The Impact of Automation on the Functions, Administration and Staffing of Libraries

A COMLA Seminar, Singapore,
November 1 – 3, 1985

Edited by Paul Xuereb

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Preface

Despite the flood of manuals, surveys and collections of Conference proceedings on library automation, I believe that this little volume will not be found redundant. The papers read at the COMLA Seminar on the Impact of Automation on the Function, Administration and Staffing of Libraries are all eminently practical in nature. Even Mrs Hochstadt's excellent survey of automation development in Singapore's libraries belonging to institutions of tertiary education is presented in a manner that emphasizes problems, solutions and benefits obtained.

Lynn Allen's highly readable and sometimes humorous *How to go online* should be invaluable to those many librarians all over the Commonwealth who are gingerly approaching the task of introducing online facilities in their institutions. It is a very lucid exposition of the various stages involved in planning and implementing programmes of this nature and her list of "online do's and don'ts" should be pinned up in every inexperienced librarian's office.

Her recommendation that the end-user should be involved in the online project from the beginning is echoed in Murray Shepherd's *Staffing implications and the management of change* which states that "experience has taught there *will* be resistance to change", a resistance that "cannot be ignored or washed away" and shows how a good manager will overcome this resistance by good communication with staff, providing a supportive environment for staff and so on.

With the availability of increasingly powerful microcomputers and a variety of software for these machines, Mary Rowbottom's *Automation for the smaller systems* will be of special interest not only to librarians with limited resources at their disposal but to others as well. Her warning about the expensiveness of constructing a database should be heeded by those under the illusion that purchase of hardware and software is the be-all and end-all.

Judith Baskin's paper on *Networks and networking* may not be of immediate practical interest to a number of COMLA member countries still at an early stage of national library automation, but even they would certainly benefit from a careful reading of this paper which points out so clearly the advantages of planning in terms of a whole region's or even a whole nation's resources.

No contemporary librarian can afford to ignore the great benefits offered by automation. If this collection of papers and reports of discussions on them will encourage the more timid to think more clearly and act more confidently, COMLA will find that the organisation of the Seminar and the publication of these proceedings has been well worth the trouble.

COMLA is grateful to the Commonwealth Foundation for the financial support that made both the Seminar and this publication possible, and to the Library Association of Singapore for hosting the Seminar so efficiently and so hospitably. I personally wish to thank J. B. Sultana (National Library of Malta) for his invaluable assistance in having these proceedings published.

Paul Xuereb
University of Malta Library

This paper addresses the theme of the Seminar within the context of automation of the libraries of major tertiary institutions in Singapore.

Why Automate?

The impact of automation on library functions, administration and staffing

by Peggy Wai Chee Hochstadt
Chief Librarian, National University of Singapore

General Background

The National Library of Singapore

The National Library of Singapore (NL) was the first library in Singapore to initiate computerisation in the mid-1970's when it submitted proposals for computerising its circulation system. Priority and focus were later shifted to cataloguing, leading to the development of SINGMARC, a machine-readable cataloguing format based largely on UKMARC and consisting of records from the Selective Records Service of BLAISE and of original cataloguing. As at the end of 1984, there were 143,000 records in the SINGMARC Database from which union catalogues on COMfiche are produced for the Library and its five full-time branches and a few government departmental libraries. Processing of SINGMARC records is batch. NL is in the process of evaluating three turnkey integrated systems which could incorporate its SINGMARC Database and handle its annual loans which amounted to a hefty 6.3 million in 1984.

The Institute of Education

The Institute of Education (IE) is the only tertiary institution in Singapore for the training of new and experienced teachers. Set up in April 1973, it offers a two-year full-time Certificate in Education Programme for non-degree holders and a one-year full-time Diploma in Education Programme for graduates. It also offers part-time and full-time Continuing Education Programme in-service courses including the Master of Education and Doctor of Philosophy in Education Programme degrees awarded by the National University of Singapore.[1]

The IE Library hopes to computerise in 1986 and is waiting for formal approval of its proposals by the relevant authorities. Meanwhile, it has started operating the DIALOG Online Search Service.

The Nanyang Technological Institute

The Nanyang Technological Institute (NTI) was established in August 1981 to conduct engineering degree courses aimed at producing practice-oriented engineers to meet the increasing demands of Singapore's structured economy.

By special arrangement with the National University of Singapore (NUS), all first-year engineering students undergo a common course at the University's Faculty of Engineering. After the successful completion of the first-year course, students may choose to complete the remaining three years either at the NUS or the NTI. NTI graduates receive the Bachelor of Engineering degree upon graduation from the NUS. The Institute has three schools of engineering: Civil and Structural Engineering, Electrical and Electronic Engineering, and Mechanical and Production Engineering.[2]

The NTI Library is the only academic library in Singapore so far to have been able to make good use of the enviable opportunity to computerise from a clean slate, i.e. right from the start when the library itself was being set up. In 1981, the NTI Library joined MALMARC (operated by the Universiti Sains Malaysia in Penang) as a subscribing member, receiving cataloguing records from it in the form of a COMfiche catalogue. The MALMARC operates in a batch mode. The NTI Library has recently implemented an online circulation system with turnkey facilities and has also developed two minor systems with a microcomputer: a serials control system and a newspaper indexing system.[3] (*See also* Appendix 1)

The Ngee Ann Polytechnic

The Ngee Ann Polytechnic (NP) set up in 1963, offers nine full-time diploma courses in: Building Management, Building Services Engineering, Business Studies, Computer Studies, Electrical Engineering, Electronic Engineering, Mechanical Engineering, Public Health Engineering and Shipbuilding and Offshore Engineering. In 1982, a Centre for Computer Studies was set up to provide courses in computer applications. It is planned to develop the Centre into an institution of excellence for non-degree computer education and is being equipped with the most up-to-date computer facilities.

In 1983, the NP Library set up an online circulation system designed by the NP's Computer Centre and Library staff.[4] The system has since been enhanced to generate the Library's accessions list. (*See also* Appendix 1)

The Singapore Polytechnic

The Singapore Polytechnic (SP) was set up in 1954. Since 1969, it has concentrated its efforts on training engineering technicians and professional manpower for the Singapore merchant navy. The Polytechnic offers fourteen diploma courses and a certificate course to both "O" and "A" level students under its full-time programme. In addition, it also offers two advanced diploma, thirteen diploma and five certificate courses on a part-time basis. The Polytechnic is introducing CAD/CAM training for the current (1985/6) academic year.[5]

In October 1984, the SP Library implemented the VTLS (Virginia Tech Library System) online integrated turnkey system for its cataloguing, circulation, information retrieval and public-access catalogue services. Its catalogue is fully converted. Plans are also underway to computerise its acquisitions and serials control functions. (*See also* Appendix 1)

The National University of Singapore

Although its origin could be traced back to 1905 with the founding of the King Edward VII College of Medicine, the National University of Singapore (NUS) was

established in August 1980 through the merger of the University of Singapore and Nanyang University. The University has eight faculties: Arts and Social Sciences, Science, Architecture and Building, Accountancy and Business Administration, Engineering, Law, Medicine and Dentistry. Postgraduate studies are offered in most of the faculties. There are a total of 48 teaching departments within the faculties. There are also three postgraduate schools for Medical Studies, Dental Studies and Management Studies. The non-faculty departments include the English Language Proficiency Unit, the Chinese Language and Research Centre, and the Institute of Systems Science (ISS). This institute provides advanced computer training and applications research for the private sector, while the Department of Information Systems and Computer Science within the Faculty of Science offers undergraduate courses in Information Systems and Computer Science as well as postgraduate studies. A major service unit is the Computer Centre which upgraded its computer capacity with the installation of a $5.8 million IBM 3081 GX processor. This, together with the existing IBM 4341 and the numerous micros and 400 workstations, makes it the largest mainframe processor complex in Singapore.

The NUS Library System comprises the Central Library, Chinese Library (housed in the Central Library building), the Law Library and the Medical Library. The Science Library was completed in 1985 while the Hon Sui Sen Memorial Library (for management and related studies) was completed by 1987.

Computerisation at the NUS Library

As early as the mid-1970's, the Library started considering various options for computerising its operations. However, proposals for computerisation were received with a cautious "wait and see" attitude from the University administration. Nevertheless a start was made in 1978 with the setting up of COMSER (Computer-Based Periodicals Control System) with the assistance of the Computer Centre. The batch system was able to produce alphabetical and classified lists of serial titles. In 1979, the Computer Centre also designed the software for the loans system called LACS (Library Automated Circulation System) which was partially tested in 1980.

MINISIS Test Programme (MTP)

The crucial period of development began with the implementation of the 10-month MINISIS Test Project (MTP) which started in June 1981 and was completed in March 1982. MINISIS is a generalised management and information retrieval system designed to run on the Hewlett Packard 3000 series of computers. It was developed by the International Development Research Centre (IDRC) of Canada. The MTP aimed:

1. To test the suitability of MINISIS for developing the Library's own online integrated system for library operations in acquisitions, cataloguing, documentation and information retrieval of the scale and size of operation of the NUS Library System. (*See* Appendix 1 for basic statistics on NUS Library resources and services.)
2. To test the capability of MINISIS to accept MARC bibliographic records in such a way that the NUS Library would be able to use MARC records to create

its own cataloguing database. This process involved the conversion of MARC records to the internal MINISIS format through the use of the conversion programme ISOCONV, written by IDRC.

Implementation of MINISIS

CATALOGUING. Results of the MTP satisfied the aims set. Consequently, MINISIS was implemented in stages for cataloguing, starting with the Central Library in April 1982, followed by the Chinese Library in November 1983, the Medical Library in August 1984 and the Law Library in January 1985. Records of titles in the Chinese language are input in Hanyu Pinyin.

ACQUISITIONS. For acquisitions, MINISIS was also implemented in stages and became fully operational in the Central Library in October 1984 and the special libraries by January 1985. As MINISIS is basically a database management system for *bibliographic* applications, it lacks various accounting and other features necessary to acquisitions work in a large library such as the NUS Library. To date, the Library's programming staff, in consultation with the Acquisitions staff, have completed and incorporated the following enhancements to the Acquisitions Module: average price of books (not available under the manual system); automatic currency conversion (much more time-saving than manual system); vendor statement: amount purchased from various vendors (not available under the manual system); statement of vote commitments by teaching department/faculty (weekly); printout of purchase orders (weekly); reminders to vendors (monthly); statistics of orders by number of volumes/copies, by teaching department (weekly) – too time-consuming and uneconomical to compile manually; list of orders cancelled (weekly) – too time-consuming and uneconomical to compile manually; other ad-hoc reports as requested.

Further enhancements (under study) will include those relating to funds accounting, claims and cancellations as well as vendor reports.

DOCUMENTATION. From 1960 to 1981, the Index to periodical articles relating to Singapore, Malaysia, Brunei and ASEAN was compiled manually in card form as an ongoing project. In May 1982, the PERIND Database was set up, with records input by the staff of the Humanities/Social Sciences/Management Reference Department of the Central Library (for humanities and social sciences), the Medical Library (for medicine and related subjects) and the Law Library (for law). PERIND presently holds over 15,000 records. An index covering the humanities and social sciences for 1980–82 and a supplement for 1983–84 have since been published as a by-product of PERIND.

Implementation of LACS (Library Automated Circulation System)

The LACS system, originally designed by the Computer Centre in 1981, was further enhanced by the Library's programming staff in consultation with staff of the Circulation Department and the special libraries. It was also implemented in stages, starting with the Law Library (December 1983), the Medical Library (October 1984) and the Central Library (in stages, from October 1984–June 1985). A total of 650,000 volumes was retrospectively barcoded and data-captured by the Library staff for the implementation of LACS.

Capabilities added to the system include:

1. Loan programme – calculation of fines and automatic printout of fines receipts; alerting borrower of books awaiting collection; interlibrary loans; automatic locking off of delinquent users; automatic alert for lost books found.
2. Query programme – easier to use and more information provided; instant printout of loan list personal to user.
3. Reservation by the first return copy.
4. Automatic generation of reservation notices, overdue notices, recall notices for books needed by the Recommended Books Room (RBR).
5. Membership programme for registration of new members and updating of members' information.
6. Fines and fines accounting.
7. Keeping track of books sent to RBR (the Recommended Books Room), to the Singapore/Malaysia Collection and books on long-term loan to Library departments and University teaching departments.
8. Reservation by call number.
9. Reports and statistics.

Further enhancements are in progress for (a) a portable backup system (b) stock-taking (c) online help facilities (d) loans of restricted materials and (e) management information reports.

LACS is interfaced with MINISIS so that the required bibliographic data from the Cataloguing Database NLIBNUS is automatically retrieved and input into the Circulation (Loans) Database LACS.

Information Retrieval

Online retrieval from the MINISIS database is by author, keywords in title (including series title) and subject heading (Library of Congress Subject Headings). It is also possible to retrieve by classification number (Library of Congress) and ISBN (International Standard Book Number). However, public access to the Library Catalogue is through: (1) the COMfiche Catalogue (COMCAT) produced quarterly; (2) monthly supplements to COMCAT in computer printout; (3) the Card Catalogue (for titles catalogued under the manual system and not as yet converted into machine-readable format).

Online retrieval from the LACS database is by call number and barcode number.

NUS Library Databases

By June 1985, most of the major computerised services of the Library had become fully operational.

Database Management

Database management is handled by the staff of the Library's own Automation Unit which was set up in October 1982 and relocated in September 1984 in a new Computer Room in the Central Library building. The Unit is headed by a systems librarian, assisted by two analyst programmers, two professional staff members and 4.5 members of support staff. The Unit maintains very close links with the University's Computer Centre and works in full collaboration with the other 14 departments of the NUS Library System (including the special libraries.)

Appendix 2 shows the hardware configuration of the NUS Library Computer System.

Library Online Information Search Service (LOIS)

In addition to the computerised in-house operations (including online subject retrieval from its own internally generated databases such as NLIBNUS and PERIND), the Library also set up LOIS (Library Online Information Search Service) utilising external databases, in April 1982. LOIS is linked to DIALOG in Palo Alto, California, USA, through which the Library is able to access over 200 databases covering a comprehensive range of subjects. Some of the more commonly searched databases include CA SEARCH (for chemical sources), COMPENDEX (for engineering sources), SCISEARCH (for scientific and technical sources), SOCIAL SCISEARCH (for social science sources), BIOSIS PREVIEW (for biological sources), NTIS (National Technical Information Service: for technical sources) and MEDLINE (for medical and related sources).[7] The Library is constantly looking out for other additional vendors who can provide information either not available through DIALOG or at cheaper access rates and/or better retrieval capabilities.

Factors Contributing to the Rapid Automation of Major Academic Library Services

It is worth noting that all the accelerated automation activities carried out at the four major academic libraries described in this paper have been quite recent developments which have taken place within a relatively short time-span, namely, between 1981 to 1985. While a very large library system such as the NUS Library has taken five years to get its in-house and adapted systems fully operational, the Singapore Polytechnic Library has managed, through a turnkey system, to computerise most of its operations within one year. The following factors have contributed to the rapid development.

Climate for computerisation. In 1980, the national economic policy laid out the directions for development in the 1980's. The most significant change was the restructuring of the industries from labour-intensive to capital-intensive, high technology and high value-added, through automation, computerisation and the upgrading of operations to raise productivity, as well as through the development of skilled manpower, particularly computer personnel.

In March 1980, a high-powered Committee on National Computerisation was appointed with the then Minister for Education as Chairman. Its major recommendations as contained in its Report (October 1980) included the speedy establishment of Computer Training Centres to produce the needed computer professionals; the active promotion of computerisation in the Civil Service, and the promotion of the software industry.[8] Following this, the National Computer Board was established in June 1981 whose terms of reference included the encouragement for the establishment, development and expansion of the computer services industry in Singapore and the promotion, development, implementation and coordination of computer data processing for universities, government departments and agencies. Thus, the NUS, NTI and the two Polytechnics and their libraries found themselves in a very healthy environment

for computerisation. Added encouragement came in the form of the National Productivity Board (NPB) established as the prime implementing agency in support of the National Productivity Council's Productivity Movement. Computerisation was (and still is) vigorously promoted as a means to raise productivity. In such a congenial climate, proposals for computerisation had a much better chance of being approved.

Increases in library budget. During this period, the steady and significant increases in the library budget also led to a rapidly increasing volume of new accessions. Accelerated increases in student enrolment and in teaching staff and the establishment of many more new courses also led to a corresponding increase in the use of the various library services. At the NUS Library, the volume of acquisitions, cataloguing, loans and requests for information searches rose to the extent that computerisation was the only way to clear the various work bottlenecks created.

User pressure for sophisticated service. Academic staff are vocal and persistent in their demands for the satisfaction of their library and information needs. They form a sophisticated user group that can compare services which their own library provides (and more important, does not provide) with those in overseas institutions which they may visit. Even the student users are becoming very demanding, and where computer literacy is concerned, they are also sophisticated users. Group petitions are becoming the order of the day. Academic library users are quite aware that the library is a service organisation and expect to have their requests satisfied expeditiously. They form a formidable lobby for more effective and efficient service, which gives added urgency to the need for computerisation.

Advances in telecommunications technology. The rapid advances in telecommunications technology also help spur the development of computerised library services. For instance, the NUS Library would not have been able to start the DIALOG Service in 1982 at affordable cost if Telecoms (Singapore) had not installed its TELEPAC Service then. Telecommunications facilities in Singapore are excellent as Telecoms (Singapore) is extremely progressive in the development of its services to customers.

Computer expertise. Each of the four academic institutions has a Computer Centre which provides the needed expertise to assist the Library in planning and maintaining its computerised system. The understanding and support of the computer centre is crucial to the success of the library's computerisation efforts, even in cases where the library may have its own computer personnel. At the NUS Library, the two analyst programmers are on the Centre's establishment but assigned full-time to the Library while all library applications for capital funding of computerisation projects are channelled through the Director of the Computer Centre. In the four institutions, there is generally good rapport between the Computer Centres and the Libraries.

