HARDWARE AND SOFTWARE : EVALUATION AND SELECTION.

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Abstract

The available software and hardware are discussed. In particular, specialised and integrated systems are described. It was concluded that Indian libraries should design and implement an in-house written packages and adopt specialised-cum-integrated systems in a piecemeal approach. Hardware should be carefully evaluated and selected. It should be expandable, compatible, robust and tested.

SOFTWARE

Option

Before choosing any software package to suit the present needs and future plans of a library, it is worth mentioning briefly the relative merits and demerits of some of these systems.

The co-operative system may allow the library to get a better, more complete system for less investment in money, material and staff. Since cost and data are shared by many libraries, such a system is sure to provide the benefits of sharing data, authority information, inter library loan resources, etc. But as the shared network becomes larger, the system functions may become more difficult to change or enhance in ways that suit the special needs of users. Moreover, the system may become a financial liability, if the costs go up - a development over which the individual members may have no or little control. This possibility is specially so at present when a large part of the cost of using such utilities is the price of the communication, which go chiefly through telephone lines but there is no efficient telecommunication service available throughout India. Above all, no such system is presently available either at the local or national level.

With regard to the turnkey systems, the supplier is responsible for the necessary hardware, software, installation and maintenance. Therefore, no computer expertise, according to Boss (1990) is required on the part of the library staff and there is usually a firm contract price and predictable delivery date. Some other advantages are that the cost of designing and programming the system can be spread over several installations and that the supplier is usually continuously enhancing the system and new features may be added. But I think at least some of the library staff need some computer knowledge in order to negotiate with the suppliers and to run the system. Moreover, the library may have to pay dearly to keep date with new developments. It has been observed by Bawden (1990, P.56) that if the hardware and software are purchased from different suppliers and when some fault develops in a system, and it is not clear whether the fault lies in the hardware or the software, the suppliers tend to blame each other's product. But such a problem generally does not arise in this case as the whole system is purchased from a single supplier. However, this system may not fit exactly the requirements of a particularly library. Its acceptability depends upon how easily the system can be modified in order to achieve the satisfactory results. This system is sure to be less efficient than an in-house written system as the library has no alternative but to depend on the expertise and reliability of the system supplier for both the initial packages and subsequent maintenance and support. In reality there is no chance of getting a modification made to a standard business package to suit individual users needs. For specialised packages, the supplier may be willing to consider customisation on request but probably at a higher price. Bawden (1990) says that there are well-attested stories of trivial modifications, which cost more than the original purchase price. This idea is also confirmed by Mudrick et al.(1992, P.303) who say that so much modification is required to fit the needs that it would have been cheaper to have developed the entire software internally. This is certainly the point at which the attractiveness of the cheap, standard package begins to wane and the advantages of some degree of in-house control becomes clear. Moreover, some libraries cannot opt for this system who may have already purchased a computer.

As far as the off-the shelf packages are concerned, they are :

a) economical because the investment cost for the initial creation and later maintenance is

spread over several years;

b) available at short notice and the system can, therefore, be implemented earlier;

c) well documented including detailed system specification, identification of hardware requirements, input, output and file specifications and systems training and user manuals; and

d) a well-tested set of programs and the supplier has a sufficient number of clients to justify the adequate maintenance arrangements (Rowley, 1993a).

In addition, for such packages, support and advice service are available from the supplier, who is likely to be a specialist in that kind of software and should, therefore, produce a better quality product with valuable features, whose importance might not occur to the new user. But this system represents the same problems as are posed by a turnkey system. However, keeping its relative merits in view, it is a suitable option for the libraries but there is no good software readily available in India and the problems with imported commercially available software are the huge licence fee, custom duty, package and transport charges, quite apart from government restrictions and regulations. Moreover, imported packages may not suit the environmental conditions and atmosphere and are sure to impose other problems. For example, initial creation and later maintenance with the help of the supplier or seeking vendors support, if the system fails, is not always possible and if possible it will prove too expensive as the libraries have to bear the travelling allowances (TA) and the daily allowances (DA) charges of the technician, deputed by the firm for the purpose. Literature on library automation also lays stress on the avoidance of unnecessary and combersome dependence upon geographically distant organisations or personnel. The question also needs to be examined as to how far the imported packages can be used on the locally manufactured computers.

