told by well-meaning analysts that they must change their behavior in a way which seems unnatural, uncomfortable,

and perhaps even irrational, for the greater benefit of the larger organization.

If approaches which depend on achieving a consensus among working librarians have been less than spectacularly successful, then it is reasonable to give careful and serious consideration to approaches which rely on the judicious use of power. Writers in the past have tended to use a great deal of restraint when discussing this Machiavellian aspect of systems work. The literature is replete with Milquetoast references to "the need for top level management support of any major systems effort." The key factor in assessing the effectiveness with which power is used seems to be the decisiveness with which the chief executive acts. Of course students of management practice have been saying things like this for years. What has been lacking in libraries is not the will or determination to act, but knowledge and experience of workable strategies for implementing successful change. Naturally, a manager is reluctant to act when his or her advisors present conflicting views, and the results of many requirements analyses foster such conflicting opinions.

Where does this state of affairs leave those who believe that the application of new technologies to the problems of library operation does indeed make sense and should be pursued? One could, of course, stop tampering with established organizations and concentrate attention on commercial developments and new libraries.

When commercial organizations (e.g., Richard Abel Co., Information Dynamics Corporation, BRO-DART, etc.) develop systems requirements, they do not even attempt to satisfy every potential user of the system they are developing. They know that they cannot please everyone! Those they do not please will merely ignore them. In cooperative efforts, however disenchanted people may become active or subversive opponents of the development.

Similarly, the opening of a new library (e.g., the University of California-Santa Cruz Library) is a particularly opportune time for the introduction of new technology. Only staff members sympathetic with the application of modern technology to libraries need be recruited. In any case, everyone joining the organization expects that they will need to make some adaptations of their previous behavior to the requirements of their new organization.

However, the answer has not been to abandon change in established libraries and leave it up to the new libraries or the commercial firms.

The solution for many practical working analysts is to avoid the morass of the theoretically perfect (hence, interminable) requirements analynative is selected.

The Model Study—A Summary

The object of developing a thorough understanding of goals, present methods and possible alternatives is to enable the decision-makers to make the best possible choice among alternate courses of action. Of course they can and often do make choices based on more intuitive criteria, but ideally a thorough study will precede the selection of a new system. A thorough study of requirements for a new system is a multi-step process. The phrase "requirements analysis" does not have consistent meaning in the literature of systems analysis.[2] In order to describe how the phrase varies in meaning, we will start with a list of the steps one might find in an ideally planned analysis of requirements. These steps are shown in figure 1 along with several hypothetical and real life strategies for modifying the ideal study. As a matter of semantics, requirements analysis could, in different contexts, encompass all, fewer or more than the steps shown in figure 1. Even the order in which steps are taken will vary from one analysis to another.

To a certain extent the steps named in figure 1 are arbitrarily divided. In actual practice, no clear division between steps occurs. The boundaries between the formulation and evaluation of alternatives (steps 8 and 9) and the statement of goals, objectives and requirements (steps 2, 6 and 7) are especially blurry.

The application of any of the first four strategies (A-D in figure 1) leads to a set of detailed requirements for the new system while either of the last two (E-F) presumes that the selected system will satisfy enough of the intuitively known requirements to warrant its adoption.

Requirements analysis ends either when all alternatives have been rejected and the old library procedures retained or when a new altersis study.

Description of the Steps

There is no one discrete point at which one can say the process of requirements analysis actually begins. The moment an organization begins to examine its basic objectives the process has begun in the most basic sense. Figure 2 shows several levels in the development of objectives into ever more specific statements. The level at which the statements become less philosophical and more operational might be con-

Step	Description of Step	Strategies					
		A	B	C	D	E	F
1	Delineate scope of study and resources	X			X		
2	State library's goals, policies, constraints	X					
3	Forecast future goals, workloads, constraints	X	X			X	X
4	Describe and analyze existing system	X	X	X			
5	Reevaluate the scope of study	X					
6	State objectives of new system	X	X	X	X		
7	Deduce requirements	X	X	X	X		
8	Formulate alternatives	X	X				
9	Evaluate alternatives	X	X		X	X	
10	Select alternative	X	X	X	X	X	X
11	Begin system design	X	X	X	X		

Fig. 1. Strategies for a Requirements Analysis

sidered the boundary between objectives and requirements. Figure 3 shows the relationship between some hypothetical objectives and requirements to illustrate one example of this boundary.