Numerous short courses, seminars and workshops relating to the various aspects and levels of information management systems and computer science are conducted regularly by the relevant teaching and service departments and held on campus. Many of these are relevant to the management of the library

computer system. Library staff directly involved with computerised operations or those with a personal interest are able to attend them either free or at a discount fee. This ready opportunity for computer training helps tremendously to generate and maintain the motivation as well as develop the expertise necessary to the successful implementation and smooth management of computerised library and information services. In addition, the expertise of the staff of the academic departments/units can be readily tapped. For instance, at the NUS, staff from the Department of Information Systems and Computer Science, the Institute of Systems Science and other departments of the Faculties of Science and Engineering as well as the Computer Centre respond positively to any requests for consultation and advice on computer matters from Library staff.

Effects of Computerisation on Function, Administration and Staffing

Function and Administration

As the effects of computerisation on library function and administration are often inter-related, they are discussed together in this paper. Most of them are common to academic libraries which have undergone the change from manual to computerised systems, as reflected in the international literature sources on the subject. Some perhaps pertain especially to the Singapore situation while others are not felt here, again perhaps on account of the circumstances peculiar to Singapore. The effects discussed are all drawn from the individual experience gained from the NUS Library Computerisation Project, whether felt or unfelt.

Although F. W. Lancaster's book, *The Measurement and Evaluation of Library Services* was published in 1977, the major reasons for (which also become the effects of) automation as stated in Chapter 9 (Evaluation of Automated Systems in Libraries) are still valid today in varying degrees, depending on the size and scale of operation of the particular library and the local conditions under which it operates. They are:

1. Improve productivity
2. Reduce staff
3. Improve control
4. Reduce error
5. Improve speed
6. Increase range and depth of service
7. Facilitate cooperation
8. By-products
9. Improve dissemination
10. Reduce unit cost of operation.[9]

Most of these effects are seen in the respective NUS Library services after computerisation.

Technical Services

ACQUISITIONS. The computerised Acquisitions System permits staff to search bibliographic records in the Library's NLIBNUS Database (titles on order, in process, catalogued) online from any terminal in any part of the Library by

several access points (keywords in title and author/ISBN/publisher/date of publication). It can generate various listings for information dissemination and management control, including statistical and financial reports. Purchase orders and reminders to vendors are also automatically generated. Manual filing has been reduced and will be eventually eliminated. Similarly eliminated are the checking and annotating of instructions on purchase orders. The time saved has permitted the same complement of clerical staff to handle more orders.

The following table gives statistics of book orders requested and processed and orders placed for the months of December–August for 1982/83, 1983/84 and 1984/85 using manual and automated procedures.

	Orders received	%	Orders placed	%
1982/83	15,606		11,393	
1983/84	20,880	% inc. over 1982/83 33.8	13,631	% inc. over 1982/83 19.4
1984/85	27,288	% inc. over 1983/84 30.7	16,184	% inc. over 1983/84 18.7

(Note. The months December–August have been taken because in October and November 1984 the staff weeded the order drawers and input outstanding titles into the NLIBNUS database.)

CATALOGUING. A machine-readable catalogue which is accessible online from any terminal located in any part of the library system is a real boon to the staff of the whole library. A great deal of time is saved from library staff having to trek to the card catalogue or the Acquisitions or Cataloguing Department to check on whether a title is on order, in process or catalogued, be it one in the Central, Law or Medical Libraries, as the database is a union catalogue of acquisitions and cataloguing records for the whole NUS Library System.

For the library user, although he is not able at present to get the full benefits of a fully converted and online public-access catalogue, the availability of COMfiche catalogues (COMCAT) at different locations in the library does facilitate easier bibliographic access for titles that have been input into the NLIBNUS Cataloguing Database.

The following labour intensive, time consuming and repetitive chores have been eliminated: typing of book loan cards and book pockets; duplication of catalogue cards; sorting of catalogue cards; typing of tracings and added entries and checking of these (now automatically generated and not necessary to check for accuracy); filing catalogue cards in the Public Card Catalogues (bibliographic records are automatically filed); refiling of catalogue cards withdrawn from card catalogues for typing in of bibliographic information and holdings statement (data is now added to the bibliographic records online); typing and duplication of the monthly *Accessions List* (now produced as separate lists for the different libraries by a commercial vendor from master computer printouts).

Added benefits from a machine-readable catalogue are found in the better retrieval capabilities through multi-access points and the numerous printouts and byproducts that can be generated at a fraction of the time required for manual compilations. The microfiche catalogues also require less storage space and maintenance.

The workflow of the Cataloguing Department has been streamlined as new books need not be sent back and forth from the Acquisitions Department to the Cataloguing Department. Time and labour are also saved since the brief (basic) bibliographic data input at the Acquisitions stage need not be duplicated by the Cataloguing staff who can use the data and add to or modify it to create the full bibliographic record. Accuracy in cataloguing is also much improved as the built-in AACR2 punctuation and the A4 size printed worksheet assist cataloguers in their record creation and editing work. (Fields are prompted.) Improved productivity is shown in the following table of cataloguing output.

Statistics for Manual Cataloguing and MINISIS Cataloguing
July 1980/June 1981 and July 1984/June 1985

	1980/81	1984/85	% increase/decrease 1984/85 over 1980/81
Manual cataloguing titles	8005	540	– 93.3
MINISIS cataloguing titles	2243	20525	+815
Total no. of titles	10248	21065	+105.6
Total no. of professional staff	5.29	6.63	+ 25.33
Professional staff cataloguing output	3725	11756	+215.6
Individual output	704	1773	+152
Total no. of clerical staff*	10	12.5	+ 25
Clerical staff cataloguing output	6523	9309	+ 42.7
Individual output	652	744	+ 14
Total no. of staff*	15.29	19.13	+ 25

(**Note.* Total number of staff is given although not all clerical staff are involved in coding CIP/LC data and even those involved do not code on a full-time basis.)

Cataloguing output increased by 105.6% in 1984/5 over 1980/1 while staff increased by 25% for the same period.

Readers Services

CIRCULATION. The Computerised Circulation System has achieved significant time-saving on loan transactions (including reservations) for both operating staff and borrowers because of the many automatic functions which have simplified loan procedures and led to speedier operation. Shorter queues are evident and borrowers are pleased with the time saved in waiting to be served as a number of tasks which they previously had to perform have now been eliminated (filling in the loan cards, reservation cards, fines receipts). As returned books are discharged much more speedily, they are also returned faster to the shelves, thus allowing a better circulation of books. There is better control over loans since online messages and loan links can be prompted by the computer for every borrower. There is also less confusion among the operating staff over the loan rules since the loan limits are also prompted. Many tedious routines of sorting, counting, filing, withdrawing, inserting, refiling and typing loan cards have been eliminated. Like acquisitions, circulation statistics and listings can be produced speedily to facilitate the monitoring of loans and analysis of usage patterns to aid the selection and acquisition of resources. By accessing the LACS and NLIBNUS databases, the details and location of a missing item may be verified quickly. More items reported missing are found since a more systematic search can be done. The automatic accounting of fines, generation of overdue notices and the transfer of student data from the student database (Subase) of the Registrar's Office to LACS have improved administration.

While borrowers are happy with the improved loan transactions, they (especially the teaching staff) have mixed reactions to the efficient implementation of the loan rules. Many of them view the constant automatic reminders and the final locking off procedure as punitive. However, the majority do appreciate the aim of the loan policy: to ensure the widest circulation of resources among the largest number of borrowers.

REFERENCE. The main functions of any Reference Department is to aid users exploit the ever increasing mass of information either within our library or outside. It is most opportune that present technology has made it possible for us to meet the challenge of the "information explosion".

For the Reference staff, computerisation means ONLINE access to information. The major benefits of having such a capability are the same, whether the computer is in the next room or thousands of miles away. They are:

1. Enhanced searching capabilities, e.g. we can • retrieve records via additional access points such as keywords in titles which are sometimes newly coined terms and terms not found in the LC Subject Headings e.g. "terotechnology" and "corporate culture"; • we can process multiple-concept searches at one go, that is, using a combination of author, title keywords and subject headings; • and we can retrieve information instantaneously if we print the citations online.
2. More up-to-date information. Databases (both overseas and in-house) are usually updated more frequently than their printed versions. This currency of information is much appreciated when accessing overseas databases as the library's printed indexes are sent by surface mail.

For our in-house library catalogue, we have a record of an item from the time it is input at the acquisitions stage, instead of only after it has been catalogued. We also have a true union catalogue of the materials acquired in the Central (including the Science Collection), Law and Medical Libraries since 1981, with multiple-access points – one up on the union card catalogue, which held only the main entry cards from the Law and Medical Libraries as well as the Science Collection.

3. More interaction between users and Reference staff. Since Reference librarians act as intermediaries in online searching, this has resulted in more interaction. The Library staff are now more aware of user needs and the University's research trends, and users are more aware of the staff's ability to help.

4. Enhancement of the library's image. Many users are impressed by the speed of online retrieval of information.

The following effects have also been observed in the use of in-house and external databases:

In-house

1. Although automating the catalogue has many advantages, users now have to bear the inconvenience of checking separate listings. For example, to find out what is in the Central Library, a user will have to check: the Main Card Catalogue (now being microfiched); Science Card Catalogue (now being microfiched); COMCAT and COMCAT supplements. However, this problem should be resolved when we have a converted online public-access catalogue.

2. As COMCAT is available at multiple locations, it is now more convenient for users to check post-1981 acquisitions.

External (LOIS)

1. We can now access information beyond the resources of our library.

2. LOIS retrieves citations to materials that are not found in our library. Since July 1984, based on 76 returns, 68% (average) of the significantly relevant citations retrieved for each search request were not found in any of the NUS Libraries. This has increased the workload of the Reprographic Services Department.

3. Based on 213 user responses, the saving of time (176 responses) was mentioned as the major benefit, followed by "found information of which I was unaware" (137) and "kept me informed of developments in my area(s) of interest" (105).

4. The introduction of automation to aid the provision of information has brought about the need to abandon our traditional information-is-free philosophy. Users and staff have to adjust to the financial reality that information is an expensive commodity.

PERIND

The Reference Department is also involved in the project of indexing periodical articles relating to Singapore, Malaysia, Brunei and ASEAN (as an entity) in the humanities, social sciences, law and medicine.

Automation has made it possible for the PERIND records to be retrieved online, and it has also enabled the humanities and social sciences part of the index to be published more frequently.

Use of the Microcomputer

The easy availability of microcomputers has revolutionised the functioning of the Reference Department. The micro is primarily used as an 'intelligent' communicating terminal for online searching. Since early 1984, the NUS Library has acquired a communications software package (TELEPACK), written to meet our specific requirements, to access overseas databases. The main advantage of this package is that it allows us to store messages and send them one line at a time. This also allows us to store complicated passwords and then send them by two key-strokes.

Other uses include word processing, and creating a database that contains terms indexing the contents of reference materials.

Staffing

Reduction of Staff. The foremost questions on the minds of most library managers (especially at the middle management level) when asked to raise productivity in their departments is: Will my staff be cut? If so, where will be they posted within the Library System? The answer to the first question is usually acceptable if the "cut" is converted to a reassignment of duties within the same department. The second often needs much persuasive skill to convince the head of department of the rationalisation for staff changes. The problem will be compounded by the state of relationship between heads. Then, the staff members concerned may also experience problems such as disorientation and social alienation when their duties are changed within their own department or if they are transferred to other departments.

Definite effects on manpower have been experienced at the NUS Library. In Circulation, fewer staff are rostered at the counter so that more staff are deployed to shelving and shelf-dressing duties. This has alleviated the extent of shelf failure, a problem endemic to any large library system with open-access collections. Staff from other departments need no longer be rostered for loan counter duties (after office hours), thereby drastically reducing the confusion and problems arising from too many and different staff handling the job at different times. Efficiency and productivity are raised when the same complement of staff is put to a set of duties as they become thoroughly familiar with the procedures and can handle borrower requests/queries confidently and faster. The computer's ability to trap "delinquent" borrowers automatically also means that more staff time is expended on immediate follow-up actions on cases of disputed loan violations and on handling these borrowers. In Acquisitions, the same complement of staff is able to handle a much heavier workload. In Cataloguing, two clerical officers have been posted out of the department and the manpower saved from the routine repetitive chores is now utilised for copy cataloguing, thereby increasing cataloguing output.

In Reference, although there have not been any appreciable saving of staff time, staff are now able to handle more comprehensive searches in a much shorter time as well as offer a more personalised service.

Staff Training. The importance of a planned systematic ongoing staff training programme for computerised operations cannot be overstressed. At the NUS Library, a great deal of time and manpower is spent on this but it is considered

well spent. The responsibility of initial staff training for all library departments (including the Special Libraries) and at all levels was assigned to three departments: the Library Automation Unit (for circulation procedures), the Acquisitions Department (for acquisitions procedures) and the Cataloguing Department (for cataloguing procedures). Appendix 3 provides statistics on the time expended on staff training for the implementation of the LACS system (circulation). Constant upgrading of computer skills is imperative, especially for the systems librarians and the online searchers.

Another aspect of staff training worth noting is the understandable but significant increase in the number of observation/training attachment visits to the NUS Library by staff of other libraries and institutions in Singapore as well as from overseas. This has affected staff time appreciably, particularly when many observation visits involve the provision of consultancy or advisory services on the part of the NUS Library staff.

Staff Attitude. Attitude towards computerisation at the NUS Library at all staff levels has been most positive. The eagerness to try new procedures was very evident. Staff take pride in being part of the changed, new and improved system in which they have played a significant role in evolving. Similarly, no problems have been encountered with the unions. This may be attributable to the congenial environment for automation created by the national promotion of the use of computers through countless campaigns and ministerial pronouncements.

A very important and welcome change in staff attitude which computerisation is imposing on the whole NUS Library environment is the need to view the Library as a whole entity rather than in a compartmentalised perspective. Staff should become more aware that unilateral decisions on work procedures or policies that may seem relevant to one department can have far-reaching implications for the others. Consequently, more work committees with members drawn from various units may be set up and more forums between departments should be held.

Interlibrary Cooperation through Networking

Although the benefits of automation have been many for those academic libraries in Singapore which have implemented computerised systems whether fully or partially, the full potential of resource sharing and cooperation among Singapore libraries at the national level through a national bibliographic network has yet to be tapped. Happily, concrete steps are being taken towards achieving this goal.

SILAS

The Singapore-based Integrated Library Automation System (SILAS), a national bibliographic database system, was formally proposed by the Ministry of Finance in August 1983 and approved in June 1984.

The main objectives of SILAS are:

1. To develop a national bibliographic database of machine-readable records for all types of library materials.
2. To expedite the availability of bibliographic information.
3. To provide cooperative online shared cataloguing services, based on the

national bibliographic database. These services would support copy cataloguing, original cataloguing, and the maintenance of an online authority file for the purpose of original cataloguing.

4. To provide online inquiry services, based on the national bibliographic database. The inquiry services would assist reference searches, the coordination of acquisition of material leading to collection rationalisation and development, interlibrary lending and sharing of resources, etc.

5. To provide a range of products or services based on the national bibliographic database, such as selective records service; individual COMfiche library catalogues; COMfiche union catalogues (national, regional or by subject group); new titles (or accessions) lists for individual libraries; and the union catalogue of serials.

The Western Library Network (WLN) will be used for the implementation of SILAS, which will be headed by a Director who will be responsible to the SILAS Management/Liaison Committee, chaired by the Director of the National Library (NL). NL has been the first participant of the network. Within three years after the successful operation of the System at NL, SILAS will accept twenty libraries into its network. The long-term goal is to include all libraries (whether government or non-government supported) in the network.[10]

Libraries in Singapore look forward with keen interest to participating in SILAS for the many benefits to be gained.

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Automation Unit), Miss Jill Quah (Head, Cataloguing Department) and Miss Sylvia Yap (Head, Science/Technology/Architecture Reference, Central Library). Last but not least, grateful thanks are due to Mr. Choy Fatt Cheong (Library Automation Unit) and Mr. Christopher Khoo (Science/Technology/Architecture Reference, Central Library) for their assistance in searching and abstracting international literature sources on the theme of this paper.

COMPUTERISATION IN MAJOR TERTIARY INSTITUTION LIBRARIES IN SINGAPORE
(As at 31 October 1985)

LIBRARIES		NANYANG TECHNOLOGICAL INSTITUTE (f 1981)	NATIONAL UNIVERSITY OF SINGAPORE (f 1905)	NGEE ANN POLYTECHNIC (f 1963)	SINGAPORE POLYTECHNIC (f 1958)
HARDWARE	Computer system	IMS Microcomputer, DG, IBM PC	Hewlett Packard HP3000 Series 48	PRIME 2250	Hewlett Packard HP3000 Series 48
	Main memory	0.064 MB 1.5 MB 0.256 MB	3 MB	0.5 MB	2 MB
	Total disk space	30 MB 30 MB 10 MB	1250 MB	228 MB	536 MB
	No. of public access terminals	–	–	–	6
	No. of terminals for internal operations	6	32	5	15
AUTOMATION OF LIBRARY FUNCTIONS	**Library Functions**	**Software used**			
	Acquisitions	(In-house)[2]	MINISIS	–[1]	VTLS[1]
	Cataloguing	MALMARC (batch)	MINISIS	(In-house) (batch)	VTLS
	Circulation Control	TECHNOCRAT	LACS (in-house)	(In-house)	VTLS

Appendix 1 – contd.

		NTI	NUS	NP	SP
	Information Retrieval	(In-house)[1]	MINISIS	–[1]	VTLS
	Public catalogue	–	–	–[1]	VTLS
	Serials control	(In-house)	MINISIS[2]	–[1]	VTLS[1]
	Others	–	–	–[2]	
	External online search services	–	DIALOG	–	–
EXPENDITURE ON AUTOMATION	Total expenditure on library automation (hardware & software, including consumables since inception) in S$	$210,000	$1,000,000[3]	$100,000	$470,630
LIBRARY RESOURCES	Books (volumes)	47,500	1,261,195	74,142	130,000
	Journals (titles)	1,000	9,989	780	1,000
	Microforms (titles/reels)	40	21,924 reels 124,839 microfiches 32,414 microcards	–	69 fiche titles
	AV materials (titles/items)	840	1,644 titles 22,588 items	2,362 titles 24,002 items	1,440 titles

Appendix 1 – contd.