Although the design and implementation of an in-house written package definitely requires greater skills in system analysis, communication, liaison and project management than the acquisition and implmentation of a pre-written package yet it is tailor-made and can be expected to cater for every little idiosyncrasy in every application. Such packages will encourage the library to adopt more standard practices and iron out some of its unnecessary habits. The system will not prove as expensive as it is in the West, where the programmers demand high salaries. In India, man-power is very cheap and there is no lack of expert software professionals. Moreover, most of the libraries, who have computerised their services in India, have developed their own systems. No doubt, support like documentation, user groups and other users, training, help disks and maintenance arrangements is crucial at the initial stage for the new computer information manager but as Rowley (1990) says, it should be welcomed by all those who have to manage a computer system. Again, it will take some time to produce such system as it will have to be tested and corrected at regular intervals. However, it is better to follow the proverb; slow and steady wins the race. Keeping all these considerations in view, an in-house package seems to be the most appropriate option as it will also be possible to gear it precisely to local needs. It will also be written in a version that runs on the already procured hardware.

The questions also arise: why not to acquire and use the packages, already developed by any other Indian library or those which are available free of charge like that of CDS/ISIS developed by UNESCO for developing countries ? As we know, India is a vast country with diversified lingual, cultural, educational and social background. Obviously, the libraries will develop or purchase only such packages, that will satisfy their local needs and social environment. Moreover, most of the libraries have not fully automated their activities. In addition to dependence on other library's agreement, one library has no guarantee that the packages developed by other libraries will be expandable or compatible. Regarding CDS/ISIS, these packages are not user friendly. Perera (1992) while evaluating these packages concludes that these packages are friendly to experts but hostile to novices; limited instructions provided by them are not sufficient even for expert users; and documentation does not provide much help. According to Bhargava et al.(1993) the package is not capable of handling numerical operations like the calculation of overdue documents, budgetary allocations and the expenditure on acquisition; is not suitable for inter-connecting two or more databases for a single application like linking an acquisition system with the on-line catalogue and circulation systems; and does not update inverted files automatically, whenever a change is made in the database etc. Moreover, the purchase price should be a consideration but not a major factor in the choice of software. Weatherby et al.(1990) says that nothing is without a price, Installation of some free software may require extensive and time consuming computer training before it becomes functional.

Possible Approaches

There are two possible approaches for designing a library automated system :

1) Specialised Systems; and

2) Integrated systems.

A specialised system, as its name denotes, may be designed for any one of the in-house operations, e.g., acquisition or circulation control, and this approach makes it possible to concentrate on the development of one application at a time. An integrated approach, on the other hand, is one where files are inter-linked so that deletion, addition and other changes in one file automatically activate appropriate changes in related files.

Both these systems have their plus and minus points. Integrated systems have become increasingly popular because such systems can carry a number of functions within a framework. It also covers any qualms about compability, offers greater scope for staff saving and offers better user-friendliness of management information. It is also easier to learn because functions and their commands mimic each other and are built to work together. However, the main drawback of such packages is that they are not as powerful and sophisticated as separately available packages. Therefore, it is not wise to rely on some elements of an integrated package. Keeping these considerations in view, it is better for the libraries to adopt the specialised-cum-integrated system in the piecemeal approach because it is easier and has the advantage of providing a better system as both the programmer and the library staff have the opportunity to concentrate more on each individual section and particularly on the first urgent one. There is no danger of incompatibility as the programmer can develop packages later in a manner which can be integrated to the previous ones. Such an approach has other advantages as well. It is flexible and will permit a carefully managed process so that the staff, as well as the users can adjust to the new system and verify each part. It will also provide an opportunity to test the new system, find out its results whilst comparing with the old one. Above all, it will not prove a financial burden on the libraries as the system can be implemented in many phases as funds become available.

Evaluation and Selection

In India, there are many firms, like Progressive Software Pvt.India Limited, New Delhi, Tata Consultancy Service, New Delhi etc., who offer their services by deputing a team of their programmers to write the software packages for the library. Many of these firms work in collaboration with foreign firms; there is a world-wide demand for their programmers, which I have personally observed while visiting some of the software houses in the UK and by interviewing them. Therefore, while selecting the most suitable firm and evaluating its activities, it is suggested that the libraries should follow almost the same procedures, which will be discussed for the selection and evaluation of hardware later on. Only one point should be added here, i.e., the operating system adopted should be UNIX, which is the latest one and has one main feature, i.e., it is an open system.