To coordinate this chapter with the others in this issue of *Library Trends,* the description of requirements analysis will be restricted to steps 5 through 10. The following paragraphs will further clarify the relationship among the several steps identified as part of the ideal requirements study.

REEVALUATE THE SCOPE OF STUDY (STEP 5)

The scope of the requirements study is invariably limited. An example of this limiting is shown in figure 3. Often the impetus comes from management, either because there is an obvious pressing problem or because a manager's intuition tells him that the potential for improvement in one part of the library is particularly great. At other times, the impetus comes from the analyst, either because early results of his analysis reveal a potential for improvement in one area or because he recognizes that a study of the whole library would be much too large a task to handle effectively.

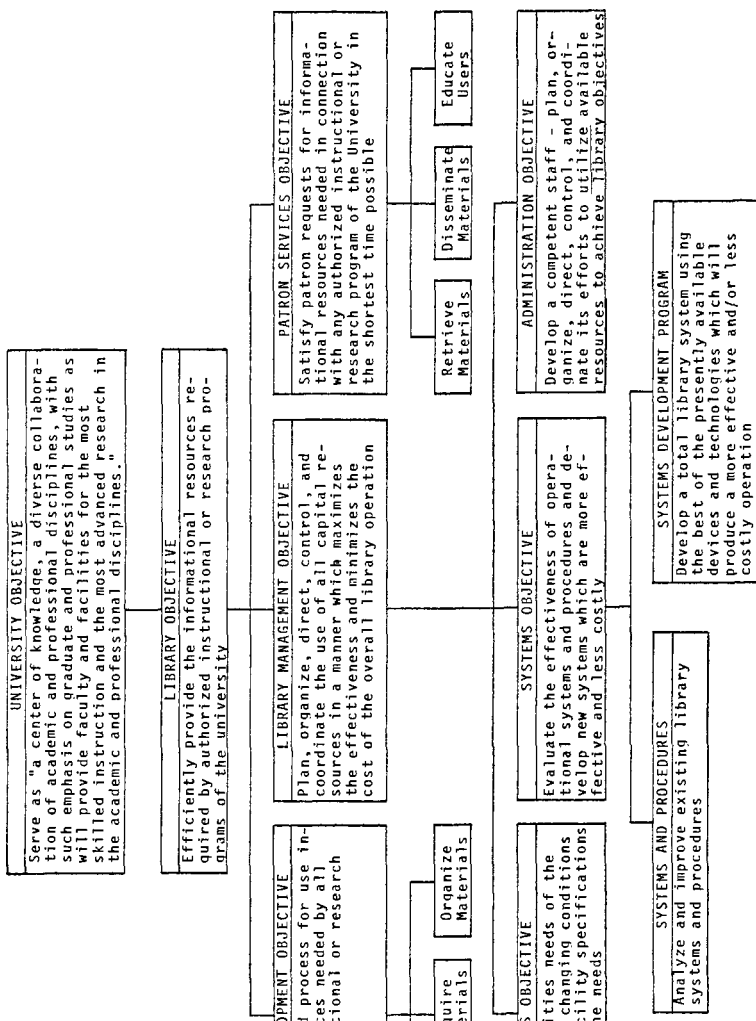

Fig. 2. Library Objectives Hierarchy

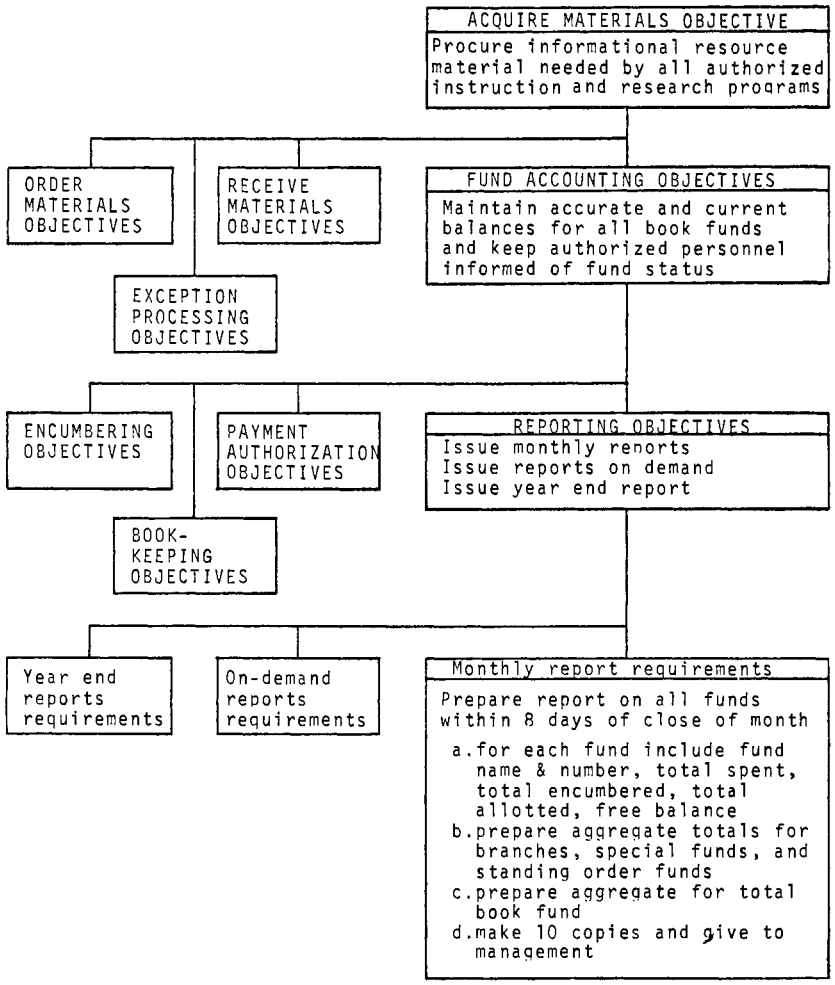

Fig. 3. Relationship of General and Specific Objectives

While an opportunity for improvement may be missed as a result of restricting the scope of the analysis, the results may be worthless if too much is included. An all-inclusive study might have to treat some steps in a cursory way, or if done thoroughly might take so long to complete that it would be obsolete by the time it is done.

STATE OBJECTIVES OF NEW SYSTEM (STEP 6)

Ideally one would not state the objectives of a new system without taking into account the objectives of the organizations within which the system is to operate. Just as a library's objectives must contribute to the achievement of the parent organization's objectives, so too must the objectives of the library departments contribute to the achievement of the overall library objectives. A logical approach is to work down in hierarchical fashion beginning with the highest level organization and ending with requirements for a specific system. In general, the analyst works with top library management to articulate policy, with middle management to formulate objectives, and with first line management to specify requirements.