			NTI	NUS	NP	SP
BASIC ANNUAL LIBRARY STATISTICS (1984–1985)	Total membership		2,484	20,997	8,584	12,630
	Loans	Books (volumes)	44,955	869,197	156,794	212,720
		Non-print materials (by loans)	1,488	34,563	18,427	26,720
	Accessions	Books (volumes)	12,500	57,423	7,825	8,940
		Journals (titles)	86	599	–	50
		Microforms (titles/reels)	–	1,545 reels 18,573 microfiches	–	2 microfiches
		AV materials (titles/items)	245	597 titles 3,332 items	546 titles 4,451 items	600
	Cataloguing	Books (titles)	6,358	27,829[4]	5,363	7,662
		Journals (titles)	474	689[4]	–	50
		Microforms (titles)	–	389[4]	–	2
		AV materials (titles)	38	233[4]	501	600

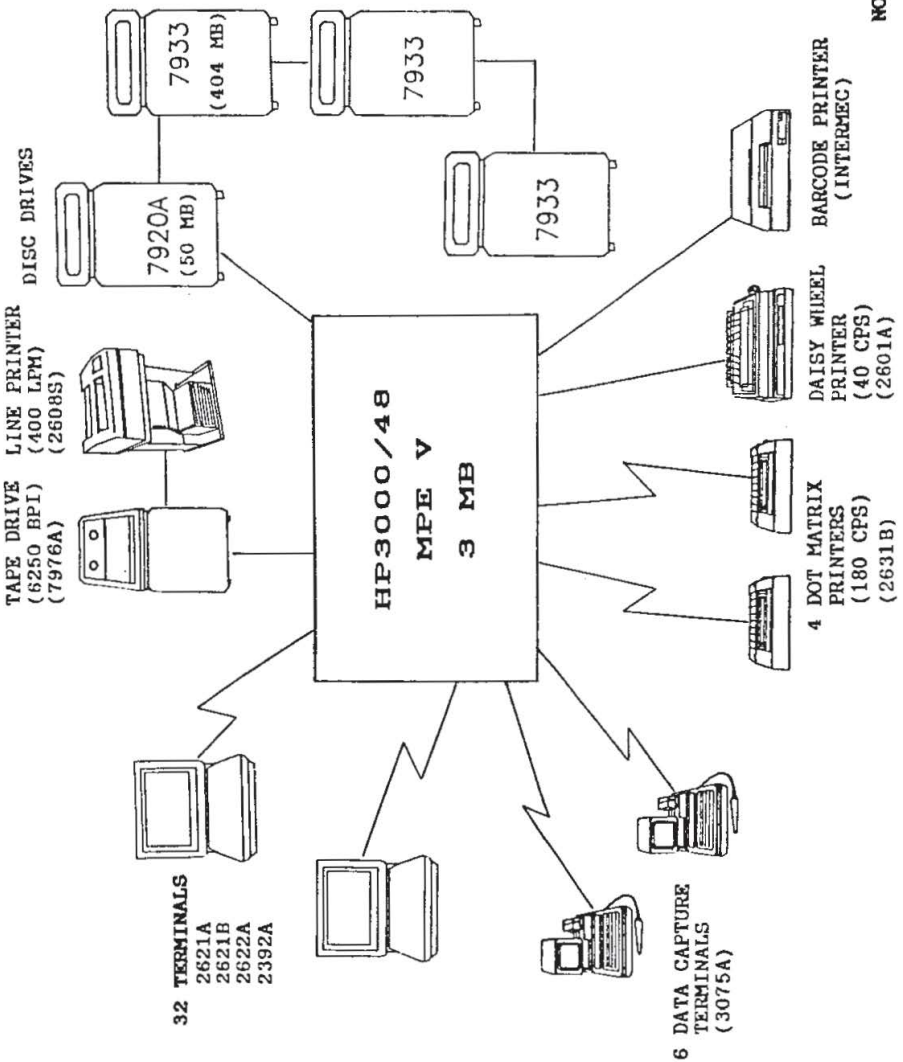
Notes:

1 In the process of implementation.
2 Under study.
3 Excludes MINISIS and LACS software.
4 Excludes re-catalogued titles and additions (titles of new editions and duplicate copies.)

NUS LIBRARY COMPUTER SYSTEM

HARDWARE CONFIGURATION

Appendix 2



Appendix 3

TIME EXPENDED ON STAFF TRAINING FOR IMPLEMENTATION OF LACS (LIBRARY AUTOMATED CIRCULATION SYSTEM

PERIOD	CONTENT	CATEGORY OF STAFF	SIZE OF GROUP	TRAINING DURATION (per session)	NO. OF STAFF TRAINED	TOTAL TRAINING TIME
SEPT. '84 (Partial implement-ation of LACS)	Using the light pen terminals for loan transactions. Hands on.	Circulation – All staff	3	1 hour	20	7 hours
	Same as above	All other non-prof. staff in Central Lib.	4	1 hour	91	23 hours
	Same as above	All prof. staff of Central Lib.	6	1 hour	35	6 hours
	Data entry and modification. Pro-cedures on membership registration.	Deputy Libra-rian's Office	2	4 × 1 hour	2	4 hours
JUN./JUL. '85	Demonstration of loan transaction programmes. Exception procedures. Use of the Reservation and Query programmes. Hands on.	All prof. staff of Central Lib.	5	2.5 hours	41	20 hours
	Data entry and modification Hands on.	Serials Dept.-Prof. staff	2	3 hours	2	3 hours
	Data modification. Hands on.	Cataloguing – 1 Prof. 3 COs	4	2 hours	4	2 hours
	Data modification. Hands on.	Reference – 5 Prof. staff	5	1 hour	5	1 hour

Appendix 3 – contd.

PERIOD	CONTENT	CATEGORY OF STAFF	SIZE OF GROUP	TRAINING DURATION (per session)	NO. OF STAFF TRAINED	TOTAL TRAINING TIME
	Loan transaction programmes and procedures. Reservations and Query programmes. Housekeeping procedures. Hands on.	Law Library staff	6	3 hours	12	6 hours
	Same as above	Medical Lib. staff	6	3 hours	12	6 hours
	Loan transaction programmes and procedures. Hands on.	All staff in Circulation	4	2 hours	25	12 hours
	Reservations & Query programmes. Housekeeping procedures. Hands on.	Circulation – COs	5	2.5 hours	5	2.5 hours
	Revision of loan transaction procedures	All staff in Circulation	5–7	1 hour	23	4 hours
AUG. '85	2nd revision	All staff in Circulation	12–13	2 hours	25	4 hours

TOTAL TIME SPENT ON TRAINING: *106.5 hours*

Notes:

1. Most of the one-hour sessions consisted of 30 to 40 minutes of demonstration and explanation and the rest of the time was spent on hands on experience.
2. Sessions lasting more than 1 hour were broken down by intervals of 30 minutes or 15 minute breaks so as to sustain the interest of participants.
3. These formal trainings for the counter staff were supplemented by constant supervision and explanations during the actual operation of the system.

How to Go Online

Lynn Allen
AWA Computer Services, Perth.
Western Australia

Introduction

I have been asked to speak on the topic "How to go online" and the first question one might ask is: "Online to what?" Today's technological possibilities are mind boggling as anyone knows who attempts to cope with the information society, a term which borders on the cliche these days, but is none the less apt. Information technology has become the umbrella term encompassing the modern librarian's tools. Some of these are: computers; telecommunications; videotex; satellites; storage technologies, e.g. optical discs, micrographics etc.; videodiscs; facsimile technologies; electronic mail; home micro computers; interfacing technologies.

To all of these librarians must add the concern they have always felt over the delivery of information and the moral commitment to ensure that it is freely available to those who require it. As Barry Jones, Australia's Science Minister who is regarded as the Minister for the Future, has said, "Telematics, assisted by communications satellites, can expand or cripple human capacity and understanding. Pluralist, democratic and decentralised management of information facilities is an indispensible prerequisite for an ideal information society. Monopolistic or oligopolistic control of information is as unthinkable as entrepreneurial control of air, water or sunlight for profit."[1]

This may seem a somewhat idealistic way to commence my paper but for me it is a basic principle, indeed it is the whole motivating force behind all this excitement and trauma of "going online".

However, the moral issues and the technological issues do not exist in isolation. They come together in the choices libraries make for the provision of online services. These choices, in Australia at least, are almost overwhelming and I want to list some of them briefly, although I will return to them in discussing a model of online possibilities.

Each library will have some intention to install or have already installed one or more of these, otherwise this conference would be irrelevant. These are: in-house automation, either function-driven or integrated sharing of a local computer facility with another organisation participating in a local network; contributing to a national network in some way; accessing other networks, including international ones.

These connections can range from the informal, pay as you use, to very formal networks where each user accepts specific governance policies. In any case, change will bring great disruption to the library. As Gordon Undy points out, "Systems which work must challenge the whole basis of an organisation and the workings must be rethought from the ground up with a solid commitment

to the new world throughout the organisation. Systems which do not disturb the environment generally change very little for better or worse."[2]

It would be impossible to discuss going online to many different systems, so I will focus on generalising from my experiences. To do this, I must explain the background on which this paper is based so that each person can decide for himself what relates to his specific situation and what can be discarded because circumstances are too different. I want to avoid any "how we do it good" talks so I will give you some background information on the origins of some of the concepts outlined here.

For 13 years, I worked at the Library of the University of Western Australia, during which time I became familiar with the automated circulation system which was one of the early examples of in-house developed programmes. Later we joined ABN and, as Head Cataloguer, I was primarily responsible for that system's implementation into the library's operations. I was invited to join AWA's URICA team in June 1983 with project responsibilities within AWA for the implementation of URICA at the Library Board of Western Australia, now called the State Library Service of Western Australia. In August 1984, I was invited to manage AWA's software operations in Western Australia, covering software not only for libraries, but also for business and government, as well as development of new products. Two products specified and developed in Perth in 1985 are Context, a records management system, and Infotext, a community information system.

I have also been involved in answering tenders and discussing systems for education and public libraries for Australian and Singaporean libraries, so my familiarity with different types of libraries has increased.

This paper does not attempt to tell how to go online in every situation, but to concentrate on issues which are most likely to be common to multiple situations.

Components of an online model

To develop a typology of online possibilities is rather like opening Pandora's box. Each time you think you have counted them all, another library will come up with a new configuration with yet another variable. These are some levels of online operation:

1. in-house: no automation/partial automation/integrated.
2. local: shared facility with another institution/department.
3. regional: state or city union catalogue obligations and differing levels of automation between them.
4. national: sharing facility/contributing records.
5. distributed networking: computer to computer connection/downline loading.
6. international: dial up/online.

These can be further complicated by adding another component. For example, a library need not be limited to one type of local network – very few large libraries would be. Thus, there may be interconnections online with networks which share a common subject or type of library or clientele or material. Examples of these are Law databases, School library databases, Health databases and Film collections. There are many more.

As if life is not complicated enough, we can share facilities or databases for library functions – cataloguing, inter-library loan, acquisitions, SDI services. The future will give us access to many non-library networks, e.g. publishing and bookselling.

To underline the complexities, I would like to give a few examples without tying them down to specific libraries. Firstly, a library may have partial internal automation in which it has invested a great deal of money. It can join a local or national network and still keep its internal system. However, it is still left with some unautomated functions and faces steep rewriting costs of existing systems or purchasing of an up-to-date integrated system. This is a fairly common occurrence in Australia at the moment. Another example could be a library with no internal automation which joins a network to enable it to develop machine-readable files and then will buy an integrated system to install in-house. It is then faced with another variable – interfacing the two.

The whole thing begins to look like a jigsaw, only the final piece is never put in place, because we live this jigsaw and neither technology nor our fellow librarians stand still while we put a master plan into action. Thus, what I wish to do now is to consider whether we can bring this problem (or is it a challenge?) into manageable proportions and isolate elements that are common to any of the situations produced by combining these variables. The variables are never static; the typology never rests, so it is necessary to build an external management framework to help us maintain control.

Manageable elements

The important words are "Management" and "Control". No matter what stage we have reached in our online implementation we must have control and we must have a management plan that enables us to be flexible and alter schedules etc. if our arrangements are threatened through late delivery of equipment because of an airline strike, or training is postponed because the expert has the 'flu. We need to operate on the assumption that "anything that can go wrong will" and not the notorious, and quite unfairly reported, Australian attitude of "she'll be right".

So, how do we isolate the elements which we know we can manage, regardless of our online situation? I am not covering the decision-making process on which network to join or which system to buy. Neither am I assuming that the library will have an integrated library system like URICA and join ABN, although those are most familiar to me. However, these can stand as excellent examples of total in-house automation and national networking that work in harmony with each other.

What I am assuming is that the library has done its homework, has asked all the right questions – which would be the basis of another paper – has signed the contract and is now ready to plan and implement an automated system of some sort.

The most important components for the implementation of the automated system are those that are important for a manual system: the information, the clients, and the staff. Related elements are the policy implications at the highest level; cost control and relationships with other libraries (which could be regarded as clients).

Automation adds some significant components: relationships with suppliers; probably some very careful results monitoring; relationships with external funding bodies; products production, e.g. catalogues.

I want to look at some of those now in some detail from the point of view of what should be considered, and then go on to develop a project control methodology to cover these elements. Of course, none of these elements is mutually exclusive, as we will find out.

1. Information. Presumably we have chosen a particular online path because we are improving the quality of our information in some way – better delivery, more relevance, filtered for the client's level of expertise, etc. However, how are we going to tell the world about this wonderful new information? How is it going to be delivered? Do we have to sell a new technology, e.g. the online public-access catalogue or the microfiche reader (which is hardly new)?

Do we have a marketing exercise on our hands? Well, of course we do. I would never underestimate the confusion a change in a library's operations will bring. For example, if you have had a very successful undergraduate reading room reliant on computer printouts by title and you decide to provide an online catalogue enquiry by subject and take away the printout, watch disaster strike if lecturers and students are not told about it enough in advance, if there is no booklet describing the change, etc.

What are the likely implications of this new set of information? If we can tell clients about so many new books, what's the inter-library loan traffic going to be like? If we allow undergraduates to perform searches on a new database but don't allow them to request inter-library loans, how are they going to react? It is important to have all elements at least in mind so these kinds of inconsistencies do not occur.

What decision do we have to make about what type of information we will store in our new system? The most interesting discussions have been held in Australia – now probably mostly resolved – over what data should be stored locally and what should be stored nationally. I refer you to Gordon Undy's book on interfaces and local data.[3]

We must decide what will go where and how it will be managed. What level of expertise is needed to maintain it? If it is necessary for this information to come together at what stage will it do so? Interfacing systems is a whole discipline in itself.

2. Clients. How well do we know our clients? If you manage a university library, how many items are borrowed by undergraduates as opposed to honours students? How do academics use the library? How significant are research assistants in academics' attitudes to the library? Which subject specialists use the library most frequently? Of course, everyone who works in a university library can answer some of these questions, often from an intuitive level, but when you come to automate, the lack of this information can be disastrous.

For example, retrospective conversion will loom large on any library's automation list. What to convert first? There is probably not much point in converting all the architecture books if the architecture students only want to read journals

and the architecture books have hardly been borrowed. I am surprised at how little thought libraries put into what to convert. They do so on the hit rates, e.g. how many will be on ABN; or on the imprint dates, e.g. go back through all the 1970s imprints. When it comes to explaining to clients the composition of the new catalogue, this method does not work. I have seen comments such as "The new catalogue contains everything purchased by the library since 1979". That is absolutely meaningless to a user – once again it is for the library's administrative or financial goals that such a conversion has taken place. I do not even see the point in telling the reader such a thing.

An examination of previous innovations and client response would be an excellent idea and those who have survived such experience within the library, no matter how junior the staff, are an invaluable source for this information. For example, let's say a library introduced a microfiche catalogue three years ago and now intends introducing an online one. What did they learn from that experience? The microfiche might have used different subject headings and some clients disliked that. It may have lacked a classified list and as some academics who used the library heavily relied on that approach, they felt deprived. Will the new system overcome these shortcomings or perpetuate them?

We should never underestimate the terror with which even the most brilliant academic approaches technology. In one case, many academics refused to borrow a book with a new circulation system because they felt it was more impersonal than an assistant doing it for them. Imagine their horror when they have to place a reservation for an item by using a computer terminal. Some fortunate enough to have research assistants send them along to the library. Others less fortunate treble their account at the bookshop buying every book they need, or remove them from fellow academics' bookshelves in their studies, much to the consternation of library and academic staff alike.

I would say that we spend a lot of time talking about how we are improving services, but the disappearing friendly faces replaced by "user-friendly" terminals offer little comfort to many people.

If your clients are members of the public then this problem is never revealed to you until numbers drop off considerably. Is your new technology attracting a younger clientele unafraid of the technology and drawn to the library to play with the system, while it drives away older members to either unautomated libraries or simply deprives them of the pleasure of reading because they cannot cope with the machine? This is what I meant earlier by a moral dimension being added to every decision we make about automation. If by automating we actively introduce deprivation and an information-poor group, then we fail as librarians.

An even more crucial question, and one which interests me greatly, is how people handle information. Every library system says it has an OPAC, but on what theoretical grounds is it based? How many expect a user to know what a corporate body is? How many gather information on how the catalogue is used? I have written before on OPACs, and subject access is my research interest, so I have probably read most of what is published on these topics. It is clear that the linguists are still trying to decipher how language works and whole disciplines have sprung up on topics such as human communication. It is fascinating and frustrating to be in the business of developing computer systems expected to

communicate with what we patronizingly call the "computer illiterate". Librarians must remember that the way we categorise information, e.g. subject, title, personal author, and the difficult ones: classification numbers, corporate bodies and uniform titles, to say nothing of the term serial, is a set of linguistic structures in itself which to other people is jargon. We should not expect every one of our clients to learn our language – we should learn theirs.

This is an enormous topic but one which has to be addressed by any library going online with an OPAC component. I am not suggesting there are any answers, but we should set up systems independent of library jargon with monitoring facilities and accept that we may rework and add on to our OPAC systems every year for the next ten years before we get it right. I suspect there will be as many different OPACs as there are client types.