Packages

The various kinds of packages which the libraries should develop include :

1. Library house-keeping operations including Inter library loan modules and OPAC.
2. Information Retrieval Systems e.g. database creation and maintaining interactive searching of in-house as well as external databases.
3. Current Awareness Services including indexing and abstracting.
4. Communication/network, e.g., electronic mail, local area network etc.
5. Business packages like word processing, spread sheet, publishing systems, graphics etc.
6. Training modules for library staff and information users.

HARDWARE

Options

Like software, there are many options of hardware as well. Among these are :

1. using parent body's computer,
2. using computers belonging to an external services like co-operative services, national bibliographic agencies, on-line search services, commercial computer based services and so on;
3. the library acquiring its own computer.

As already mentioned, the first two options are not available to most of the libraries, therefore, discussing their suitable is beyong the scope of the present article. Thus, the libraries have no choice but to opt for the third option. While

selecting the hardware platform, a key question to consider is whether to use mainframe, miniframe or micro computers. Mainframe computers are considered to be the most powerful, intermediate as mini computers and small machines as micro computers. Keeping in view the increasing number of users and the information explosion, mainframe or miniframe is the best choice but it will prove a great financial burden to the libraries. Moreover, now the computers are becoming so small in physical size and faster in their capacity to process information that it is difficult to draw a distinction between them. Previously, the micro computers were standalone systems but now these can be linked together as part of a network connecting with a file server, which controls them. Keeping these factors and others in view, it is recommended that the libraries should purchase the micro ones.

I have already recommended that the libraries should adopt the new system piecemeal. In the course of time, a number of PCs will be linked together in a network. A network of micro computers as opposed to a series of stand alone micro computers, will support shared databases, networked software and will offer access to other hardware such as CD-ROM drives and printers.

The size and cost of the required hardware needed at the consecutive stages are difficult to assess at present because, such issues can be determined in a better fashion once the software is written. However, it can be said that when a library shifts to a completely automated system it may need a minimum equipment of: a powerful fileserver, some PCs (for various house keeping operations, office automation etc. depending upon the size and nature of a library), printers, etc., and at least five to six dumb terminals for the public access catalogue. However, the hardware should be supplemented with CD-ROM drive, fax, UPS etc.

Evaluation

In order to evaluate the hardware, the library should keep the following criteria in mind :-

1. As the library is going to automate its activities piecemeal, it is absolutely necessary that it should purchase only such hardware which is expandable. It should be able to add more and more terminals and to have a link with other mainframes (like that of the parent body's, which may be installed in the near future) in order to be in a position to participate in the Information and library Network (INFLIBNET) programme and other local, national and international networks. For this purpose, compability is also an important consideration, which must be kept in view because the library may at a later stage decided to purchase the equipment from other firms for some reason. Therefore, the libraries should adhere to a particular standard.

2. It should be robust, tried and tested and not likely to crash or break down. Since hardware is very expensive, therefore, only the latest equipment should be preferred.

3. It should have the ability to operate quickly in order to handle the peak load, large files and records.

4. It should be purchased from a reputable firm in order to have enough support and back-up. Such vendors usually deal with standard business machines with features that are not likely to be superseded in the next few years.

5. Last but not least, the purchase price, cost of the maintenance, upgrading, repair etc. are also essential factors, which should be given due consideration.

Selection

The selection process should involve the following steps :-

(i) Specification of Requirements

The first essential step is to define carefully the requirements of the systems, also known as operational requirements (O/R), which is a statement issued to suppliers giving details of project against which they are invited to submit tenders. It forms an important document, which must enable the supplier to determine whether or not he should invest effort in competing for the business (Clayton, 1992, P.14). In order to save embarrassment and time, the libraries should keep in view the rules and regulations of their respective parent organisation, while framing this document. It is also advisable to consult the guidelines laid down by the working group of the UGC, which, has laid down the technical specifications of hardware and software and of associated infra-structure for various units and different levels. Typically this document should include :-

1. background of the institution and its library.

2. broad and specific objectives which the library hopes to achieve through the new system.

3. details of the environment in which the system has to work, i.e., existing hardware, standards, protocols, health and safety regulations etc.

