The first part of this paper considers three general approaches to the development of an automation programme in large academic library. The library may decide to wait for developments; it may attempt to develop a total or integrated system from the start; or it may adopt an evolutionary approach leading eventually to an integrated system. Outside consultants, it is expected, will become increasingly important. The second part deals with important elements in any programme regardless of the approach. These include the working out the capability to do automation work, staffing, equipment, feasibility study and costs.

Introduction

From the earlier discussions it is clear that most computer-based systems in academic libraries, at present, are in the developmental or early operational stage. Improvement and modifications are frequent at this period. Also it is difficult to make a meaningful separation between the development, administration or management function. It is not attempted here, in this paper, to distinguish between developmental and administrative function but, instead, to discuss in an informal and non-technical way some factors to be considered by librarians and administrators when their thoughts turn to introducing computer systems into their libraries. Fortunately, in India they have now started thinking along this line.

I: Approaches:

The first task of a library administration is to formulate an approach to automation based on a realistic assessment of the institution’s needs and resources. Planning a library building has some similarity in approach with automating a library. Each library is unique in some respects, and requires a building which is especially designed for its own particular needs and condition. There is nothing as such, library automation programmes.

Newly founded university and other advanced academic institution libraries which have small collection, but have resources, should take the logical course of attempting to design integrated computer-based systems for all library house-keeping operations, provided they have easy access to the machine and are allowed required amount of computer-time. Several other university libraries (viz. BHU, Bombay, Calcutta, Delhi, Madras, etc.) may approach in an evolutionary way and should design separate, but related, batch-processing systems for various house-keeping functions such as circulation, ordering, catalogue input and card production. Still other libraries expect to take little or no action until some order or pattern has begun to emerge from the experimental work that is yet to be undertaken in India. Only time will tell which of these courses will be most fruitful. Meanwhile, the library administration must decide what approach to take; and the approach to automation, like that to a building programme, must be based on local requirements and available resources.

a) The Wait-For-Developments Approach

The basic idea behind this approach is that practically all computer based library systems are in an experimental stage with questionable economic justification, and that it is unnecessary and uneconomical for every library to undertake difficult and costly development works. The advocates of this approach say that it makes sense to wait until the pioneers have developed some standardized, workable and economical systems which can be installed and operated in other libraries at a reasonable cost. This is a cautious approach.
which minimizes costs and risks. This is a reasonable position to take for the smaller ones. But, for the larger libraries, however, it overlooks, that soon, in order to cope with increasing workloads, they will have to develop the capability to select, adapt, implement, operate, and maintain systems that were developed elsewhere. The development of this capability will take time and will be made more difficult by the absence of any prior interest and activity in automation within the adapting institutions.

A major error in the wait-for-developments approach is the assumption that a time will come when the library automation situation will take some stable shape so that one can move into the field confidently. This probably will not happen for many years, if it happens at all, for with each new development there is another more promising one just waiting on the door-steps. How long does one wait for the perfect system to be developed so that it can be easily "plugged in", and how does one recognise that system when one sees it? There is real danger of being left behind in this position, and a large library may then find it difficult indeed to catch up.

b) The Direct Approach to Total Systems

A library is a total functional unit and all its varied operations are inter-related and interconnected. The logic of the situation demands that it be looked upon as a whole by the system designers and that a single integrated or total system be designed to include all house-keeping operations in the library. Such a system should make the most efficient and economical use of the capabilities of the computer. This does not require that the entire system be designed and implemented at one time in the beginning, but it permits treating each component function as one of a series of modules, each of which can be implemented separately, though designed as part of a whole. Several large university libraries have chosen this method in U.S. The University of Chicago system is the most advanced.

Unlike the evolutionary approach this total system approach must be based on sophisticated third generation computers and other batch-processing equipment. This is expensive, complex, requiring trained and experienced staff and system designers. Since the development costs involved in this approach are considerable, the library must receive sizable financial grant before attempting this method.

The total system has logic in its favour; it always aims at the right goal and the goal should ultimately be attainable. Another fruitful result that should come out as a by-product of this development process is that it should push a big step forward of both library automation and computer technology. It should be expected that the first models will be economically and technically viable but it may be hoped that they will work well enough to serve as prototypes for later models. The pioneering libraries may very well suffer serious setbacks in the process, and the authority should carefully weigh the risks and the gains for his own library.

c) The Evolutionary Approach to Total Systems

This approach consists basically of taking a long-range, conservative view of the problem of automating a large complex library. The ultimate goal is the same as that of the total systems approach but the method of reaching is different. In the total systems approach, objectives are defined, missions for reaching those objectives are designed and are usually in a series of computerized modules. In the evolutionary approach, the library moves from traditional manual systems to increasing complex machine systems in successive stages to achieve a total system with the least disruption of current operations and services. Quite a few European and North American university libraries have followed this line.

In the first stage the library should undertake to design and implement a series of basic systems to computerize various procedures using its own staff and locally available equipment. The basic idea is to raise the level of operation-circulation, acquisitions, cataloguing etc - from existing manual systems until major portions of the conventional systems have been computerized. The problem with us is that we librarians are basically conservatives. We like to follow the present manual systems and stick to it even though we do not fully understand the reasons behind the operations of present manual systems.

At some point the library itself, computer hardware and software, all should have ad-
advanced to a point where it will be feasible to undertake the task of redesigning the simple stage-one systems into a new integrated stage-two systems built upon the operating experience obtained from the earlier systems design. In stage-one of library automation librarians are expected to learn computing and do this design and programming themselves rather than to teach computer people about the old manual systems and get the job done through them.