A wise Paul Fasana put it this way, somewhat tongue in cheek: "I worry about the effect on the library user of all the technical and managerial decisions that are being made in libraries today. And then, in a very selfish way, since I am only an administrator of technical services, I quickly go on and remind myself that there is a vision somewhere out there that will make it all worthwhile. Only occasionally do I have any qualms about the public service and reference librarians who will have to attempt to use the wonderful interim services and add-on products that we have devised for them in serving patrons."[4]

3. Staff. I want to turn my attention now to some points about the human factors in implementing an automated system. The positive aspects are usually fairly evident – some people like change. However, many do not. This is essentially a library management issue and I must admit that I find the quality of much of the literature on library management pretty poor. Certainly, there is very little of any theoretical nature on the management of online projects – they tend to relate specifically to actual projects.

Do not underestimate the pressures on your staff through the automation of their activities. Because these systems usually cost a lot of money, the pressure begins at the top – the Head Librarian will be in a position of being watched closely by the funding authorities to ensure no money is wasted. This pressure will get passed on down the line, never fear. If one has drawn up some library goals which I will discuss later under policy, then some pressures can be minimised because of activity being placed in a framework. Vague threats of staff cuts and constant review of statistical output or input will lead only to dissatisfaction.

Training can be an enormous load if it is not treated as a necessary stage in the project and people given sufficient time to cope. If the chief expects the Indians to be a review centre in ABN, for example, in one month, then he or she will be sorely disappointed.

Staff should be told about what will happen long before it does. Training schedules, documentation reading time, review meetings, individual assessments without undue pressure should be every library manager's goals at these times. Information should be passed to everyone, whether affected immediately or not. An example I can recall is this: if catalogue cards will not be produced any more, the person whose total job is typing and filing them should be told of this before she decides for herself that at the age of 59 she will probably be made redundant

– she hates that automation before it has even started and her friends will hate it too as they imagine persecution and fear the same fate for themselves.

To avoid individuals applying objectives to themselves, the library management should work out hoped-for achievements and milestone checking points. For example, let us say you have joined ABN. A medium term goal could be an increase in annual cataloguing figures of 5000 titles with the same staff levels. This gives the department not only a goal but a reasonable time to achieve it – compare that with the review-centre-in-a-month attitude.

To quote Barry Jones again, "There is nothing inherently alarming about much of the new technology . . . but there is much to worry about in terms of human responses to it (or, even worse, failure to respond at all). Worst of all is a fatalist acceptance of technological determinism – the belief that nothing can be done to monitor the social impact of technology."[5]

4. Policy implications. Online systems of any sort must trigger a consideration of policy matters. If the new system does not produce a shelf list card, what happens to the shelf list approach to information in that library? Is another means found to produce this service or is it dropped? Only a library that has already written its policy and objectives can fit automation into its systems and allow the system to grow and/or change productively. Richard Llewellyn tells us that "most organisations will have reasonable intuitive criteria for . . . [goals], although I have found it rare that these are established, written criteria for most or even many of those factors. It can be a salutary and beneficial experience actually to go through the formal exercise of establishing on some sort of quantitative basis a measure for those parameters, it can be even more salutary to draw up two lists, one for the desired state and one for the currently achieved state."[6]

I was never involved in this in a library, but since becoming State Manager for software projects, with market analysis, marketing strategies, implementation and follow-up procedures, it has been essential to do so. In fact, it seems essential to one's professional life to apply this in all areas. You may not adopt a Management by Objectives approach, but I can certainly recommend it. Your action programmes simply fall into place.

Especially when joining a network or sharing in some distributed processing environment, it is necessary to consider the policies of your fellow venturers and consider any adjustment that may be necessary in your own operations. Then, it is necessary to discuss, formulate and communicate those to your staff and clients as need be.

Without policies and long term goals too much money can be wasted in the interim. Michael Gorman advises that "the best use of mechanisation will be founded on a complete reconsideration of all of our systems, an examination of what we are doing and why we are doing it . . . We should think of the eventual possibilities of machine systems and what they can achieve, and not be diverted by short- or medium-term problems."[7]

In the choosing of our online solution we will have made many compromises anyway since no system is perfect. Having made these at the buying stage, we should not start complaining about them and attempting to change systems which in five years' time we may replace.

Having examined the major components of online implementation, I want to make some brief comments on the remainder.

5. Cost control. Some method of paying for services rendered, products delivered, etc. needs to be implemented. It will be essential to communicate – and in some cases, work – with funding authorities to ensure systems are acceptable. It is too easy to pay money without sufficient checks. For example, if your first set of catalogue cards arrives unreadable, are structures in place for payment to be withheld until a replacement set is delivered? If you are to be charged for downline loading of a number of records, have you requested your software supplier to include statistical monitoring so that you do not pay for records not received?

In a large organisation it is easy for invoices to go to accountants and products to library staff. The library is running a multi-million dollar business and needs to remind itself of this sometimes.

6. Relationships with other libraries. What effects will be felt by other libraries in your region by your online decisions? Can you fulfil previous services? For example, will you continue to provide catalogue cards for many card union catalogues to which you previously contributed, or will you stop doing so now you have fiche catalogues? Have you informed them of such, and will there be any repercussions?

Have you cut yourself off from networking by your hardware decision or should you be setting up working parties to investigate future linkages? In small areas like Singapore and Western Australia – and given today's technology the world is small – what one library does usually affects some other library.

7. Relationships with suppliers. With most online implementation, a new variable will have entered your life in the form of one or many suppliers. They may be an organisation like the National Library of Australia which shares many of a typical library's problems in funding, staffing etc. Or, it may be a computer supplier like AWA whose organisation is totally different. Have you clarified such things as acceptance testing and delivery dates? Have you allocated that responsibility to someone? Do you understand your suppliers' organisation and the difficulties they may have with meeting some of your demands, such as a promise to deliver a piece of equipment you cannot pay for for twelve months?

You should expect suppliers to learn about the library profession, to respect it and, hopefully, have some librarians on staff with whom you can have jargon conversations. You will have done much of your investigations in your tendering or decision making process but once a contract is signed you should go over everything again – look at the system again, clarify contractual obligations, etc. Have a social get-together – and remember it is a *contract* you have signed. This is crucial to the development methodology I will outline. If the library staff expect a supplier to do everything, the project will be less than successful. A contract means an agreement between two parties and an us-and-them attitude simply leaves the library as the loser in the short term and the supplier a loser in the long term – you have to pay for your system because you have signed

a contract, but you can prevent the supplier selling any more if you tell everyone you are unhappy.

As libraries automate more and more functions, there will be more and more suppliers and internal structures to cope with this are most important.

8. Results monitoring. Result monitoring is essential but impossible without the goals having been set. Without qualitative and quantitative goals having been set you have nothing to measure.

As Donald Foster has indicated, "For each activity performed, the department must, using whatever approach is considered most appropriate, establish reasonable goals, keep clear and precise records, and be accountable for the results."[8]

Thus, I have outlined many of the issues that will characterise any online project. Some will be more relevant than others but most will be present. It is one thing however to recognise the elements in a puzzle, but another thing to cross each one off in a meaningful manner and reach one's objective.

In the rest of my paper I want to outline a project control methodology specifically related to library operations. I could not have given this paper two years ago. The combination of working with private enterprise to monitor costs and justify time spent in specific ways, together with working with many types of software projects from conceptual design to implementation has enabled me to develop a methodology which I believe works and which continues to be used in our day-to-day operations in the implementation of URICA as well as all other AWA software customers.

I did not develop this methodology alone and it continues to undergo refinement as we learn from an implementation as large as the State Library Service, which is installing the whole of URICA as well as new modules like Film Bookings, to the smaller project in the utilisation of URICA as an educational tool at the Dept. of Library and Information Studies at WAIT. I use Western Australian examples because that is the area I am most familiar with.

Project control methodology

If one argues that library management shares its problems with other types of management structures, then library software control does not need to be considered totally different from other software implementation projects. The language is different and failure to fully appreciate this, results in significant communication problems, but the activity of installing a system consists of similar components whether you are implementing an accounting system, a newspaper advertising system or a commercial printing system. Thus, do not underestimate your suppliers' experience. They may not know a great deal about how to catalogue a book, but they will understand many of your problems in installing a system. The ideal situation is one where the supplier employs librarians who not only understand your situation and have lengthy experience as librarians but who also understand how to implement systems as well as understanding the product in great detail. There are very few people like them around, but you have entered into a contract and if you choose the right staff you will manage satis-

factorily with several people who together can bring all the necessary skills to bear on the project.

What follows is an implementation methodology that has been based on the successful installation of AWA products and as such may not always be applicable to less user-friendly systems, but it is a framework on which we could build, and it could lead us to some interesting discussions.

It would be most gratifying to produce a library automation project implementation methodology and this exercise is certainly long overdue.

Project Control Philosophy. It is necessary to formulate a strategy based on some sound theoretical principles. We prefer an approach whose basic tenet is "user-driven computing". We apply this to all our installations and essentially it involves client and supplier getting together and deciding who will do what. Keep in mind that the supplier can be any vendor of services to your library, DIALOG database service, ABN, Telecom or even your booksellers.

What do we mean by "user-driven" project control? Essentially, it means that the end-user – an unfortunate term – or the person who will be expected to implement and survive in the organisation with the new processes is involved from the beginning. In other words, the project control philosophy is people-based rather than machine-based.

Depending on the size of the project, a coordinating person or group needs to be appointed. The constitution of this group is up to the library concerned and you might like in your workshops to give some consideration as to who they might be in your organisation. The project control group must be given a clear brief and be powerful enough to get things done, e.g. telephone a supplier, sign an order. The project control group should report to senior management, but senior management, for example the State or University Librarian, need not (indeed probably should not) be part of the group.

A second important staffing stream is to appoint a liaison officer in each affected department or section of the library. This person must be intimately involved with the workings of the section but should be willing to undertake the role of liaising with the project control group. Sufficient staff time must be allowed for that person to perform testing, training and general trouble-shooting – these should not be in addition to existing duties.

The duties of the liaison officer include briefing staff on the project and effects of its implementation; organising and conducting staff training (this person would be trained first by supplier); providing feedback to Project Control Group and/or Data Processing Manager about modifications or problems. Perhaps the most important role of this person is to advise on the best implementation of methods, workflow, etc. from the user's point of view; conduct system testing and field test documentation; sign off each stage as being acceptable before moving to the next.

The project control methodology is a phased one, that is, each phase of a project is identified, measured, scheduled, carried out and signed off. At each stage the staff know what has been expected, what has been measured and what the next step is. You can see how important communication skills are in order to avoid confusion.

The methodology must be written down and have the total cooperation of your supplier. Suppliers will be able to make suggestions as to how best to install their system, but you should not leave the matter entirely to them, as they do not know your staff, and even senior staff in a library do not always fully appreciate the complexities of front-line operations.

The first stage is to document your objectives for the methodology. Here are some:

1. To realise the management objectives of the library.
2. To ensure well designed computer systems are installed.
3. To effect the timely and efficient operation of the system.
4. To ensure carefully planned and tested systems are implemented.
5. To ensure costs are controlled etc.

The objectives will be added to or modified for each online project. They must be given in writing to each member of the project team and distributed widely to staff. Similarly, schedules should be distributed. It does not matter if schedules slip or gain time as long as they are adjusted accordingly and staff are aware of the changed circumstances. It is necessary to highlight vital dates and crucial tasks that cannot be allowed to slip because of financial clauses in contracts, etc.

The most important aspect is pointed out by Foster when he says: "All parties (library director, department head, cataloguers, clerks and, indirectly at least, library patrons) must understand and agree upon what is expected and what is not expected."[9] Accountability is very important but impossible to maintain if the objectives are not clearly stated in measurable terms to begin with.

Before discussing the phases of the project, I'd like to speak a little on scheduling. Computer controlled scheduling packages are available for most microcomputers and I recommend that you consider purchasing one. It will enable you to break each phase into separate tasks, allocate priorities and produce printed schedules that are always up to date. You should have three types of schedule: the monthly macro-schedule, the weekly one based on tasks, and the weekly one based on human resources, like the ones illustrated in Figures 1–3.

Project phases. To discuss the project phases in realistic terms, I want to offer as an example the implementation of the URICA library system into an organisation. ! will stay at the conceptual level as I am not relating the implementation of the system within a specific organisation.

Only one module is implemented at a time. It would be unacceptable to be at the same stage of installation with two separate modules. However, it is feasible to be in warranty period for one while providing orientation for the next, or to be field testing documentation for one while discussing programme modifications with a different liaison officer on another. The important aspect is to keep your human resources schedule up to date or you'll find yourself with three weeks' work and only two weeks' worth of people to do it!

It is also agreed that in addition to the documented schedules, all meetings are documented with action signals placed against attendees and dates by which action must be completed.

I will go through sequentially the stages possible in a project but not all will be applicable in any one situation.

FIGURE 1

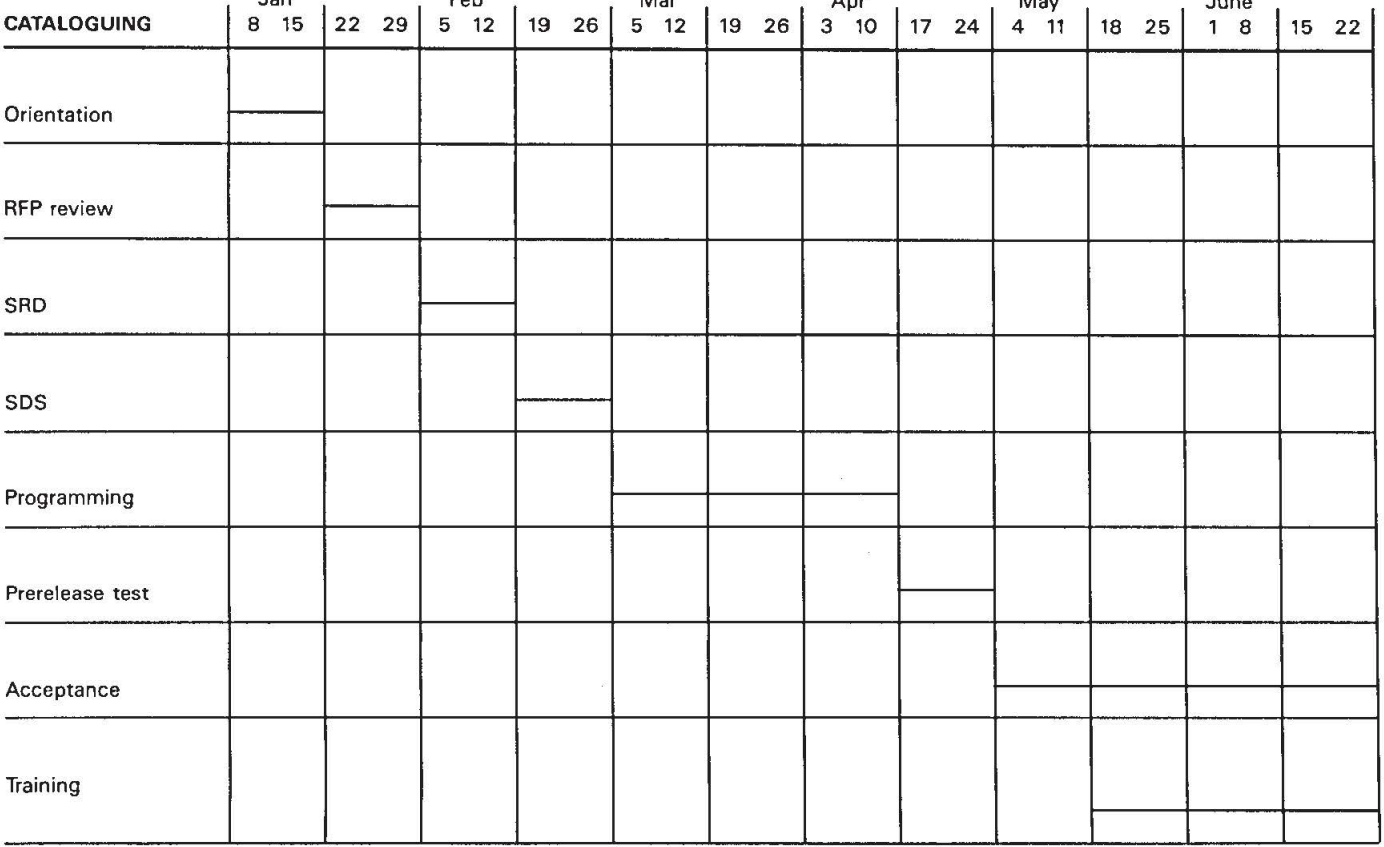

CATALOGUING
Jan
8 15
22 29
Feb
5 12
19 26
Mar
5 12
19 26
Apr
3 10
17 24
May
4 11
18 25
June
1 8
15 22
Orientation
RFP review
SRD
SDS
Programming
Prerelease test
Acceptance
Training

FIGURE 2

MONTHLY SCHEDULE	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
CATALOGUING												
ACQUISITIONS												
SERIALS												
CIRCULATION												
OPAC												
RECON												

FIGURE 3

PERSON etc.	Jan 8	15	22	29	Feb 5	12	19	26	Mar 5	12	19	26	Apr 3	10	17	24	May 4	11	18	25	June 1	8	15	22
Lynn	CAT orient.				CAT SRD assist.		CAT SDS										CAT training prep.				CAT training			
Stuart									CAT program.															
Chris													CAT test											
Client A	CAT orient.				CAT SRD										CAT test				CAT		training			

1. Orientation

This involves showing the system once again to the user section. This is done by professional librarians and discussions may be held briefly on how the system parameters will be set. However, the objective is to get the staff on side, make them feel involved and that the system is "theirs".

2. Functional Requirements

This document describes the functions required by the library in any system. This will have been produced already in a tender situation. If such a document has not been produced, for example, the library has decided to join ABN for reasons which have remained unwritten, it is a good idea to write this. However, it is like locking the stable door after the horse has bolted, because the technology has now become a given, so if your staff dislike a function, it is a little late. Typically, with an integrated library system, this will be a review of the tender stage.

3. User liaison discussions

It is necessary to go through the system in detail with the user liaison office, reviewing a tender document or the functional requirements document. Any requested modification would be discussed with the supplier's librarian as to its feasibility etc. and then form the subject of separate discussions internally with automation project control group.