The results of analyzing the existing system may imply system objectives which are overlooked when working down the hierarchy alone. Working up the hierarchy from procedures to requirements to objectives has the benefit of making procedures justify themselves.[3] Since working both up and down the hierarchy to identify system objectives can occur simultaneously, it is difficult to separate this aspect of the analysis into discrete steps.

DEDUCE REQUIREMENTS (STEP 7)

The purpose of developing requirements early in the requirements study is to establish criteria for selecting one of several alternate means for achieving a set of systems objectives. An example of simplified requirements is presented in figure 3. To be useful in evaluating alternate systems, the requirements must be stated in their order of priority. It is a matter of management policy to decide the relative order of importance for a set of itemized requirements. The list may very well contain low priority "requirements" which are in reality only desirable; that is, an alternative which does not include a "desirable" still might be selected because it better satisfies the higher priority requirements.

It can be quite a job to get the desirables identified as such, rather than as requirements. When a new system is being contemplated, both management and line staff are eager to elevate desirables to requirements. At a later stage, namely the evaluation step, selling points can be made for alternatives that easily (cheaply) produce desirables.

The development of a list of requirements (and desirables) is a highly error-prone process. The analyst may deduce many of them from policies and objectives specified by management. Some may be

extracted from policy and procedure manuals or from the analysis of current systems characteristics. Many of them will be extracted from the heads of line staff who just "know" what they want a new system to do. One reason the process is error prone is that past outputs invariably are equated with requirements. If such "requirements" go unchallenged, any resulting new system will have the old faults designed into it, with the dubious benefit of producing a new system which may do unnecessary things more efficiently.

