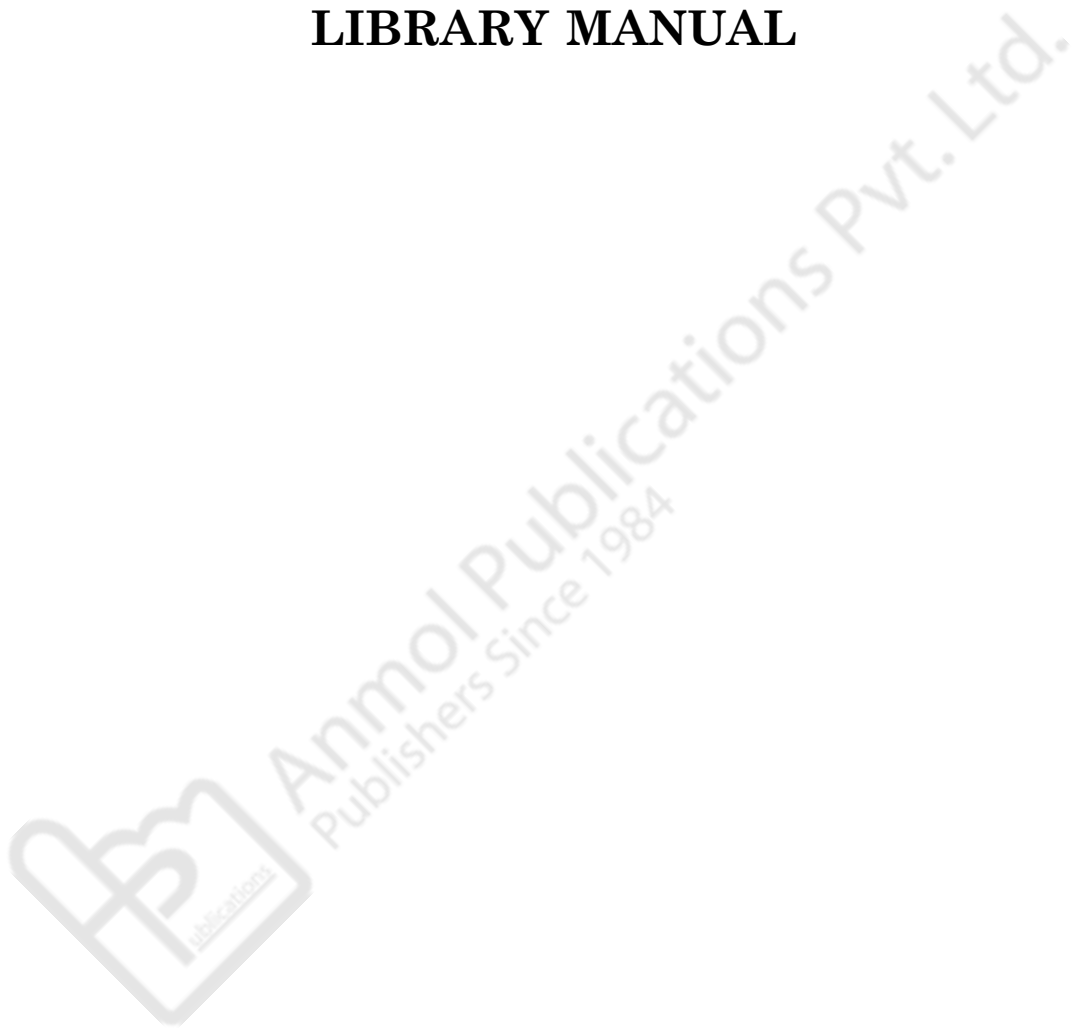


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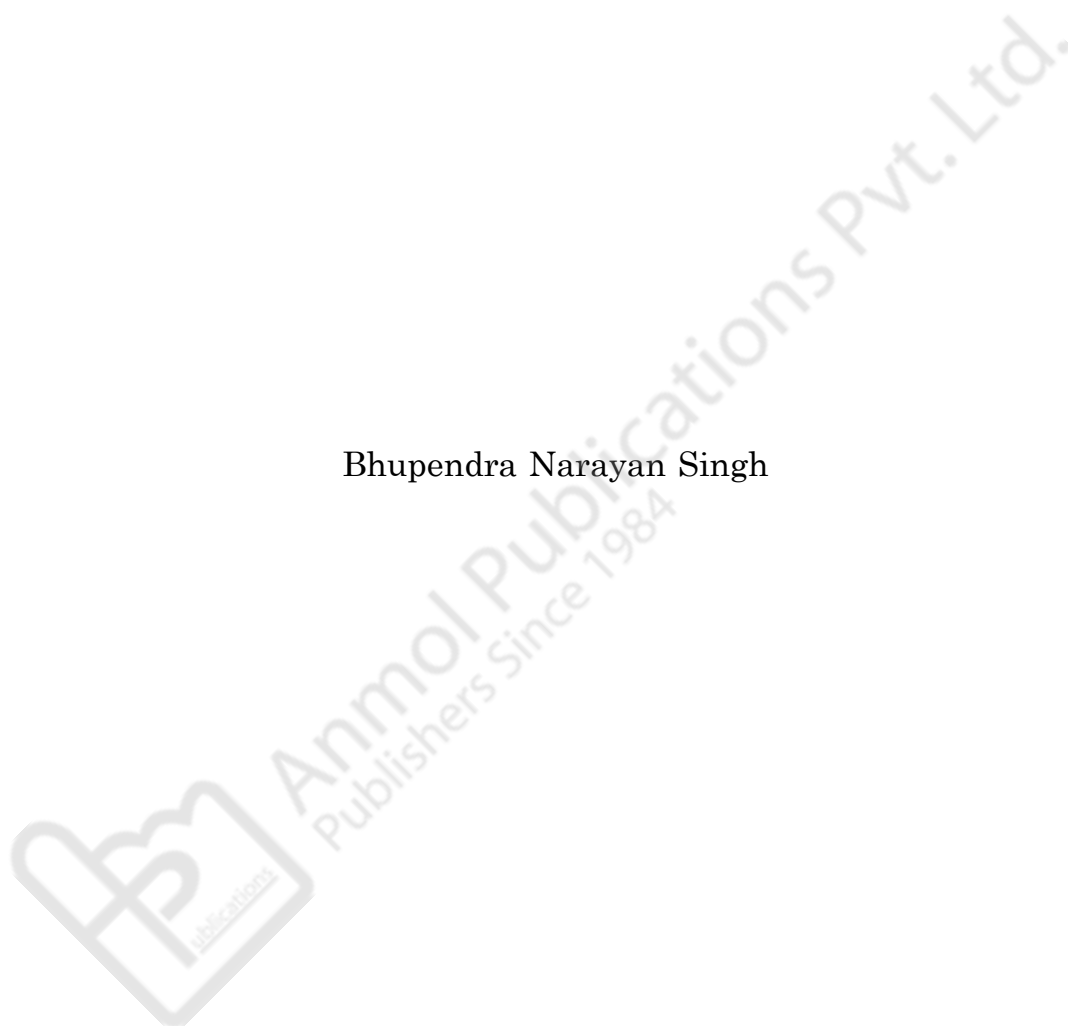




*Encyclopaedia of*  
**LIBRARY MANUAL**

**Volume 2**

Bhupendra Narayan Singh



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## Preface

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Every profession needs its own body of knowledge (theoretical foundation and specialised skills) to be exclusive, such that it sets it apart from other professions and establishes its identity as a profession. Medicine, Law, Engineering, Education, etc. have their own core of knowledge and mastery of their specialised core set them apart from each other and from the para professional group within their own category.

This core makes them so exclusive that, as an example, even if the doctor were to sit under the coconut tree with his stethoscope, he can still practise his profession. Can we say the same for the librarian? Can a fresh graduate without library qualifications undertake cataloguing and classification, indexing, abstracting after being trained for a week? I say yes! All he needs is intelligence, subject knowledge, general knowledge and the ability to look up AACR II and LCSH. Now with OCLC and Bibliofile CD ROM databases, why does one need the librarian? And if the fresh graduate can do what any librarian is trained to do, what then, is so special about librarianship?

The lack of the intellectual foundation has long been the weakness of the library profession. This has to be rectified if the library profession is to be enhanced. If we were to scrutinise the intellectual core of other professions, we will realise that they are generally multidisciplinary in nature and that they comprise theories and skills. In education for example, the theoretical basis is very broad encompassing psychology, sociology, management and administration, development, history, while at the same time pedagogy provides teachers with specific skills in teaching. What about librarianship? Would it not be sensible for us to broaden our intellectual base to include Psychology (to study user behaviour, educational psychology, research psychology), Sociology (to understand the cultural/social environment/framework within which the library operates) Philosophy, Local History, Fine Arts, Communications, Languages, Law, Management, Computer Science/IT (including programming) while Research Methodology, PR, Indexing, Classification, Information Retrieval are examples of the professional/technical skills that could be taught.