Here, parameters would be discussed together with workflows, training schedules, handover arrangements of any documentation needed or requested and generally build up the confidence of the liaison officer.

4. System Requirements Definition

This is a document produced by the library staff in conjunction with the supplier whose understanding of the system is greater at this stage. It considers the technology that has been purchased and outlines how that technology will fit into the library, and includes such items as reports required.

Questions will be answered by the supplier, outlining what is appropriate and possible, and providing a quote or suggesting further discussion, depending on the situation.

The final document must be signed off by both supplier and library manager.

5. System Development Specification

This document is produced by the supplier of your technology. It responds to the System Requirements Definition and is an internal document usually. It will include programme names, menu changes, report and screen layouts, file definition changes etc. It can be given to data processing staff in the library for information but typically would not be.

It will be signed off internally in the supplier's organisation and is sometimes called an "Internal Specification".

6. Programme development

This stage consists of design, programming, testing and debugging and system testing, all within the supplier's organisation. The supplier then delivers the test

software and documentation to the user liaison officer or persons as instructed and gives the officer a detailed run-through to show that the specifications have been met.

7. Pre-release testing

The officer then tests the system, having designed test data in conjunction with library staff to produce a result as expected in live operations. Time should be specifically allocated and the officer should produce documented results of testing. Any 'bugs' should be reported to the supplier's contact person, fully documented and fixed and then further tested to the officer's satisfaction.

When the officer is satisfied, an installation acceptance notice is signed and the software is loaded 'clean' into a test account.

8. Acceptance testing

There will then be a controlled period where more data is entered in parallel with existing manual systems and the results compared. This is the final version of the software and can be signed off when the liaison officer is satisfied.

9. Training

Formal detailed training can be carried out by the supplier or by the liaison officer, usually by the supplier. Staff should be taken from normal duties and training should replicate the live situation as much as possible.

10. Installation

A specific date is agreed to where the Live installation account is set up and, after training, a date specified when Day One commences. Parallel testing should be carried out, especially in financial areas to ensure figures match. Many people object to parallel running but we urge it most strongly. If a client refuses parallel testing, the dangers of this decision should be pointed out.

11. Warranty period

A specific period will be indicated in your contract during which troubleshooting support will be made available by the supplier. Problems should be reported in writing and will be attended to. For us, thirty days is allowed after installation date during which time problems can be reported and fixed free of charge. After warranty is complete, the client signs off the software and any further work is considered another project and subject to the same project phases as appropriate.

12. Maintenance

This is the lengthy phase of software after it is signed off, during which suppliers will assist, amend and support for varying amounts of time and cost. It may include receipt of software upgrades, e.g., new modules or features.

13. Post-implementation review

It is essential that this be done after a reasonable time – but not too long after installation.

The system should be reviewed against the various documents and any queries and concerns raised by staff should be dealt with promptly. It is not essential

to have suppliers present – they can be invited to answer queries after the meeting, should any arise. A question and answer session can be useful. It also provides feedback to the supplier if there are areas of dissatisfaction.

Online Do's and Don'ts

To summarise, I have listed some do's and don'ts.

ONLINE PROJECT DOs.

1. Write down goals and objectives
2. Appoint a project control group
3. Appoint user liaison officers
4. Provide realistic quantitative measurements
5. Apply project control methodology
6. Have regular progress meetings
7. Keep users aware
8. Implement technology responsibilities
9. Involve staff
10. Review staff structures

ONLINE DON'Ts

1. Add on responsibilities to staff
2. Have too many chiefs
3. Keep staff in the dark
4. Rely on memory
5. Ignore ergonomics
6. Believe delivery dates
7. Leave it all to the supplier
8. Panic

I hope I have given you some ideas about controlling the online project in your libraries. It would be most useful to have a library automation methodology with checklists and tasklists and I trust this is a contribution to that end.

I would like to conclude with some remarks I made at the end of a paper on implementing ABN in the University of Western Australia's library. My opinions have not changed. I think there are several criteria for a successful online implementation. They are:

1. Creative problem solving based on detailed understanding of all aspects of the automation process.
2. Acceptance of change and a desire to fully explore the potentials of dynamic systems.
3. Establishment of goals and objectives which make possible the rational assessment of future successes.
4. An attitude of accountability – to one's colleagues, institution and clients.

5. Awareness of the very real human problems caused by people's attitudes to technology.
6. Operating within an atmosphere of encouragement, enthusiasm and support and, finally,
7. A commitment to quality and service in the production of facilities which imaginatively take advantage of the new technologies.

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Automation for the Smaller System

Microcomputers, their capabilities and possibilities

by Mary Rowbottom
Customer Support Department, Computers
Library Service International Ltd. (CLSI)

For many years the library and information community has used computers and communications technology to provide an efficient means of organising materials and recording transactions. The first steps in automating library procedures were taken over 15 years ago and the software marketplace has been developing ever since.

Libraries have very complex needs and they require machines with large storage capacity and sophisticated processing and file handling. For libraries to store their catalogues, or for information departments to store collections of abstracts or, perhaps, full text company reports, large amounts of disk storage are required. To provide multiple access points to this data, that is to search by author, or by title, or by ISBN, or by classmark, or by subject (and any item may have many subjects) or by any word in a notes or abstract field, many indexes to the information are required and these in turn take up large amounts of disk storage.

Libraries want to know the 'state' of their collections at any one time. What books are on loan to which borrowers? Have borrowers taken more books than library policy allows? How many reservations are outstanding, and on which books? What orders are overdue? What serials have not arrived? And so on. All this has meant a move from the batch processed systems of the early 1970's to the systems of today where many transactions are processed online in real time and therefore require powerful computers. The minicomputer systems that are available now to large public and academic libraries are still trying to provide solutions for the complex demands of libraries – demands which include provision of an online service to distant parts of the library, and communication to services external to the library and the provision of enquiry facilities to readers as well as to library staff.

Until very recently these facilities were only available to large libraries who were able to afford minicomputer systems costing many thousands of pounds. Yet many of the reasons and justifications that libraries use to put the case for automation apply equally to small- and medium-sized libraries as to large ones. Since the development of the microcomputer it has been possible for small libraries and information units to consider automation and for large libraries to exploit technology in new ways and to perform tasks which hitherto have been too costly to justify on larger computers.

We are now in a position where all libraries can justify using microcomputers in some way. Obviously not all the available software is of use to all different types of libraries. College libraries may wish to exploit microcomputers to administer circulation control and other housekeeping tasks; special and industrial libraries may be more interested in automating abstracts collections and

detailed subject catalogues; and large public and academic libraries may be more interested in manipulating statistics or in the organisation of community information. Many large libraries are introducing microcomputers as back-up devices to their minicomputer systems to record circulation transactions when the main machine is down. Obviously these micros are available most of the time for other functions.

Microcomputers have to date had a short but exciting history. We have already witnessed, as this paper will show, their usefulness and flexibility, and this usefulness is developing at a great rate. It is remarkable what has been achieved so far and there is promise of great things to come.

When libraries in the United Kingdom began exploiting microcomputers there was no software written specifically for the library market and business software was in the early stages of development. Microcomputers at that time were small and had limited processing power and storage capacity. So, the first attempts to use micros effectively in the library were confined either to using general purpose software already available, such as word processing packages and small database packages, or to writing software specifically to do the job. Surveys carried out in 1982/83 demonstrated that about half the software being used in libraries at that time was developed in-house. From about 1982 onwards some commercial organisations began writing new software or developing existing minicomputer software for the library microcomputer software market. Around that time new companies were set up with the particular aim of writing and developing library software for microcomputers, and so today in the UK there is a thriving marketplace and a respectable choice of software both of British origin and imported, usually from the United States.

Software of use to libraries can be divided into two types. The first is "business" software – general purpose packages that have been written for the wide business market and in which is included word processing, spreadsheet and database. The second category is "library" software written specifically to fulfill the needs of the information community. Obviously there are overlaps in these two categories and certainly there are some business packages which are far more appropriate to use in libraries than others.

"Business" software is relatively easy to find out about. There is a bewildering array of popular magazines which regularly review both new machines and new software packages. Often comparative reviews are varied, and this can help in the selection of the initial shortlist of packages to consider. Of all the packages available four categories are of most relevance to libraries: word processing packages, spreadsheets, database packages and communications packages. Some aspects of their use in libraries will be described below. Library specific software is relatively difficult to find out about although some useful sources do exist. In the UK there are a number of journals, including *VINE*, *Program and Library Micromation News*, which regularly report on available microcomputer systems. In addition there are directories:

- *Text retrieval: a directory of software*, compiled by the Institute of Information Scientists and edited by Catherine D. Hamilton, Robert Kimberley, Christine H. Smith; with an introduction by Jennifer Rowley; published by Gower. It lists packages in detail for all types of computer, mini or micro.

– *A directory of library and information retrieval software for microcomputers*, compiled by Hilary Gates; published by Gower. It includes American and British software.

Exhibitors at conferences are a very helpful source of information and the Library Technology Centre at the Polytechnic of Central London can give help in the form of information sheets, seminars and appointments both to see the software and to discuss aspects of its implementation.

Word processing is a virtually "universal" application. All libraries, from the very largest to the very smallest, can find a use for word processing. Applications can include standard letters, mailing lists, preparation of reports, minutes, catalogue cards, library guides, and so on. Word processing is important not only because it can help improve the administration efficiency of the library but also because it can help staff gain familiarity with the keyboard and with the basic operations of the machine. Many libraries that are now considering automation have staff with little or no experience or knowledge of computers. They need to learn, and learn preferably on tasks which have little long term importance. Word processing can be a valuable first step.

Spreadsheet packages have already been mentioned for their applications in budgeting allocation, financial administration and statistics manipulation. Some libraries have used spreadsheet packages in very inventive ways, for instance in planning reshelving.

Database packages have obvious library applications and there is a wealth of software to choose from, ranging from simple mailing list software through to complex "programme generators" like DBase II and III which allow the user to programme in their own applications. Generally speaking the software that has been written with general purpose applications in mind is not good at flexible subject based retrieval from variable length records composed mainly of free text such as abstracts, although there are some exceptions. Usually tasks which require complex subject retrieval are better done using the text retrieval (or information retrieval) software which will be discussed later. Nevertheless, there are many instances of the use of database packages in libraries. The organisation of interlibrary loan requests is an example. Leicester Polytechnic have developed a package – AIM, which was Compsoft's, DMS or Delta database package to generate and store these requests, after transmission directly to the British Library Lending Division using the Artel service.

Some public libraries are using database packages for community information. An example is Cambridgeshire Public Library. The Library and Citizens Advice Bureau are sharing the task of collecting details of services and facilities of all kinds provided by statutory and voluntary organisations as well as support groups and leisure clubs and societies. The software they are using is Superfile, produced by Southdata Ltd. Each institution has its own machine (different makes of microcomputer, incidentally) and as the information files are built they are transferred to the other organisation. The project is being expanded to include files transferred from the local Health Authority and ways of making the information publicly available are being experimented with.

Another approach to provision of community information is being tried in Devon, a rural English county. Here a British Library project is underway which uses a

touch screen attached to a microcomputer upon which local interest files are mounted. The touch screen was selected because it facilitates use of the technology by ordinary people who do not necessarily have keyboard skills. The package DBase II together with word processing is being used to organise the information. So far the project has proved a great success.

Other uses of database software in libraries include mailing lists, staff training files, journal circulation lists, journal holdings lists, and so on.

Viewdata is a specialised kind of database package using colour and graphics and organising the information into discrete "pages". Viewdata software is available for microcomputers and some UK libraries have exploited it as a teaching aid, for instance to instruct students on the use of abstracting journals, or to produce a guide to the library services in place of the usual printed guide. Viewdata format either through Prestel or stand alone is another vehicle for the provision of community information because of its familiar appearance to the general public.

There are many instances where libraries wish to communicate electronically with the outside world: one has already been mentioned – the transmission of interlibrary loan requests. Going online is an obvious example; others include use of the Prestel and telex services and third party electronic mail services such as British Telecom Gold (in the UK). All these tasks can be performed using the microcomputer as the communicating device, as well as a modem. Software to perform these tasks is often produced by the hardware manufacturers themselves; in the UK, examples include Communique, marketed by ACT, the manufacturers of the Sirius and Apricot microcomputers, and Torchmail, produced by Torch. There are several options for the popular BBC micro, most of which are supplied on chips to be plugged into the microcomputer main board. All software in this category allows storage of user aids and passwords to speed the process of signing on and enable downloading of results.

Software designed to go online is also produced and marketed by a number of software companies working specifically in the library field. Downloading of material retrieved by online searching is an increasingly popular activity. Once material is held locally it can be edited, merged with other search results, reordered and, if necessary, annotated before being printed and sent to the requestor of the search. These facilities improve the calibre of the search service offered. Packages also offer the ability to store search commands in advance of going online. These can be transmitted as appropriate during the search to make small savings in connect time charges.

Specialised software is available which simplifies the search dialogue to enable end-users, the research scientists themselves, to perform some simple searches in a number of databases. An example of this is Userlinks IT (Information Transfer) product which offers a menu driven approach avoiding the need for knowledge of the host command language.

Once information has been downloaded it may be advantageous to keep it, preferably organised by a database package, to make local retrieval possible. To do this the downloaded material must be reformatted to the requirements of the database package used. There are some reformating programmes available, an example being Headform, from Head Computers Ltd.

One of the first types of software to be written for the library market were text retrieval packages – software designed to cope with lengthy textual records and to provide sophisticated subject retrieval. Many of these types of packages are based upon the facilities available from the online search services and a large proportion of the packages marketed today are microcomputer versions of minicomputer products that have been widely used for more than ten years. Examples of these products include Microcairs, Micro status, Assassin PC and BRS search. All these products use an "inverted file" structure, an index resembling a back-of-book index to achieve rapid and comprehensive indexing of bodies of text. The consequence of indexing almost every word in text-based records is that the storage required for the index is great; it may be as much as 200% of the space required for the original records, depending on the nature of the text itself and assuming the whole of the record is indexed. Most of the microcomputer-based text retrieval packages that have been developed from mini-based software do offer upwards compatibility. In other words, if the application outgrows the microcomputer, the databases can be transferred intact onto a larger machine (running the same software, of course). This does mean that companies which are geographically dispersed can use the same software packages at different locations and different machines and yet be able to exchange data relatively easily.

Broadly speaking all text retrieval packages offer similar facilities for design of record structure, type of indexing required and search facilities. They differ in the length of records supported, the degree to which indexing can be controlled (some offer an online thesaurus), and the variety and sophistication of printed reports. Some packages are more appropriate for full text storage, others more suitable for the storage of abstracts and extracts. As with all software, it is important to consider carefully the proposed application (and the available resources) before selecting the package to be used.

Text retrieval packages usually find applications in special libraries where there is emphasis on subject retrieval and where the material held is described in a high degree of detail. There are, however, instances of these packages being used to support more conventional catalogues and other library housekeeping applications.

With the recent increase in the processing power and storage capacity of microcomputers there has been the development of software to support library housekeeping applications, including the catalogue and cataloguing, circulation and acquisitions. This is an important growth area in the UK where packages are constantly being launched and developed. Even so, products have been around for a relatively short period; very few libraries have made purchases so far. It is in this area where the greatest developments are likely in the near future.

Software to perform library housekeeping tasks can be divided into two categories based upon the origin of the package. The first category is the package that was developed to satisfy one aspect of the housekeeping problem, typically circulation control for small college libraries. These packages offer extremely sophisticated circulation facilities including barcode input, variable loan periods and reader categories, flexible reservation lists, full notices, and statistics reports. The book record used for circulation tends to be brief, often not a full catalogue

record, with limited search or access points. Once the package is established in the market there is often development of further modules to perform other functions such as acquisitions or the full catalogue. In this way a system is generated that can support all, or many of, the housekeeping functions but because of the way in which the software was generated, circulation control is likely to be retained as a central feature of the software and may be implemented separately.

The second category of software is the "integrated systems" where the design and implementation of all, or most, of the housekeeping functions was envisaged from the outset. In this category of software the cataloguing module tends to be regarded as the central feature and the other modules, such as circulation control, can only be implemented if the catalogue is in operation. Typically, though not always, software in this category finds its first market in the special library where subject access rather than circulation control is the greatest problem. Some packages may contain enhanced catalogue records that can store extended subject descriptions, even abstracts, and may offer thesaural or authority file facilities. Packages of this type may be suitable for colleges as any unnecessary subject facilities can often be "edited out" by the supplier and the circulation control need be no less flexible than for software in our first category.

Circulation control software can be relatively cheap. The cheapest multi-service point system is based on an ACT Apricot microcomputer and uses portable Epson microcomputers with attached light pens as data capture units. The data capture units are only able to store the bar code numbers relating to the transactions. Transaction information must be transferred to the Apricot microcomputer in a batch at the day end. Statistics, notices and reports are generated from the files held on the Apricot. This configuration (hardware and software) will cope with up to 260,000 items each with a brief bibliographic description for around £7,500. More expensive circulation control is possible using multi-user or networked microcomputers where the system files are updated online in real time with corresponding improvement in facilities.

Very recently a circulation system has been launched in the UK to run on a BBC microcomputer. The software, being marked particularly at schools, costs £150. The system is capable of handling up to 2,300 borrowers with full name and address details and up to 20,000 books identified by an accession number and a 20 character short title (this can be increased to 6,000 items if no short title information is held.) However, issues and returns are relatively slow, approximately eight and five seconds respectively. The system offers the advantages of printed overdue notices, reservation alert, and a number of printed lists of borrower details and items.

The "integrated systems" are usually offered on multi-user or networked microcomputers. Often the software modules can be purchased separately and so a "phased" implementation is possible. Typical costs for both hardware and complete system software range from about £15,000–£20,000 although more can be spent depending upon the number of terminals, the amount of disk storage and so on. There are several systems available to choose from.