Requirements must be stated for all individual inputs and outputs and for the system as a whole. Inputs and outputs are of two types: material items (books, serials, maps, etc.) and instruments of communication (invoices, request cards, verbal requests, etc.). For each input of either type, the requirements must state the frequency (average and peak), the processing to be done, and the final disposition. For each material output, the requirements must state destination, timeliness and physical condition (property stamped, bound, marked, etc.). For each communication output, the requirements must state the data elements to be included, the average and peak lengths of each data element for written communications, destination, medium (verbal, written) and timeliness.

Once requirements for individual inputs and outputs and the system as a whole have been stated, the juggling of priorities begins in earnest. Some requirements may be in conflict; i.e., the requirements to produce an output within two days of the arrival of an input may be able to be satisfied only at a cost beyond an overall system cost constraint. The less important must be sacrificed.

There are no fixed priorities which invariably apply to establishing requirements in every library systems development effort. The variables are so numerous that it is not practical to predecide for all situations that costs or patron satisfaction or any other factor should dominate choices. Manager's intuition, funding limitations, political considerations, external pressure, physical constraints, the talents of available personnel, agreements with other agencies or institutions, and (possibly most important) just plain personal preference, all may play a role in establishing the relative importance of various requirements.

The process of listing characteristics wanted in the new system in priority order is concluded when someone in authority declares that features below a specified item on the list shall be considered desirable only, and that all of those above that point shall be considered essential requirements. When management has approved the formally docu-

mented list, the analyst may begin the task of finding alternate systems approaches which meet the requirements.

FORMULATE ALTERNATIVES (STEP 8)

"Alternatives" are the significantly different ways of satisfying requirements. Some alternatives may be totally automated, some may be completely manual, and others may be mixed. Some may rely on techniques and technologies previously used in libraries while others may incorporate procedures which appear radically different or unfamiliar. One alternative is to do nothing, i.e., retain the present system.

The formulation of alternatives is probably the most challenging aspect of systems work for the analyst. There are an infinite number of possible ways of carrying out any library function. But only a very limited number of them will meet all of the essential requirements. Competitive alternatives can be discovered empirically via surveys of other libraries, but procedures vary greatly from library to library, making it the exception when another library's system will fit perfectly. Almost certainly the analyst will have to hypothesize a small number of further alternatives based on an instinct for the overall cost/effectiveness of each.

Alternate systems approaches must be described in enough detail that the costs and effectiveness of each can be reasonably well predicted. As an aid to evaluation, the formulation of each alternative system should be documented in a working paper which expresses the concepts embodied in the proposed alternative. This working paper is called the system concept document.[4] There is one system concept document for each alternative to be evaluated. The first section of the document contains a narrative description of how the system would work when operational. Work flows and volumes are described with special attention to new procedures. New equipment is described; new job skills are noted; and the projected lifespan of the new system is forecast. The second portion of the system concept document is devoted to developing and installing the new system. Changes in library organization, personnel and equipment are described. Schedules for retraining personnel and installing equipment should be included. If computer-assisted procedures are part of the new system, a schedule for the development of the programs is also included. The third part of the document is for evaluation based on costs and benefits. But the evaluation cannot begin until after the analyst has received agreement from all

levels of management that the proposal is understood and contains an adequate degree of detail.

EVALUATE ALTERNATIVES (STEP 9)

The process of evaluation is both science and art. Ideally analysts would like to establish a single objective measure of the overall cost and effectiveness of each proposed alternative. The list of gross requirements (and desirables) might be quite long and the alternatives will certainly vary in the extent to which requirements are satisfied. Attempts to develop a single quantitative measure of desirability are always subject to wide (and justified) criticism. One approach is to give each of the evaluation factors a weighted point value. That alternative which meets the combination of requirements and desirables with the highest sum of points "wins." However, unless the winning approach is clearly far superior to the others and also is the intuitive choice of nearly everyone, the weighting factors undoubtedly will be questioned.

The process of evaluating alternatives is sometimes called a trade-off study. Benefits of each alternative are compared with the total cost of ownership (i.e., amortized development costs, operating and maintenance costs). Increased effectiveness benefits of a new system are generally obtained at the expense of reduced cost benefits and conversely. Naturally, there are some happy exceptions, but in general one must be traded for the other. The trading process itself boils down to the personal preferences of the person who makes the final decisions.