4. present requirements and future plans, i.e., it should involve the requirements based on an initial needs analysis as well as the guidelines and objectives against which the later progress can be measured.

5. a time table for the implementation of the system. The system should be installed during vacations otherwise it will cause inconvenience to the users.

6. information about terms of payment, maintenance, site preparation, delivering and scheduling guidelines, installing and training procedures.

7. mandatory questions to be answered by the firm such as whether the systems allow for multi-lingual flexibility as most of the libraries have a good collection of non-English documents; whether the voltage stabiliser, a line filter and a surge suppresser are designed for the local power supply (220 volts) etc.

In short, the needs and requirements of the library should be stated clearly, succinctly and realistically and should not be based on the capabilities of any one system. Boss (1990 P.629) says that in formulating the requirements of the library, it is necessary to be realistic in terms of what is available and what the library can afford. As a rule of thumb, one should not dictate; one should not leave anything out; and one should use clear terminology. The O/R document, as discussed provides vendors with a formal proposal and gives them a perspective on how to satisfy the needs and objectives of the library. It is written specifically to identify what is acceptable in the proposed automated system. Therefore, it should be preserved as it will serve as a reference tool at the implementation, maintenance and review and will form a part of the contract with the supplier.

(ii) Request for Information (RFI)

Once the O/R is written, it should be sent to a variety of possible vendors/firms and they should be asked to give an indication whether these requirements could be met and an estimate of what the cost would be. Vendors usually send out a packet of information for evaluation. The library, in turn, should also evaluate the information and judge the degree to which the proposed automated system meets its needs. Therefore, vendors that will provide the best possible match should be select as potential candidates. The list of vendors can be found from directories, year books, advertisements, articles in the professional press etc. Workshops offered by professional associations, educational institutions, exhibitions, conferences are also valuable. Assistance in this regard can also be sought from other organisations like INFLIBNET, National Information System for Science and Technology (NISSAT) etc.

(iii) Request for Proposal (RFP)

At this stage, the library should invite tenders from the potential vendors, who are expected to submit a detailed description of the system, which each of them would propose to supply. It is important that the vendors should be compelled to reply to all requirements and specifications in clear, unambiguous language. After evaluating the proposed system and selecting the vendor who most adequately matches the requirements of the library, it is valuable to visit or contact a variety of organisations using their system. The names and address of the institutions using their systems are usually supplied by the firms. Thus, upon the successful completion of a series of evaluation tests, the library should forward all the relevant papers to the Purchasing Unit of their respective institutions as per their normal procedures, who may sign the contract and place orders with the firm. In the contract especially, it should be noted that after the installation of the system, there will be a set of standard formal tests; a system reliability test in order to find out that the systems operates at a specified level of effectiveness for a specified period of time; a functional validity test to assess that each and every function of the system performs as required; and the full load test in order to evaluate the performance of the system during peak hours.

The same procedure should also be followed whether the library wishes to purchase a single or small item as Bawden (1990) also suggests that the same guidelines for small or big purchase should be gone through, in an appropriately simplified form to avoid buying something which will immediately prove valueless or much worse. It is also suggested that the staff of the library, who will ultimately use the systems, should also be involved in the evaluation and selection process.

REFERENCES

Bawden, David (1990) : Going automated; implementing and using information technology in special libraries and information units. London, ASLIB

Bhargava, J.K. et al.(1993) : Sanjay; an Indian library automated package based on CDS/ISIS Program 27(1)P.51-66

Boss, R.W. (1990b) : Procurement of library

automation systems. Library Technology Reports 27(2) P.629-749

Boss, R.W. (1990a) : Library manager's guide to automation. 3rd ed. Boston, G.K. Hall

Clayton, M. (1992) : Managing library automation. 2nd ed. USA, Ashgate

Mudrick,R.G. (1992) : Information system for modern management. 3rd ed. London, Prentice hall.

Perera,P. (1992) : Micro CDS/ISIS; a critical appraisal of its search interface. Program 26(4) P.373-386.

Rowley,J.E.(1990) : Guidelines on the evaluation and selection of library software packages. ASLIB Proceedings 42(9) P.225-235

Rowley,J.E. (1993): Computers for libraries. London, The Library Association.

Weatherby,N. et al.(1990) : Guidelines for establishing automated libraries in developing countries. Computer in Libraries. 10(2) P.21-28.