The systems offer broadly similar facilities: a flexible length of catalogue record with some opportunity to change its structure, subject indexing on a selection

of fields, real time integration between modules (e.g. orders are immediately retrievable through the catalogue), single title record to which item data is attached. The systems differ in the flexibility of the reports and statistics that can be produced, the flexibility of subject searches and the file structure/indexing approach. For instance, one system offers full authority control of fields and very rapid retrieval of any short character string (wherever it is situated) from within controlled fields, another offers thesaural capabilities. From these points it should be clear that the catalogue search facilities of these products are moving towards the kind of sophistication that until now has only been available through text retrieval software.

Most of the available systems have focused on cataloguing, acquisitions and circulation control as the control modules. Some of the systems are better able to cope with serials than others but fully fledged serials control, with predictions and chaser letters, has lagged behind other developments. Two suppliers have recently announced serials control modules. Other stand alone serials software is available from some subscription agents.

Public access is an important topic that has recently attracted a great deal of attention, at least in the minicomputer marketplace, and increasingly microbuyers are considering public access terminals. Of course, dedicated public access terminals add to the overall cost of the system – more terminals need to be purchased and if the software is networked (rather than multi-user) this can mean the purchase of more relatively expensive microcomputers. In addition libraries of all sizes often underestimate the number of terminals needed by their own staff for efficient running of the library. So, for a combination of reasons, the software suppliers are not yet offering separate, specially designed public access modules, but it will probably be the next development in this rapidly expanding marketplace.

From the foregoing it is clear that the UK library software market is healthy and is developing rapidly. Indeed it is remarkable how quickly microcomputer software has developed and grown in sophistication. Even so, it seems that we have not yet witnessed the full impact of new technology – this is a growth industry and as the technical capabilities improve so the application will proliferate. Perhaps the next most important advance will be in communications. Microcomputer networks are already well established, but the business of communicating between buildings and over long distances is still relatively expensive and far from trouble free.

At this point it seems sensible to summarise the main "lessons to be learned" before embarking upon implementing a microcomputer system.

There are many thousands of software packages currently being marketed. Each day new packages are launched and others, like the companies that produce them, fade into oblivion. It is essential to choose software that not only adequately performs the required tasks but also is produced by a reputable company that is likely to remain in existence for the foreseeable future.

It is not easy to introduce technology to the workplace (or anywhere else for that matter). For the successful introduction of any of the software so far discussed many hours and weeks of hard work are required to achieve any benefits. Enthusiasm and dedication are everything.

Many professionals embarking on the task of purchasing and using a microcomputer system are bewildered and perplexed by the lack of available help, advice and support. Conditioned by our colleagues who buy minicomputer systems, many of us expect all suppliers to respond to invitations to tender and to fall over backwards to help us make our decisions (in the hope that they will make a sale!). Except at the very top end, the microcomputer marketplace is not like that. Profit margins are themselves literally micro and any supplier who responds with a 100 page proposal is likely to be out of business next week unless there is a price tag to match the effort he has gone to.

Be careful to include the costs of all aspects of the system in your budget. There is more to buying a micro than just hardware and software. Consumables (e.g. disks, tapes, printer ribbons) must be included at the very minimum and you should consider very seriously expenditure on training and both hardware and software maintenance.

Another 'cost', and debatably the most important and far reaching consequence of automation, is the enormous investment in data. Most of the software described in this paper are database packages; in other words a database must be constructed, and often this means typing in and checking all the records. The implication of automating circulation control is that all the stock must be barcoded and the barcodes associated with the relevant item records. All of these procedures are extremely expensive in terms of staff time. If those staff resources are to be committed then it is essential to ensure the investment is wisely made. The real cost of building a microcomputer system includes the cost of building the database, and with the current rate of development of microcomputers it is likely that you will be considering new equipment in four years' time or perhaps even sooner. The key to a successful feature is the investment in data.

If planned and implemented carefully and sensibly, automation brings many benefits. It can free librarians and information professionals to do more interesting and more productive work such as the development of new products and services. Automation can only provide these benefits where its application is appropriate. There are many instances where automation has generated more problems than it has solved and, particularly in small libraries, manual methods may be more effective and efficient for some procedures. This paper has discussed the possible uses of a range of different software products, which may find application in a range of different types of library. All libraries are now in a position to introduce some microcomputer applications. The fundamental question is, what aspect of automation can serve you best?

Networks and Networking

Judith A. D. Baskin
Director, Networks Branch,
National Library of Australia

The subject I was given to speak on is an enormous one, so I am going to limit this paper to the following areas:

1. The benefits of networking
2. Different approaches to networking.
3. Issues in networking

Hence, in talking about networks and networking, my remarks are confined to the aspect of the seminar which dealt with the function of libraries. This paper does not cover those other very large areas of the seminar theme, administration and staffing.

Benefits

The use of networking among libraries has enormous implications for the way we work. At a meeting of the Library of Congress's Network Advisory Committee in August 1985, one of the speakers commented: "No longer can a library afford to cover the bibliographic universe. However, with sufficient co-operation and sharing libraries should be able to provide access to the universe of knowledge even if all the information is not under one roof".[1]

Perhaps only Americans could imagine that their libraries might aspire to being able to afford to cover the bibliographic universe. We have the advantage from our less bibliographically rich countries of knowing this all along. We should then be more open to the opportunities afforded by networking.

Usually the first benefit of networking is identified as the sharing of cataloguing data. None of the existing databases are comprehensive. In our countries, dependent on publications from a variety of sources, we need data from a number of the major publishing countries. Publications from our own country and region are not well represented in the northern hemisphere's databases, so it makes sense to find a way of sharing the cataloguing done in our own region or country. It is cost effective to put all this data in one database and share it via a computer network. On ABN we have mounted the Library of Congress databases for material from many countries and for a range of types of material, UK MARC, CANMARC, the US Government Printing Office, the New Zealand National Bibliography and records from our own Australian National Bibliography. Even with all that data, four million bibliographic records, there are now 250,000 original records supplied by ABN participants, that is, records not found on the database created by the agencies listed above.

Another benefit of networking is the sharing of improvements to existing data. The Australian libraries' preference for LC records over BNB because of their higher standard has been fairly recorded. Where an existing record is not satisfactory, participants may improve the records and these improvements become available

to others. What is only now becoming apparent is the inferior serial catalogue records in the LC MARC files. The cost of serial cataloguing is very high. Some ABN participants have estimated the cost as being in the region of $A60–70. New records or upgraded records from one participant will save other participants undertaking this very expensive work. An example of the provision of more or improved serial records is the work being done by the Australian Bureau of Statistics. It has undertaken to catalogue or upgrade existing cataloguing records for all published colonial, state and federal statistics of Australia, an enormous benefit to all those libraries which make reference use of statistical data and to those who wish to get catalogue data for their statistical holdings.

Yet another benefit is more speedy and more comprehensive data about a country's own publications. In the past, the identification and central cataloguing of a country's publications has been the responsibility of the national library. This is still so. However, the libraries in our network whose institutions publish material, most importantly the special libraries of government bodies, are making efforts to identify what is published by their organisations and to put a record on the system quickly, even if it is only an interim record. Government organisations produce a very large proportion of our countries' publications, highly important, often widely unknown and hence underused. Consider the benefits for a rural public library in having access to search facilities for its country's government agricultural publications; or city libraries serving underprivileged areas having access to community information published by government. On our network, 17 per cent of the original cataloguing comes from special libraries, a significant part of that being their own institutions' publications. Given the ability to share data via online networks one wonders when the first co-operatively catalogued national bibliography will emerge.

The benefit of shared cataloguing is still very hotly debated. Many query the cost of cataloguing on a central facility. Some libraries are now asking to be allowed to catalogue on their local system and to upload the data when it is complete. This seems to me to be fine as long as the transmission is prompt and as long as those libraries work on the records when they get onto the database to ensure that the new records are compatible with records already on the database. Given that they need first to search the database for a record, download if it is, work on it in their local system and then work on it back on the central database, I am not sure that this will prove a very rational way of working.

The availability of data on CD-ROM (compact disc read only memory) may change this scenario. For example, ABN may produce regular copies of its database for use off-line and this would considerably reduce the to-ing and fro-ing.

There is fairly constant criticism of network standards. Given that ABN's minimum standard is close to AACR's level 1 standard, a lot of such problems are self-induced by those libraries which work to higher levels when they do not need to, either for their purposes or to meet the network's standard. The other issue in the cost of cataloguing on a network is "it costs me more than before". Maybe it does; maybe it doesn't. In general, people making such statements have not costed their original manual cataloguing effort. Before moving to a network situation, it would be wise to identify exactly what is being done in cataloguing and how much it costs. Then the beginnings of a valid comparison can be made.

But even then, a comparison solely of cataloguing locally and cataloguing on a network by itself does not take into account the benefit of what is actually being done when one catalogues on a national or shared system.

Cataloguing on a network creates records for a local individual catalogue, but it also simultaneously creates a major union catalogue; a major inter-library loan tool; a major tool for the rationalisation of acquisitions and a major national reference tool. I consider these to be the major benefits of cataloguing in a network.

Cataloguing is a means to an end, not an end in itself. If, while creating a local catalogue one can create this other tool, the entire country will have benefited, not just the local library. It is unlikely that government would ever directly support the total cost of the sophisticated tool thus produced, so networking, sharing the costs of the system, allows libraries to create it by applying their collective resources to the job.

On the union catalogue side, consider the old style of union catalogues. One card sent to a central location for filing; access via the author only; access only by asking the central source to search the file for information or by expensively microfilming the file; always slow; always out of date; too expensive and cumbersome to consult routinely for acquisitions and collection development other than for the most expensive items.

With an automated system, search by all access points is possible at the local level. This search can either be online or, less efficiently, by searching a microfiche catalogue produced from the network's records from time to time.

I have referred to rationalisation of collections. The database is up to date and because it is readily available it is possible to search it for acquisition purposes. Most libraries only consulted the old style union catalogues for acquisition reasons when cancelling serials or when considering the purchase of very expensive items. How much more sensible to look at what is held when deciding whether to order materials to see if one can rely on other libraries' holdings and buy an alternative title, or whether the item under consideration is a genuine item of need. Networks thus provide a potential vehicle for co-operation in, or co-ordination of, collection development.

It has to be said that cataloguing networks with their large files of description data about library materials now provide a major tool for reference. The information retrieval systems have made the data in journals more accessible. As a result of having a database of library materials available, reference staff can undertake subject searches of material contained in our enormously expensive and under-utilised monograph collections and also non-book collections, such as pictures, prints, maps, films, etc. Our network members report increased use of their own monograph collections and increased inter-library loans of monographs as a result of having such a tool available.

An allied advantage is the potential for opening up the total national collection for use. The national collection of a country is the collection of all government funded institutions, and some private ones. Networks, including our own, report greater use of small and/or local collections. In the past many libraries relied on the large libraries, borrowing materials blindly without checking union catalogues first to see where the material was held. Now, when they can see quickly where material is held, and that it is held by libraries close to them, they can and do

borrow from local sources. Of course, the smaller libraries may not be sufficiently strongly staffed to handle this extra work. This is where national planning is necessary to help them cope. Can government, the main funder of libraries, afford to buy materials for a particular special library and not give that library the means to use those materials cost-effectively by allowing use by members of the community outside the library's immediate clientele? The expense of maintaining libraries is very high. Many are under-utilised capital resources. Moreover, because special libraries are mission oriented and usually cover only a relatively specialised, sometimes heavily specialised, part of the universe of knowledge, they are likely to be very carefully selected and up to date collections. How can government afford not to make this resource available to the whole community?

Different approaches

There are of course many different approaches to networking. The national libraries of Australia and New Zealand have adopted the approach of a centralised national network, in Australia's case excluding schools. Both countries are small in size of population and in total library resources. It seemed sensible, given our limited resources, to attempt to achieve a national network. We considered in Australia that (although we are one of the largest countries in the world) our population was so small and our bibliographic resources so small relative to the totality of recorded knowledge, that information about our resources would be best brought together in a national central database. Moreover, when we began to plan the national bibliographic network there were no online networks operating in Australia and even now there are only two others just beginning. In addition, union cataloguing had been very largely centralised in the National Library and the Commonwealth Scientific Industrial and Research Organisation creating a climate of co-operation with central bodies. Hence, we came to the conclusion that a central database was our answer.

I shall not comment on Singapore's approach: that comes best from the National Library of Singapore, whose long term strategy for SILAS (Singapore Information and Libraries Automated System) it would be good to hear about.

The National Library of Canada is a proponent of the decentralised approach, linking existing or future networks and individual libraries by a set of computer protocols (standards) called Open Systems Interconnection. Many of the reasons advanced by the National Library of Canada for such an approach are the reasons we gave for a centralised approach. However, probably the most significant reason for their decision was the existence of the very large online network, UTLAS. This did not apply in Australia.

I will divert here for a moment to describe OSI. OSI is a set of international standards or protocols for information transfer between computer-based systems potentially supporting any application over any combination of communication media. They are, in effect, a set of rules by which two computers can exchange data. The protocols cover agreements on which computer can speak at which time and the format or syntax of the data exchange between the participants. The basic idea is that any two machines can conform to a given protocol no matter what they are or which vendor supplies them. It is hoped that the various hardware or software suppliers will implement these protocols so their systems can talk to other systems.

The protocols have seven layers. Those layers include the basic method of communicating (for example packet switching networks, a local area network), common communications oriented services, common applications, file services, job services, message services and the particular service the recipient requires. In the case of libraries, that may be a bibliographic search or an inter-library loan transaction.

We in Australia did not have a large utility like UTLAS. We believe that a total decentralised approach is not suitable, as without a central database or a major utility like that in Canada libraries would be slipping in and out of a series of other libraries' systems to track down the item they want or for reference enquiries – a fairly cumbersome way of locating information and material. We intend to make use of OSI but continue with the strategy of a centralised database together with selected computer-to-computer permanent connections. We are still assessing the most appropriate ways of doing so. One application which we hope to use is the Library of Congress's Linked Systems Project (LSP) which I shall discuss briefly later.

Currently, the National Library of Australia is using the IBM standard SNA (Systems Network Architecture) for linkages between computers.

There are of course other types of networks. The National Library of Australia operates the Medline services in Australia. This is a one-way information provision network. Those countries who take the software and database pay the US National Library of Medicine to index data. However, we have long felt the need to add data for Australian material which the National Library of Medicine does not cover – Australian nursing journals, for example. We have developed on Medline an *Australasian Medical Index* to which Australian and New Zealand authorities add data which is useful to our medical communities. Notable examples are a database on aboriginal health and (under an international contract) a database on the biology of ageing. New Zealand uses the Australian Medline service via the packet switching network. In addition, Fiji, the Philippines, Singapore, Malaysia, Korea and Hong Kong access the Australian Medline Service. We hope to extend the service throughout the South Pacific and South-East and East Asia region and will assist countries in the region in developing their own database. So this is an example of co-operation through networking to improve a pre-existing service.

I should mention that when we began this Medlars service in 1969 we had no computer; our first came in 1974. We borrowed space on the Australian Department of Health's computer and both of us have found this such a good arrangement that we still use their bank of IBMs, our own being largely occupied by ABN. This is a way of getting computer capacity when your institution is not yet in a position to get equipment and staff.

If you come from countries with limited resources you may think such advanced systems are out of your reach. If you see the advantage of networking, however, you can prepare for it by:

- encouraging libraries in your country to set and use realistic and standard cataloguing procedures;

- encouraging your national library to ensure that your country is involved in international standard setting to ensure that international standards are relevant to countries outside Europe and North America.
- encouraging the use of MARC compatible local systems.

In addition, you will positively benefit by being able to watch developments elsewhere.

As I have indicated, one is the decentralised/centralised debate. There is no right answer. The choice will be different from country to country because of its individual circumstances. I have quoted an example of the different approaches of the Australian and Canadian national libraries to a somewhat similar situation.

Another potentially major development is one I have considerable interest in. Libraries more than most related institutions co-operate, join in setting standards of mutual acceptability and believe in making information available to the community. What about the other elements of the national collection: the museums, art galleries, archives and other specialist collections? Some working in these fields see themselves as information providers; many do not. Is there potential benefit for users in co-operation between all these types of institutions? I believe so.

In Australia we have a working party looking at possible developments in linking the information systems of the National Library of Australia, the Australian War Memorial, the Museum of Australia, the Australian National Gallery, the Australian Archives and the National Film and Sound Archive. I might say as a considerable understatement that it is not easy but I believe that the eventual benefits will be worthwhile. We have been working on a number of projects, one of which is the identification of data elements common to these types of institution, which will assist future linkages between our systems.[2]

At the Smithsonian in Washington, David Bearman is looking at specifications for a system which would link all the resources of the Smithsonian (including the zoos). The major problem/challenge is to convince museum and gallery curators that the functions of selection, acquisition, cataloguing, control, conservation, preservation, reference use and lending are essentially the same, as the library profession has long recognised. He predicates a decentralised/centralised system. Some data will be held locally but overall control information will be held centrally. Data may be exchanged between the local and central files. The ultimate aim is for users to be able to have access to relevant data from anywhere in the system on the topic they require, whether it is in the libraries, museums, galleries, archives or zoos of the Smithsonian Institution. Incidentally, Bearman sees a further development: the ability to access any database the user needs, the user using natural language, ordinary speech, to ask for information and the system interpreting this to match the search language of the required database. This is not futurology. The technology to do it exists now; to achieve it the technology has to become economically viable and it has to become acceptable to the potential users.

Obviously at some stage one has to get to grips with the new technology developments in order to assist our users to get the most cost effective access to the world of information. But one will reap the advantages of others' thinking, work, mistakes and achievements without having been a pioneer.

Key issues

Let me now even more briefly discuss some of the key issues in networking. One much cited overseas is *copyright* of the record. The problem is that a national agency creates a record, or a participant in a network creates a record and in automated systems it may be used and re-used. It may pass into other networks – a national agency may actually find its own record being used in a commercial facility to compete against the national agency. It is, as with so many aspects of networks, a matter of who pays for what. Basically we are free traders attempting to get the best range of data for the users but in the growing climate of "the user pays", the creator is increasingly looking for recompense.

Standard setting is an issue. The lowest safe and appropriate standard of descriptive cataloguing should be the goal for all cataloguing institutions. Nothing focuses the mind more on the cataloguing rules developed over many decades than the computer's ability to point up all deviations from the rules which in manual systems may have escaped even the most sharp-eyed cataloguing supervisor. In online catalogues the concept of main entry becomes meaningless. The focus of attention should be on descriptive cataloguing and subject access.