Data collection and organization must be as systematic as the analyst's skills will permit. Some of the data will be quantitative (costs and work load capacities are examples) and others will be qualitative (patron acceptance, training requirements and staff acceptance are examples). The qualitative are by far the hardest to evaluate, but at the same time may be the most important. In most studies, the quantitative factors must be favorably evaluated as a minimum condition of acceptability before the qualitative factors are then brought in to swing the decision. The quantitative evaluation will indicate what work loads can be handled by the alternative at what cost. If costs and productivity are within reasonable bounds, then the quality of the benefits is considered.

Figure 4 shows how the characteristics of alternatives typically are summarized and displayed for evaluation. Three approaches for com-

No.	Requirements or characteristics against which systems alternatives are to be evaluated	Alternate System Approaches					
		A	B	C	D	E	F
1	Requires new computer	X		X	X		X
2	Solves patron queueing problem	X	X	X		X	X
3	Produces statistics as a by-product	X	X		X	X	X
4	Probable patron resistance	High	Low	Med	Med	High	Low
5	Staff training requirements	High	Med	Low	High	Low	Low
6	Dependence on outside commercial service	High	Low	Med	Low	Low	High
7	Staff familiarity with technology	6	3	5	1	4	2
8	Meets intent of management policies	1	5	6	4	3	2
9	Compatibile with other library systems	1	3	2	5	6	4

Fig. 4. Example of Trade-off Matrix for Hypothetical Systems Alternatives

paring systems are illustrated. First, the presence or absence of a mark (X) may indicate whether a system has a particular characteristic (requirements 1-3). Second, it may be shown how well (low, medium, high) each system meets a particular requirement (requirements 4-6). Finally, systems may be ranked according to how well they satisfy a requirement (requirements 7-9). Clever analysts will think of other discrete evaluative techniques, but simplicity should be the essence of every technique.

Such a trade-off matrix as illustrated in figure 4 can, of course, be used for summarizing various aspects of costs and other quantitative performance characteristics as well. However, quantitative evaluations of alternatives are more likely to require extensive and more complex analyses before summary is possible.

The two most frequent quantitative characteristics to be measured are costs and volumes processed. If a cost accounting system has been established in the library, costs and volumes for the current procedures already will be known. The requirements analysis can focus its energy on the alternative proposals. But if cost accounting is not built into the operating procedures of the library, a study will be needed. The techniques of cost accounting are treated elsewhere in this issue.

Costing hypothetical alternatives poses an interesting challenge. If an alternative does not exist, how is it to be measured? There are two ways to cost hypothetical alternatives. In the first method the alternatives are taken one at a time and contrasted with the current system. An alternative, as documented in a system concept working paper, is culled for cost differences between it and the current system. The differences represent increases or decreases in costs. Some old costs are replaced by new ones.

The second method does not calculate cost relative to current procedures. Rather, the procedures envisioned by the proposed system are costed by means of independent estimates. Usually the new procedures are subdivided into smaller components (call them activities) and the activities are costed. Aggregate costs for whole procedures are calculated by summing the costs of the activities that make up the procedures. In some cases, accurate estimates of activity costs are available, as for instance, a key-punching task. Other activities will be at the other end of the accuracy spectrum—in short, they will be wild guesses. One of the best attempts made to cost a hypothetical system using this method was done by Leonard *et al.* in the Colorado Academic Libraries Book Processing Center proposal.[5] The activity costs were derived mostly from actual work measurements in existing library procedures. The use of this technique in Hayes and Becker[6] is much less convincing because the activities in the alternate systems are too briefly described.

Development (investment) costs must next be estimated. These costs should include retraining costs, design costs and installation costs. If an automated system is planned, there are also costs for data conversion and possibly for equipment needed during the development phase. Costs to run parallel operations are part of installation costs.

If all the costs of an alternative are within reasonable bounds (as determined by the library administrator) and the alternative can handle current and projected work loads, then qualitative factors (benefits) come into play again. The library administrator may or may not rely on the data in the trade-off matrix (figure 4). But the evaluation nonetheless, will be based on qualitative factors. Hayes and Becker sum it up when they say that the qualitative issues are "so deeply imbedded in the very concept of library service that they can be answered only by the professional judgment of the librarian. At best, the system designer can clear out the underbrush of extraneous issues—those that can be quantified—so that the alternatives are presented free

of them. But the choice among the alternatives must be made by the librarian in terms of these qualitative issues."[7]

SELECT ALTERNATIVES (STEP 10)

The selection of a new system from proposed alternatives is not always a discrete step. Normally, the library administrator will have been keeping abreast of the alternatives being considered. He will have gotten prior indication of the relative order in which the alternatives are likely to finish in the evaluation process. He will be prepared with his own set of goals and priorities to superimpose on the trade-off matricies prepared by the analyst. The decision may be made quite quickly, or elaborate reviews may be held with the whole library management team in attendance. In the latter case, the process is likely to consume a considerable amount of time.