Use of Outside Consultants

Here is analogy with the usefulness of specialists, of architects, engineers etc. in planning and building a library building which the librarian will eventually use.

A qualified 'architect' for the system may be engaged to guide the library in designing the machine operated system. This consultant must have a thorough knowledge and experience of how the library systems work. His task, like the architects, would be to turn the general programme into a detailed systems design with the full aid and participation of the library's own systems group.

II. Prerequisites for Automation:

Regardless of the approach that is selected, there are certain prerequisites to a successful automation system. It requires time and money; it consists of staff, equipment (which may be hired), an organisation with a regular budget, and a certain amount of knowledge which is generally obtained by doing a series of projects. Success depends to a large extent on how well these resources are utilized.

Staff:

Nothing gets done without people. Hence, training and holding a competent staff is the most important single element in a library automation. The number of librarian with training in computer technology is extremely small. To attract people from the computer field the authority will have to pay more than they pay member of the library staff. On the other hand, it should not be too difficult to recruit one competent librarian with good potentiality who may be trained in computer. Taking loan of staff from computer centre for temporary use in Library may be poor risks since their professional commitments is to the computer world rather than that of the library.

There are various levels of library systems analysts and programmers, and the number and type needed will depend on the approach and the stage of a particular library's automation effort. The critical factor is not numbers but quality.

It would be a mistake to underestimate the importance of the role of key-punchers, typists and other machine operators. It is essential that these staff members are conscientious and feel responsible. They are responsible for the quality and quantity of the input, and therefore of the output, and they can do much to make or break the system.

Equipment

From my discussions with a few librarians using computer on shared-time basis I am convinced that a library cannot risk vital computer based systems on to equipment over which it has no control. This view is also being reflected in current literature. This does not necessarily mean that it needs its own computer. However, if it plans to rely on equipment under the control of others it must get firm and binding commitments for time, and must have a voice in administering the equipment. One cannot foresee what will be the trend in India. However, it seems reasonable to suppose that after a few years, several librarians, within and around big cities will group together to share a machine dedicated to library use.

Brookes is justified in saying that the success of the (second generation) digital computers, a device for performing logical and arithmetical operations on number, is unquestioned. Data which are almost wholly linguistic can also be handled by digital computers but, in general, the computer and its software, designed primarily for other purposes have to be 'bent' in rather complicated ways to do other than the most superficial routines on linguistic data and then only if a simple library logic can be imposed on the analytical processes they are subjected to. The design of most machines we use is adopted so that it is as convenient as possible for man to use. But we the librarians who are mostly concerned with linguistic and semantic data analysis have to make fundamental adjustment, i.e. intellectually to a machine designed for another purpose. We all want to have a machine capable of doing what we want them to do,
rather than our having to do what machine wants us to do. Our plea to the computer scientists who are working on the next generation of computers is to allowing the horse to be put before the cart.

Organisation

The process of automation, in India, is yet to be developed. It may be advisable not to have a separate unit in the library's regular organisational structure, at this stage. The best arrangement might be, as we have already discussed, to have one or two computer orientated library staff whose activities at this preliminary, stage is to carry feasibility study, systems analysis etc.

Feasibility Study

No academic library should embark on any time of automation programme without first acquiring basic knowledge by conducting feasibility study. One should make a detailed study or estimate of the actual costs of manually carrying out the operations concerned. It is during this study, systems analysis takes place. The method of analysis of the system - the whole library organisation or only one department --- is to separate each action step by step systematically and to specify them individually so that in the end all the pieces known and understood and their combination clearly defines the structure of the whole.

Systems analysis combined with user survey will be the source of data in quantitative terms which will be essential at the systems designing stage. This is invaluable because it provides information on the total amount of money under consideration within the project and should give a guide line to the initial expenditure in developing the mechanisation system.

In a study for a printed catalogue for the Stanford University Undergraduate Library Haya & Shoffners did a cost analysis of 6 different methods ranging from the manual card catalogue to computer photocomposition. They established under the local condition at Stanford, by the end of fifth year, the best computer method would be cheaper than the manual one. This and similar type of studies, if undertaken by the Indian University libraries would benefit most of us.

Costs

The cost of feasibility studies should be within the Library's reach - one, which is planning to mechanize its systems. The necessary stationery and computer - hour to hire is cheaper in India compared to that in western world. A few man-hours per week extracted from the existing library staff should be enough and no extra appointment of staff for this purpose would be required.

But the price of doing original development work in the library automation field should be extremely high - that in most cases such work cannot be undertaken without substantial assistance from outside sources.

To justify computer-based library systems on the basis of costs alone will be difficult because machine systems not only replace manual systems but generally do more and different things, and it is extremely difficult to compare them.

Conclusion

There is no such ready-made formula for library automation in any academic library nor one is waiting to be discovered and applied to any particular library. Each library is to decide for itself which approach or strategy seems best suited to its own particular needs and situation. Experience gained by the university libraries in Europe and North America should be very useful. The first move for the Indian Librarians is to carry feasibility study of their own libraries. Few libraries in India are in proper and up-to-date shape. It is common knowledge that many such studies have shown that a computer was not really needed at all, and that the information gained from the feasibility study was sufficient to improve the existing system so as to make it more efficient than the automated one first contemplated.

This paper has also attempted to stress the need of qualified professionals with knowledge of computer and modern management procedures. Here the universities and other higher institutions who are conducting academic and professional training courses may come to a great help by producing new batch of library professionals who could take the initiative in formulating the pattern of our new library systems to meet the inescapable demand of this automation era.
REFERENCES