Information. Now that we have the technological means to control library materials we should be applying the lessons of the information retrieval systems to provide better subject access for our users. As that very sensible speaker on networks, Barbara Markuson, said at the NAC meeting, the current deficiency of the library network structure is to limit "the scope [of such systems] to . . . bibliographic control, leaving abstracting and indexing and local systems developments to others."[3] Some of our libraries are putting periodical articles and analytics for conference proceedings into ABN. We need to encourage this; we need to put more data into the record. Consider the average catalogue record – the title, access points, a note if the user is lucky, and two to three subject headings. Certainly the facility to search key words in titles and key words in corporate authors has improved retrieval. But consider that we may treat a monograph in this way in a bibliographic system, while in an information retrieval system like Medline we now find a one to two screen abstract and up to 40 descriptors for a periodical article or a paper in conference proceedings. It is our function to use technology to unlock the information in our collections for the user. I commented earlier that ABN libraries are finding increased use of monographic material (their own and by inter-library loan) because of the availability of online search capacity of data about this material. The Australian Department of Veterans Affairs, with its heavy emphasis on medicine (it operates the veterans' hospitals and veterans' medical services) has found that the use of its monograph collections has grown sharply because of the availability of this tool. Much more of that information will become available to users if we improve subject access in our cataloguing records.

Local systems. As Markuson commented, the development of Integrated Library Management Systems is a real issue. RLIN predicted two years ago that with the increased use of ILMS in their member libraries, cataloguing on the central system would decline to nothing within five years. Two years later there is little urge of this. Why? I think I have given part of the answer above.

OSI and other standards, such as SNA (IBM), are clearly assisting in the linking of computer to computer. Some people think that with the development of ILMS's libraries will become insular and not co-operate. My opinion is that in this region, when we have got used to the benefits of sharing, co-operation will continue aided by the development of links between systems.

It is possible when SILAS comes into operation, that an ABN library, say in the great mining region of Hedland, might search the SILAS database here in Singapore for information on predictions of ore carrier capacity in the Singapore port and request the required items on inter-library loan. A library in Singapore might search SILAS for a cataloguing record and, not finding it, come into ABN for the record and down-line load it back into the SILAS database.

These are some of the issues. Libraries are changing as technology brings possibilities for improved information delivery, improved library services within our reach. We are looking outwards to real co-operation with other libraries and between networks for the benefit of our users.

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Staffing Implications and the Management of Change

by Murray C. Shepherd
University Librarian, University of Waterloo, Ontario, Canada

Library automation has two major objectives: to improve access to information, and to decrease, or at least not increase, cost, by transferring low-level, repetitive "clerical" operations to the machine.

In a manual library system people perform required processing operations; if a computer is used to perform some of the work, a computer based library system results. In such a system people and the computer share the responsibility for performing the work. Librarians and library staff are capable of achieving goals and objectives less expensively, more accurately and more rapidly than by manual methods.

For the purpose of this discussion, library systems include four operations:

1 Acquisitions, that is: identifying, ordering, receiving and paying for library materials
2 Cataloguing, arranging like materials together by subject and providing access to them by indexes: author, title, subject, etc.
3 Circulation, making materials available to users by lending
4 Reference or information service.

One or all or any part of these operations may be computerized.

The four operations, or functions of acquisition, cataloguing (bibliographic data management), circulation, and reference fall into two basic categories: information management and information retrieval.

Let us deal with information management first. The materials acquisitions function involves creating an order for an item, for example a book, thus eliminating the multiple-part paper filing operation for each book. The computer is able to perform more efficiently large numbers of clerical operations in the order process. For example, the University of Waterloo Library orders and receives approximately 80,000 books a year which might require as many as one million separate clerical operations.

MASS, the Materials Acquisition Sub-System, was designed by GEAC Canada Ltd. to University of Waterloo Library specifications to increase efficiency and effectiveness of the selection and acquisitions process, in order to enhance services to the academic community and to provide better control over operating costs and the materials acquisitions budget of about $3 million.

The system begins with orders being searched online to the existing database to ensure that an item is not already in the library or on order. Orders are then input and machine sorted and sent to the vendor and several internal machine readable files. The vendor may receive the orders online, by magnetic tape, floppy

disk or in paper batches. Receiving and paying for items ordered is a simple* matter of moving bibliographic records at a keyboard.

Eventually, these bibliographic records in the form of orders are moved to where the second function is performed: cataloguing, or bibliographic data entry and control. In such a system records are created, authorized, verified and "filed" so that users may find books by a number of key elements: author, title, series name and subject.

The present day card catalogue, first introduced over a hundred years ago, is a remarkable information storage and retrieval device, in that it provides random access to massive quantities of data, but it is expensive to maintain, and unresponsive to users' changing needs. Users have access to data on a library's collection from terminals located in the library, at home, or in their offices, at any time, even when the library building is closed. Microcomputer owners with a modem are able to access not only the catalogues of their local libraries, but also the collective catalogues of major libraries elsewhere. One can find out whether a book is held by a local library, and if it is in; if it is not, a "hold" can be placed, and in certain circumstances it can be delivered to the user. If the local library does not hold the item, distant catalogues may be searched and the inter-library loan systems will allow one to order the book to be sent to his local library.

Having found the book through the catalogue, the third automated function is called into action when the user borrows a book from the Library through the automated online circulation system. To "sign out" a book one passes a light pen over the user's card and over the bar code label in the book. The system then combines the two pieces of information and stores it until the book is returned, when the book bar code is "wanded" again and the book is discharged and returned to the stacks for the next borrower. No paper is created or filed. User statistics and overdue notices are all prepared by the computer.

The fourth function of library automation is reference or information retrieval. As well as information retrieval from the online catalogue there is the capability of retrieving information from other data banks through *M*achine *A*ssisted *R*eference *S*ervice – computerized library services which perform literature searches quickly, online, by search terms or subject headings. The service covers the broad subject fields of science, technology, medicine, social sciences and business/economics. Through plain language search terms one may access information in such fugitive literature as technical reports and conference proceedings as well as the periodical literature. At present, most systems are still sufficiently complex to require the assistance of a librarian, but hours of searching through paper indexes can be reduced to a few minutes of computer searching.

* Digression: when I showed this section of my paper to the Head of our Materials Acquisitions Department, he pointed out that, in fact, it was *not* as "simple" as they had assumed it would be. He had to add a full-time position to the invoicing group because some vendors are, as yet, unable to send machine readable invoices. Consequently, invoices must be keyed in so that they can be matched against our machine readable orders. The position to increase invoice keying was found in the Book Order section. This is an example of change that automation brings: that is, decrease of activity in one area but an increase in another. Flexibility is the key to the re-allocation of positions and, if need be, staff.

There is another side benefit to automation, one which figures in all four functions discussed above: electronic messaging.

When properly designed, implemented and managed, a computer based system can offer many benefits to a library. It cannot, however, perform independently all necessary information management and retrieval operations. Librarians and support staff, our essential human resources, will continue to be part of modern library service, and automation is not without implications.

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Automation is not without implications for the management and development of these human resources, and it is these implications and the question of managing change in general that I should like to focus on now. As library managers, we cannot ignore the inter-relationship between human values (often implicit) and modern technology.

The introduction of computer based library systems will cause change: technological, organizational and, most importantly, *social*. The introduction of technology to library service has always caused relationships between work and library staff to change.

Mike Malinconico, in the January 15 and February 15, 1984 *Library Journal*, makes an interesting comparison between change as a result of the introduction of traditional technology and that caused by the electronic technology. The influence of traditional technologies, he says, e.g. elevators, electric light, the automobile, the typewriter, photocopying, has been relatively limited. However, the effects of modern electronic technology is far more acute, pervasive and unpredictable. Traditional technology extends the power of human muscles and senses. Contemporary communications and computing technologies, particularly when combined, more closely resemble an extension of the human nervous system. Their influences, he concludes, are considerably more profound. It follows then, that the introduction of such technologies must be carefully managed.

The challenge to supervisors and managers is not to specify or to master the functional details of automation but rather to design appropriate organizational structures that will operate effectively when automated systems are introduced. The social and organizational considerations are far more important than the technical ones.

Experience has taught there *will* be resistance to change. This resistance, on the part of library users and staff alike, cannot be ignored or wished away, or treated as a problem separate from the introduction of change. It is part of the change process; it must be anticipated and planned for. The real issue is that people resist being changed, not so much the change itself.

The causes for resistance to change are rarely obvious, even sometimes to those who are doing the resisting.

There are four stages that a colleague of mine identifies when people undergo change. The first she calls "*rumour*" characterized by such statements as: "I hear that we are being replaced by machines". The next stage she describes is "*fear*": "I don't know anything about computers", or "I didn't take this in school", or "I'm too old to learn this stuff". The third stage is "*cynicism*": "This will never work." This can be, incidentally, a self-fulfilling prophecy which, if you let it, can lead to "I told you it wouldn't work!" The fourth and final stage she describes

is either *"resignation"* or *"hope"*: "This isn't so bad after all". It should be no surprise to you that I am quoting our very successful Associate Librarian for Planning and Systems who goes on to insist that the simplest way to get to stage four is through consultation and communication. She and I share the belief that people who are consulted from the beginning, participate in the processes and understand the reasons for change, are more likely to accept the change than those who have change thrust upon them. We work in an environment of constant and open communication and consultation.

Not surprisingly, then, one of the common pitfalls which interfere with the change process is poor communication between management, staff and the change agents (systems installers).

Without careful explanation staff may misinterpret the reasons for the introduction of a new system and improperly evaluate the benefits. Careless statements will adversely affect staff receptivity to change, accentuate consternation, and convert potential advocates into fierce opponents.

There are several other obstacles to the successful implementation of change. Among them, unanticipated *technical problems* associated with the change. Technical problems can arise if there is an unavailability of training manuals, forms, or if the systems software still has "bugs" in it. Even if all these are provided, technical problems can still arise.

Then there is the question of *attitude* – fear of the unknown, uncertainty, task enlargement or reduction. The introduction of a new system often demands a redefinition of duties and responsibilities. The manner in which various departments interact may be altered. Personal and procedural interdependencies must be considered in systems design. They necessitate increased understanding, coordination of, and sensitivity to, interpersonal relationships. Fear of personal failure resulting from a perceived inability to cope with the intricacies of new procedures can contribute to a climate of resistance. The real issue here is that people resist being changed, not so much the change itself.

Contrary to some supervisors' opinions, most people *enjoy* their work. Often the object of an activity is of less interest to the person performing it than is the ritual of its performance. If the work to be done is so "de-skilled" by the computer or does not provide for the exercise of individual judgement, people will create the opportunity to use their judgement even when it is not called for. While we are talking about supervisors there is an important point to recognize. Supervisors and middle managers are typically the most neglected group. The question uppermost in their minds is: what happens to my job when the people I supervise are using new technology? Most supervisors knew what their staff were doing because they used to do it themselves, but now, they don't know what staff are doing and how they are doing it.

Human relations may deteriorate and the change may contribute to an environment of hostility, increased absenteeism, failure to meet deadlines, and staff complaints: the quality of the air, washrooms, staff lounge, cafeteria, parking, etc. These adverse effects may continue long after the change has been implemented.

Those elements from which staff derive satisfaction should be preserved, whenever possible. If they are not, people will reject a task that causes stress.

People may develop hostility towards themselves or others leading to confrontation with supervisors, peers and subordinates which can lead to a deterioration of interpersonal relationships, morale and service.

A third obstacle can be the failure of the new system to meet *stated management objectives*, such as improved job satisfaction or efficiency. Staff may identify inadequacies in the new system before management does and reject it because it does not serve the organization's stated objectives. Management is receiving a strong signal in this case that the new system should be reviewed. If the signal is unacknowledged, staff may change their internal motivational aspirations and attitudes.

And finally, management's failure to understand, anticipate and *prepare* for resistance. Time and training must be committed. Communication takes time, and is, at least, *two-way*. Management can contribute to the failure of a new system by not providing appropriate support: recruitment, training and compensation, and equipment and furnishings.

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Resistance to change must be addressed by focusing on the sources of the problem rather than the symptoms. Dealing directly with hostility, production bottlenecks, or erroneous data input will have no permanent, desirable effects. Rather than attempting to control these forces, managers will have greater success if they have in place specific strategies for managing change.

Some of these strategies are:

1. *Understand the objective being pursued* by the proposed change. Gather the necessary information associated with the problem being addressed. Reduce it to the most basic principle, and remember, to automate is *not* an objective; to give better service is!

2. *Identify and communicate the deficiencies* of the existing system. Problem identification and thoughtful collaboration of solution alternatives are prerequisites to successful change. For example, the necessity for change might be promoted by asking staff to review and analyse current practice. That is, in the "classical" systems analysis procedure one would:

- analyze current operations
- describe the ideal
- evaluate current practice
- develop plan for change

The important principle to remember here is: do *not* define the "problem" in terms of the solution you prefer. This review and analysis develops a perceived need for change. This need is reinforced by discussions showing how the new system will solve problems.

3. *Demonstrate how the change will improve* the quality of the work performed and/or increase staff efficiency. For example, work may be redefined so that it is more rewarding or it will simplify otherwise tedious tasks. The new system may reduce overload, or eliminate bottlenecks. It may provide more relevant and more timely information which can lead to improved performance and service. The objective here is to communicate change in a way that staff will see it as a *positive* thing for both the library and themselves.

It is not possible to predict the complex and subtle consequences of even the simplest changes. It is essential that the problem-solving ability of those directly affected by the new system be enlisted.

4. *Establish and maintain open channels of communication* among managers, consultants, vendors, systems installation personnel and staff. This is time consuming, but a common mistake that managers make is to move too fast and involve too few people. Adequate time must be allowed for the transition process. Communication should include clear demonstration of management's objectives and commitments to the project. Communicating effectively means not only conveying information clearly and honestly, but listening well and responding sensitively to matters of concern. Participation and support are part of the communication process.

5. *Commit the resources* of the library to the change; provide staff with a supportive environment and promote the change at all levels.

Of particular significance among the implications of library automation for staff are issues of recruitment, training, compensation and ergonomics.

Beginning with recruitment, there will continue to be a growing emphasis on the importance of qualifications that include familiarity with current technology, and a willingness to work in rapidly changing and highly automated environments. Basic requirements for entry-level jobs reflect the needs of an automated environment. So too do the criteria for promotion. Technological developments also affect existing workloads and staffing requirements, and place greater demands on the knowledge and skills of staff, giving rise to increased training needs. Large numbers of staff require training and re-training, specifically to teach procedures and generally to enable them to understand and feel comfortable in an automated environment at various stages in their own careers.

New or reallocated resources may be required for job-related training, staff development and continuing education in order (a) to establish a basic understanding among all staff of issues in the advancement of technology, and especially to increase their knowledge of computer technology; (b) to increase the confidence and competence of staff whose jobs are directly affected by technclogical developments; and (c) to explore new ways in which technology might be made to improve staff efficiency and effectiveness, to re-structure and re-design jobs, and to improve management decisions.

Uppermost among our responsibilities as managers is to foster and nurture an environment in which well-trained and willing staff are motivated to participate in the library's development; an environment in which their commitment is acknowledged by an appropriate reward system. Many of us are more than familiar with circumstances where financial reward is limited by an organizational salary administration programme which, in turn, is limited by governmental funding. However, of equal importance to strictly monetary considerations within a reward system are career development possibilities. The availability of career paths to provide opportunities for mobility and advancement within the organization is also important to staff.

Among the questions that technological advances raise are those that may be described as "ergonomic" – questions having to do with the biological,

medical, psychological interface between people and machines. Automation must be attended by a continuing organizational commitment to the health and safety of staff.

Existing facilities and equipment must often be modified and the design of additional facilities undertaken from a somewhat different perspective. Ensuring a safe and ergonomically sound working environment must be a continuing organizational, departmental and individual priority.

6. *Encourage and use employee participation* in all phases of the change process. This is the most important method or strategy for managing change. Managers need to ensure that employees not only understand the scope and technical details of their new tasks, but also that they perceive their new duties, status and associations as being at least equivalent to those which existed under the old system. It might be desirable for some time to operate the new system in tandem with the old system. A selected group may begin operating the new system under close supervision of the systems technicians and managers. As this group gains competence and confidence, they can gradually engage the services of other employees and eventually phase out the old system. Also, training manuals, programmes, user manuals, and observations of similar systems in other libraries will prove useful in successful change. Accurate and complete information will help reduce much of the anxiety associated with change.

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Education and orientation are important factors in implementing automation. All staff, from professionals through support staff, and most importantly, front line public services clerks, can be oriented and trained in basic computer technology, what a system can and cannot do, and how to deal with its limitations. A basic understanding and a little practical knowledge of how a computer works goes a long way to dispel the notion that a computer is an intelligent, cognitive machine that can control the system.

A little learning in this case is not a dangerous thing, for it shows that computers don't do anything people haven't programmed them to do. People control computers; people can override computers; people can pull the plug on computers; people can personalise and individualise a system. People can also discredit a system by giving up the power of control over the computer and blaming the computer for not being flexible enough. Systems must be designed with as much flexibility as possible. It must be possible to override a system to make exceptions through human intervention. Flexible systems may cost more, but inflexible systems cannot handle the individual requests that are a large part of library service. Greater flexibility can be built into a library system and enhance the function of a library. Developers of a library system control that flexibility through commitment, planning and education.

Anticipating and responding to technological change often warrants functional reorganization and the possible reallocation of human resources. Such reorganizations, where necessary, must be thoughtfully planned and carefully implemented so as to recognize and respect human values while supporting the goals of the library.

There are complex sets of interpersonal relationships affected by a systems change. Those charged with making the change must be sensitive to these relationships. As library managers we have a vital role to play in piloting our organizations through the stress of complex change.

There are two ways to bring in technology: short/long and long/short – both take the same time!

The Working Groups

Discussion of questions arising from
Peggy Wai Chee Hochstadt's *Why automate?*

The reasons and objectives you consider to be most important or pertinent to automate your library, taking into account the local conditions under which your library operates.