Selecting an alternative means making a commitment to it. Making a commitment means selling the merits of the new system to the staff while at the same time helping the staff to make a smooth positive adjustment.

REAL STUDY CONTRASTS

The eleven steps listed in figure 1 represent a theoretical level of achievement which is rarely attained in actual practice. Rarely are all steps taken and sometimes very few are included in the determination of requirements. Further, each analyst's devotion to thoroughness and detail is uneven for whatever combination of steps he or she does choose to include in the analysis.

There are many reasons why this happens. One is the limitation of human intelligence and human endurance; no one person is so talented as to be equally qualified in all the skills necessary to carry out all the steps with the same degree of competence. Even a highly talented person could not do a moderately large study in a reasonable time and also be completely thorough at every step. The alternative is to hire a staff of experts who are specialists in each of the needed techniques. But, well qualified teams have their limitations too, and only the well-funded programs can afford them.

There are other more mundane reasons, however, for achieving less than theoretically complete requirements analysis. Library management may already have a specific problem identified and a solution in mind. The job left for the systems analyst is to do the detailed requirements study in order to justify management's preselected alternative.

Figure 1 shows five typical departures from a complete study. All five are defined in terms of the omission of steps. These are the kinds of departures to be discussed. Other kinds of departures such as skimping on particular steps, cycling through combinations of steps several times, or performing combinations of steps in parallel will not be discussed further.

All efforts to change existing library procedures must be backed by power in the form of authority to carry out the change to its conclusion. When a complete and thorough requirements analysis is accomplished, the analysis itself theoretically is the instrument which convinces management to exercise power and effect change. As fewer steps are included in a requirements study, the persuasiveness of the studies themselves ought to diminish. Management's use of power must be justified in other ways. The influence of strong personalities or external political pressure assumes increasing importance as the quality and objectivity reflected in a requirements study diminishes.

This point becomes especially important where library consortia are involved. The power to force change in most cases does not exist. No single higher administrative authority over all the cooperating libraries exists or, if it does, it is only at the level of the state government where it is not asserted. Unless libraries work out voluntary methods for implementing change through the effective use of power at lower levels, the use of power by higher levels of authority may become a prominent reality.

Strategy B from figure 1 is so close to a model study that, if done thoroughly, it should convince management of the need to act. The only significant departure from the model is the failure to formulate broad library policies, goals and constraints. Constraints are usually known even if not stated. Honest administrators admit that basic goals are elusive and at best they are difficult to conceptualize even without attempting to state them explicitly.

Strategy C can be as convincing as B. The results of the analysis read well because the analyst has made an effort to understand the current procedures and objectives of any new system. The proposed new system is shown to be capable of "doing the job." The dangers of designing a new system based on strategy C are that the new system could fail to handle future work loads (step 3 missing) or it might cost more to use (step 9 missing). Computer-assisted procedures, utilizing the generally expandable power of the machine as they do, have less often failed to handle increasing work loads. Hence the risk of skipping step

3 is less when computer-based alternatives are contemplated. But these same computer-assisted alternatives have often cost more, showing that the real danger of strategy C is in omitting a careful evaluation of costs when computerization is under consideration.

Strategies D, E and F begin to depend less on the requirements analysis study portion of the total systems analysis methodology. There are other ways to know what to do than through the initiation of a formal study. (In fact, it is probably wasteful to launch study after study in library after library for every contemplated change. Some knowledge must be capable of extrapolation or transfer.) The diminishing role of the requirements study must be accompanied by the concomitant increase in knowledge and power from other sources. These three "practical" strategies have been used with success and depend in part for their success on the effective use of power. We will call these three approaches *invention, replication,* and *transfer.* For each of these to work, an executive with the power to act must have unquestioning faith in the key person whom he directs to bring a new system into being.

The *invention* approach relies on the existence of a genius who combines the knowledge of what needs to be done with the knowledge of how to do it. This one man, from his many years of experience with a particular library function, intuitively knows the requirements and bases his design of a new system on this knowledge. He may talk to users and ask them for advice regarding requirements for the new system, but in the end it is his own judgment that will determine what is to be done.

The *replication* approach recognizes the existence of the many highly successful mechanized library processing operations around the country. While none of these systems will be perfect for another institution, the presumption is that one or more of them will come close enough to meeting requirements to warrant their adoption without significant modification. Almost no requirements analysis is performed because the decision to replicate a particular system is based on pragmatic considerations. It is entirely possible that the library's most critical problem, which may or may not be known, may or may not be solved by the installation of the new system. Examples of this approach include approximately thirty libraries throughout the country which replicated the original Montclair circulation system based on the use of IBM punched cards.

The *transfer* approach focuses on a particular individual who has

previously installed a system elsewhere which seems to meet a library's current needs. For example, a new head of acquisitions "knows" that a mechanical accounting machine system that he used in his previous library would be better than the smeared ledgers that he finds in his new library. The critical element in this approach is the person who has intimate knowledge of the system, with the desire and determination to replicate it at another installation. There is no way to estimate accurately how often this happens. It probably does not happen more frequently because we have all been encouraged to believe that no major systems development effort should be commenced without an exhaustive (i.e., expensive) systems requirements study, the results of which have the unanimous support of all potentially involved library employees.

The replication and transfer approaches can also be adopted after a complete and thorough requirements analysis, of course. In that case, the approaches are really approaches to implementation rather than requirements study.

The study strategy adopted may reflect the mode of implementation anticipated. Two modes are contract service and pilot testing. The first approach is where the library contracts with an outside agency for service. The contract may be negotiated only after a thorough requirements study, or it may be entered into after a brief analysis where other alternatives were not considered and little or no evaluation was done prior to signing the contract. Where the contract requires a minimum commitment on the part of the library (low monthly cost and easy cancellation terms) it is often a sensible course to forego an elaborate requirements study. Hence it frequently happens that a contract is signed after a requirements study of the type shown as strategy E.

The pilot test approach to implementation also allows the requirements study to be shortened with little risk. As before, a pilot test approach may be used even though a model requirements analysis was conducted; in fact, it often is. But there are situations where the pilot test was seen as an alternative to a model requirements analysis. The new system is tried only for a subportion of the procedures that would be impacted by the complete operational system. For instance, the new system might be installed at a branch instead of the main library, or it may be tried on just monographs and not serials. The pilot is watched closely and after a preestablished period of time, the decision is made to convert fully to the system or scrap it. Pilot projects have the merit

of offering empirical evidence of a system's suitability for meeting library requirements. Hard data are superior to the predictions of the most highly credible studies.

Another type of pilot test, the one that is regarded as a shakedown period for the committed installation of a large system, is not the type that can substitute for a requirements study, which is characterized by a totally different mental attitude. The former method, often called the back door approach, is a favorite of many analysts. The analyst knows of a good system operating somewhere or has a good idea of his own and gets management approval to try it. If it works, fine; if not, little was lost. If it works well enough, it can even be extended to other parts of the library or branches.

The above strategies are representative of actual approaches to determining requirements for a new system. The classical method requires the most time, money and expertise. The less thorough strategies seek to strike a balance between available resources for conducting the study and information needed by management to take wise action.

The use of systems analysis, at least in the area of library requirements analysis, has, to date, achieved less than dramatic results. Most successful has been the description of existing systems in libraries using systems analysis methods. But the formulation of alternatives and the cost/benefit evaluation of both existing systems and hypothetical alternatives seldom has been done thoroughly.

It is not clearly demonstrated that requirements analysis studies need to be done thoroughly. Doing a thorough job can be very expensive and time consuming. The results are often viewed with scepticism especially when a radically different set of procedures are envisioned. For this reason, the analysis does not guarantee a clear picture for management.

Persons with years of experience in library operations plus an awareness of other methods for "doing the job better" may be in just as good a position to know the best course of action as the library administrator reading a thick requirements study report. The reader is invited to think back to any major decision about which he has knowledge (such as the decision to open the stacks, start a new branch library, or switch from Dewey to Library of Congress classification). How many were preceded by detailed studies? How many worked out satisfactorily even without the study?

A comprehensive requirements study is not necessarily a prerequisite

for effective action in libraries. The correct strategy for any contemplated requirements study is precisely whatever management needs at the time to make a good intuitive choice among alternate courses of action—no more and no less.

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