Group B was the only one of the three Groups discussing this question to point out that in the Singaporean context the main reason for automating was that it was Singapore's national policy to be an information centre and that increasing emphasis was being placed on the use of computers for this purpose. All three Groups agreed that automation would enable libraries to handle more efficiently large volumes of work and would eliminate time spent on repetitive manual processes, such as the filing of cards or sending reminders for overdue books. Speed of access to information was another important objective, especially in academic and special libraries. Group E pointed out the improvement in management information made possible by automation, whilst Group B also listed "data that is more accurate and up-to-date, e.g. in a charging/discharging function." Group A may have been a trifle optimistic in considering that automation would "compensate for manpower shortage".

The overall feeling of the Groups was that wise use of automation would increase productivity and release professional staff for the carrying out of such tasks as SDI.

The major problems and obstacles hindering the implementation of automation of your library.

This question was attempted by all five Groups. Groups A and E both listed "lack of funds" as one such major problem. The two obstacles on which all Groups agreed were the lack of reliable and disinterested consultancy services available to librarians, especially the smaller ones, when planning the acquisition of hardware and software, and the dearth of training opportunities. A service such as that made available in the United Kingdom by the Library Technology Centre was widely regarded as a great necessity. Group D pointed out the lack of cooperation in Singapore and Malaysia between user groups, and appealed to the two Library Associations to take the initiative in bringing about this cooperation. Group C's awareness of the high fees charged by vendors for training in the use of their systems led it to recommend to local, regional and international bodies that training courses be organised to meet the various needs of the different grades of personnel involved in the whole computerization process. Finally, Group E mentioned communication problems within institutions which were also serving as obstacles to automation.

Which library operation/s would you consider most urgent for automation in your library?

This topic was tackled by Group A which agreed that academic libraries would

probably regard cataloguing as a high priority, because bibliographical databases were widely available and such libraries required a high standard of cataloguing. Special libraries, on the other hand, which serve a clientele with very specific needs, would probably opt for automating indexing and an SDI service.

Types of assistance you would need in the planning and implementation of automation in your library.

Group C regarded the greatest need as being for the creation of an advisory body to extend consultancy and advisory services to the smaller special libraries which intended to automate. Such advice was particularly required in the selection of appropriate hardware and software, of which a bewildering array was at present available. An organization similar to the Library Technology Centre in London was suggested. It was suggested that libraries seek the assistance of the National Computer Board through the Library Association of Singapore. Besides providing advisory and consultancy services, the Board should be able to invite vendors to set up displays of their wares and to provide information so as to help in evaluation and selection. There was dire need of training in all aspects of computerization for all levels of library staff, and therefore many more computer courses should be organised by the Library Association of Singapore.

Discussion of questions arising from
Lynn Allen's *How to go online*.

What steps should be taken (by whom, and in what order) to prepare the library for the introduction of an Online Public Access Catalogue?

This question was tackled by Groups A, D and E but the answers given tended to be vague. None of the Groups specified who should be made responsible for such preparation: references were made to "library staff". All the Groups agreed with Lynn Allen's premiss that such preparation should be heavily orientated towards the ultimate users. The first step, logically, was to train library staff how to conduct user education programmes and to carry out surveys on user needs. These education programmes should be accompanied by the placing of a sufficient number of terminals at strategic points as well as appropriate user manuals or written instructions. The Groups also emphasized the need for library staff at all levels to be involved both in implementing the system and in educating users.

What role do you see a supplier of an integrated library system playing in implementing the system in your library?

This question was discussed in Groups A, B and E. The role of the supplier was seen as advising the library on strategy, e.g. on the need to have a coordinator, liaison officer, etc.; advising on the best method of installing a system, e.g. one module at a time or a few at a time; training library staff in the use of the system; assisting in testing and debugging software when it is first installed. All the Groups were anxious to see strong support from the vendor after installation of the system in the way of maintenance, repairs, upgrading, etc., and insisted on the need for a local office to be opened by the supplier to provide frontline support.

What areas of library operations are subject to automation and what peripheral roles do you see for libraries in information provision (e.g. records management, community information, office automation)?

The Groups discussing this topic agreed that most library areas could be automated. Group B felt that a phased implementation was advisable as it would enable library staff to be inducted slowly into the mysteries of computers, and it would be easier on limited budgets. Group E saw a possible role for libraries in other areas, but this remained to be tested as in Singapore libraries had still to be tried in the main roles of library automation. Group C saw libraries assisting with records management in their parent organizations.

Discussion of questions arising from
Mary Rowbottom's *Automation for the smaller systems.*

As members of the Commonwealth you have close links with the Western world. Would you be hesitant about the purchase of software from another country because of lack of support? What local help and advice are really needed?

This question was tackled by only two Groups, possibly because it had already been answered in part in the discussion following the Hochstadt paper. Group A said it would hesitate to buy software packages from another country in the absence of local support, or if there was any doubt regarding its compatibility with the system used by the library's parent body. Group E was of the view that with the setting up of SILAS (Singapore Integrated Library Automation System) members would give priority to those packages recommended by SILAS, but recommended that all such packages be supported locally by their vendors.

You are in charge of a small library which is independent but has a close relationship with a large library. You have money to spend on automation and have to choose between two options: 1. to buy a microcomputer system for your library; 2. to use the minicomputer system currently installed in the large library. How will you go about making the choice?

Group C discussed this question in the context of a small library which is independent but has a close relationship with a parent organization, this being the situation in which most small libraries in Singapore existed. Problems could be caused by the fact that it was not always possible to depend on the parent organization which included the library in its computerization plans when it was advantageous, and then accorded it low priority when circumstances changed. If a small library chose to use the system currently installed in the parent institution, it was important to identify a suitable package which would accommodate the needs of several users and to ensure in appropriate cases that standardization was adhered to, e.g. bibliographic records to adhere to one of the MARC formats.

You have a limited amount of money to spend on a microcomputer system, although more money will be forthcoming. What will you choose to implement first? Will a phased implementation prove difficult or will it offer advantages? How will you argue for or justify money spent on library automation?

This question was discussed at some length in Group B which agreed that priority would have to be based on several factors, e.g. Where do backlogs exist? How easily can a function be computerized in the context of that individual library? How important will the impact be on the user? There was no consensus regarding the function to be implemented first, but members from the smaller libraries felt that indexing services should be placed first to provide a sound basis for SDI. Apart from allowing good use to be made of limited funds, a phased implementation would make it possible for library staff to acquire computer skills at a reasonable pace. Three arguments in justification of library automation were listed: the usefulness of automation in allowing sound bibliographical control over the global flood of publications; much greater efficiency in library services, e.g. information accessed more speedily, more accurate and more up-to-date financial statements; the possibility of joining networks and accessing information in other countries.

Discussion of questions arising from
Judith Baskin's *Networks and networking*.

Are cataloguing standards appropriate standards?

Group A felt that cataloguing standards should be interpreted according to the needs of a particular library system. Libraries following AACR2 felt that automation removed the need for a main entry once access could be made via several points, including key words in titles. It was more important to provide a multiplicity of access points than to adhere rigidly to rules regarding a main entry field. Use of micros would necessarily influence the standards to be followed: AACR2 level 3 was clearly out of the question, so simplified cataloguing was essential to make possible storage of a greater number of records and speed up their retrieval. Moreover, the trend towards local networks meant that complete records need be kept only at a control source.

Group B agreed with Group A and emphasized the need for authority control and consistency in choice of headings whilst also maintaining that only such punctuation as was required for search strategy should be maintained.

Should we improve subject access in our catalogue records?

Groups A and D, which discussed this question, both agreed wholeheartedly that improvements were needed. The subject approach by users was the commonest, especially in academic libraries, and subject indexing was often unsatisfactory and unsystematic. Group A criticised LC subject headings as being insufficient or not the commonly used terms. Group D was in favour of adding a keyword index to the subject headings and of broadening subject access by the use of Boolean logic.

Why do libraries combine into networks?

Group A listed the benefits of networks as being (a) resource sharing, (b) less duplication of expensive and specialised items, (c) elimination or considerable reduction of local cataloguing, (d) greater awareness and better utilization of the networks available in the area covered by the network, (e) financial savings: it

is cheaper for a small library to link up with a network than to set up its own system. Group C listed, in addition to these, improved efficiency of services to users, including expeditious inter-library loans.

Discussion of questions arising from
Murray Shepherd's *Staffing implications and the management of change.*

How does a manager introduce a change plan in a complex organization where the levels of staff range from the clerical to the professional/specialist?

Group A felt that the introduction of change on a hierarchical basis had the drawback of possible "miscommunication" or "misinterpretation" of information by the time it gets to the bottom of the line. It is thus preferable to communicate directly with all levels of staff in a group or a number of groups. Change must be introduced gradually and systematically, and staff must be made to understand the rationale behind it. Managers should obtain feedback from the staff actually carrying out the change. Group C emphasized the need for adequate staff training to cope with new roles and responsibilities, and for staff to be made to feel an integral part of the entire change process.

How do you know if you have a 'change' problem?

Group B thought such a problem existed if (a) there is a deterioration of services and a decrease in productivity, e.g. excessively long queues at the circulation counter, or a flood of complaints from readers that they cannot locate books on the shelves; (b) there is low staff morale: staff spend more time complaining about issues that never seemed important before, e.g. "Why can't we have longer tea-breaks?"; (c) there is a deterioration of interpersonal relations. Group A thought it was important to make a correct analysis of a situation before deciding that a problem existed which necessitated change.

How do you know when you have done enough consulting?

Group A felt it was difficult to tell. Assessment of feedback was important. Group C felt that in some cases one had to rely on intention more than on anything else, whilst Group A felt that the 'grapevine' could often provide evidence for answering the question. Group A also referred to Murray Shepherd's important comment that a manager should make it clear to staff that whilst their views were important, the final decision would be his.

Seminar Resolutions

I. This Seminar, recognising the great interest which exists in the application of computer technology to libraries due to the rapid pace of computerization in the libraries of the South East Asian region, RESOLVES that the Commonwealth Library Association (COMLA) seek the assistance of appropriate agencies to provide regular training opportunities for all categories of library staff in the region, bearing in mind the special needs of the technical support and middle level staff.

The Seminar further RESOLVES that COMLA promote an awareness of the developments in library automation within the region by publishing a regularly updated directory of the hardware and software in use within the libraries of the region.

II. The COMLA Seminar on the impact of automation on the function, administration, and staffing of libraries, having identified a pressing need for information and advice on the application of information technology in the libraries of the region, RESOLVES that the National Computer Board be asked by the Library Association of Singapore and the National Library of Singapore to set up a library automation centre having the following functions:

a) Provide a general enquiry and advisory service on all matters relating to automating library systems.
b) Provide consultancy and advisory services especially for small libraries wishing to automate.
c) Provide information on available computer systems and their applicability to different types of libraries and information services.
d) Review and examine the various library computer subject databases and advise on the most efficient method of accessing these.
e) Promote an awareness of information technology among librarians and information professionals.

Seminar Participants

(Mr) **John Allen**, East Sussex County Council, East Sussex, U.K.; (Ms) **Lynn Allen**, AWA Computer Services, Perth, Australia; (Mrs) **Hedwig Anuar**, National Library, Singapore; (Ms) **Judith Baskin**, National Library of Australia, Canberra, Australia; (Ms) **Yolanda Beh**, SEAMEO Regional Language Centre, Singapore; (Mr) **Chan Thye Seng**, Toa Payoh Branch Library, Singapore; (Mrs) **Frances Cheo**, Monetary Authority of Singapore, Singapore; (Mr) **Cheong Kwai Liew**, National Library, Singapore; (Mrs) **Yvonne Choo**, Singapore Command & Staff College, Singapore; (Ms) **Lily Das**, SAF Reservist's Association, Singapore; (Mr) **James Davies**, Institute of Education Library, Singapore; (Mr) **Stephney Ferguson**, Jamaican Library Association, Kingston, Jamaica; (Ms) **Foo Chay Hong**, OCBC Library, Singapore; (Mrs) **Lillian Foo**, Ngee Ann Polytechnic Library, Singapore; (Ms) **Fong Lai Mei**, Singapore Polytechnic Library, Singapore.

(Ms) **Goh Cheng Ean**, National University of Singapore Library, Singapore; (Ms) **Laila Hassan**, National Library of Malaysia, Kuala Lumpur, Malaysia; (Ms) **Ho Soo Miang**, Institute of Education Library, Singapore; (Ms) **Ho Sze Ying**, Ngee Ann Polytechnic Library, Singapore; (Mrs) **Peggy Wai Chee Hochstadt**, National University of Singapore Library, Singapore; (Mrs) **Ho-Lee Kiat Pia**, Singapore Police Force Library, Singapore; (Mr) **Richard J. Hudson**, GEAC Computers Int'l Inc., Singapore; (Ms) **Haji Sidek Indahsah**, MARA Institute of Technology, School of Library and Information Science, ITM, Jalan Othman, Petaling Jaya, Malaysia; (Ms) **Kee Yeh Siew**, National Library, Singapore; (Ms) **Khoo Sait Poh**, Parliament Library, Singapore; (Ms) **Ko Yun Chin**, Institute of Education Library, Singapore; (Ms) **Ku Joo Bee**, Sabah State Library, Kota Kinabalu, Sabah; (Ms) **Lena Kua**, Ngee Ann Polytechnic Library, Singapore; (Mrs) **Mary Kwan**, Economic Development Board, Singapore.

(Ms) **Lai Siew Pheng**, Nanyang Junior College, Singapore; (Mrs) **Lam Bee Goh**, Oral History Department, Singapore; (Ms) **Lau Siew Kheng**, Ministry of Foreign Affairs Library, Singapore; (Ms) **Lee Meow Hui**, Straits Times (1975) Ltd., Singapore; (Ms) **Lee Yuet Sim**, Ministry of Education Library Singapore; (Mrs) **Lee-Chin Kuei Lian**, Queenstown Branch Library, Singapore; (Mrs) **Lee-Khoo Guan Fong**, National Library, Singapore; (Mrs) **Lim Ah Eng**, National Library, Singapore; (Ms) **Lim Bee Lum**, National University of Singapore Library, Singapore; (Ms) **Esther Lim**, Queenstown Branch Library, Singapore; (Ms) **Linda Lim**, Raffles Junior College Library, Singapore; (Mrs) **Lim Pui Huen Patricia**, Institute of Southeast Asian Studies, Singapore; (Ms) **Lim Tai Siew**, Defence Science Organisation, Singapore; (Mr) **Lim Wan Boon**, Monetary Authority of Singapore Library, Singapore; (Ms) **Lim Yee Hoon**, National University of Singapore Library, Singapore; (Mrs) **Lim-Ng Bee Eng**, National Trades Union Congress, Singapore; (Ms) **Liu Wei Ho**, CDIS Instructional Materials Library, Singapore; (Mrs) **Lock Thi Xuan**, Ngee Ann Polytechnic Library, Singapore; (Mrs) **Alice Loh**, National Library, Singapore.

(Ms) **Jasmit Mahalingam**, Ngee Ann Polytechnic Library, Singapore; (Mr) **Jafred Musisi**, Kenya Library Association, Nairobi, Kenya; (Mr) **Nai Peck Ho**, National Computers Systems Pte. Ltd., Singapore; (Ms) **Vimala Nambiar**, National University of Singapore Library, Singapore; (Mrs) **Jenny Neo**, Singapore Broadcasting

Corporation Library, Singapore; (Mrs) **Ng Bing Tang**, Ministry of Trade and Industry Library, Singapore; (Ms) **Ng Chui Chia**, Kolej Tunku Abdul Rahman Library, Kuala Lumpur, Malaysia; (Ms) **Ng Kee Luan**, Catholic Junior College, Singapore; (Ms) **Ng Kim Leong**, National University of Singapore Library, Singapore; (Mr) **Ng Soo Kwee**, Institute of Education Library, Singapore; (Ms) **Ngian Lek Choh**, National Library, Singapore; (Ms) **Sally N'Jie**, Director, The National Library, Banjul, The Gambia; (Ms) **Aini Mohamed Noor**, Temasek Junior College Library, Singapore; (Mrs) **Mohd Mansor Norisah**, Marine Parade Branch Library, Singapore; (Ms) **Bachik Norma**, Dewan Bahasa dan Pustaka, Kuala Lumpur, Malaysia; (Ms) **Mohd Noor Norpishah**, National Library of Malaysia, Kuala Lumpur, Malaysia.

(Ms) **Ong Chow Ching**, Kolej Tunku Abdul Rahman Library, Kuala Lumpur, Malaysia; **Pan Yew Moi**, MMO – Mindef, Singapore; (Ms) **S. M. Peck**, Singapore Bible College, Singapore; (Ms) **Eva Phonda**, Medical Library, University of Papua New Guinea, Boroko, PNG; (Mrs) **Caroline Phua**, Ngee Ann Polytechnic Library, Singapore; (Ms) **Phua Li Wan**, Institute of East Asian Philosophies, Arts and Social Science Faculty, National University of Singapore, Singapore; (Mrs) **Phua-Tan Check Tin**, Singapore American School, Singapore; (Ms) **Jill Quah**, National University of Singapore Library, Singapore; (Mr) **Rasu Ramachandran**, Bedok Branch Library, Singapore; (Ms) **Begum Rashidah**, Automation and Research Division Library, Universiti Sains Malaysia, Penang, Malaysia; (Ms) **Gaus Rosmiyah**, Ministry of Community Development Library, Singapore; (Ms) **Mary Rowbottom**, Customer Support Department CLSI, London, U.K.

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(Ms) **Wong Kok Ling**, Statistics Department Library, Singapore; (Ms) **Wong Sheau Horng**, CLIS Instructional Materials Library, Singapore; (Dr) **Paul Xuereb**, University of Malta Library, Msida, Malta; (Mrs) **Rosemary Yeap**, Singapore Polytechnic Library, Singapore; (Mrs) **Isabel Yeo**, Straits Times Press (1975) Ltd., Singapore; (Mr) **Yeo Seng Chye David**, Sime Darby Singapore Ltd., Singapore; (Ms) **Abdul Kader Zainab**, Bank Negara Malaysia, Kuala Lumpur, Malaysia.