The intellectual core in any profession does not merely provide facts but trains the person to reason, rationalise, solve problems — in other words, to think. Independent thinking is one dimension that, for now at least, the computer has not been able to substitute. Taking for example, the study of History, it is not the facts that are so important but the lessons learnt from the past. One learns to reason out the causes and events, understands how people think and behave at that particular moment in time and evaluate, with the wisdom of hindsight, whether or not certain events could have been avoided. Expanding and developing the corpus of professional knowledge would place the library profession competitively with other professions. Mastery of it would provide librarians with identity, authority and autonomy — no one else could encroach into their domain. The lack of recognition that librarians in Asian countries suffer from is partly because they are constantly being compared with the more prestigious professions, such as medicine and law and engineering.

This approach will provide a solid foundation this subject on which the student will continue to build during the remainder of his or her professional life and most certainly during the remainder of his or her professional education.

—*Author*



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## Introduction

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### **Scope of Paper**

Daunted by the vastness and variety of the ASIA listed in the World Geographical Encyclopaedia and hampered by the lack of information on the library profession in the component countries, this paper will not provide details of any one country unless they are relevant to the issues raised in the discussion of the topic.

The focus of this paper is the library profession, particularly the enhancement of its image and status. The topic will be discussed in the following manner: (i) Scope of paper (ii) The Asian Background (iii) Defining the Library Profession (iv) Enhancement of the Library Profession (v) The Library Profession in the Virtual Library environment.

### ***The Asian Background***

In many countries in Asia, libraries have existed for thousands of years although very little has been written about them. Even in India “a nation known for its ancient and medieval, as well as more modern library establishment”-accounts of libraries in the Vedic, Buddhist, Medieval and Muslim periods of Indian history have yet to be accomplished. In China, the earliest libraries existed in the form of “an aggregate of documents” or book collections in the keep of royal families, temples and scholarly institutions. In Southeast Asia, libraries in most of the countries are the product of the 20th century, with the exception of Philippines where the National Library owes its roots to “the fewer than 100 volumes of books gathered in the Museo Biblioteca de Filipinas established on 12 August 1889”.

But modern library movement in Asia really took root in the 1970’s with greater impetus in the 1980’s, followed by a growth in professional

literature. A survey of the literature reveals great diversity in the library development among Asian countries, reflecting the vastness and variety of Asia itself. However, underlying this diversity are some common features that characterise library development in Asian countries:

- Inequitable distribution of libraries. Libraries are not well distributed throughout the country, with some parts being more well endowed than others.
- The earliest libraries are scholarly libraries or religious collections.
- Most of the modern libraries are dependant on Government resources.
- University and special libraries are more developed and privileged than public libraries.
- Libraries operate under decentralised management systems.
- There is often lack of cooperation, coordination among libraries, giving rise to duplication of materials as well as incompatibility of operating systems.
- Library development is spurred by economic growth, especially in cases of agricultural countries that need to industrialise quickly.
- Tendency to liberalise library use whereby closed access collections are subsequently open to public.
- Libraries become direct victims of wars or political upheavals in countries that suffered such tragedies.
- Library development is seen in connection with other aspects of national development social, cultural, economic, etc.
- Greater awareness of importance of libraries among governments in recent years.
- There is access to library education, with some more established than others.

Although as a whole, library development in Asia is impressive, enhancing the image and status of the library profession has been a matter of concern to most librarians over the last two decades. It has been discussed and written about in seminars and conferences in most parts of Asia since the 1970's.

And so it should be — because the process of professionalisation should be continuous. Professional literature on professionalism has shown that no profession can be completely professionalised it can only be more professionalised as the profession treads along the path of professionalism. The process of professionalisation can also be applied to various aspects

of the profession at different levels and pace so that at any one time certain aspects of the profession can be more professionalised than others.

The need to enhance the library profession has assumed greater urgency in the 1980's because of:

- greater competition posed by the proliferation of information services that are not library based.
- acceleration of IT use in library functions.
- increased professional awareness of issues related to librarianship because of greater networking among librarians.
- increase of library schools resulting in better educated librarians who opt for a career in librarianship by choice.

Altogether the 1980's saw some immediate reaction, manifested in the change in nomenclature. "Librarians" became "information professionals" or "information specialists", "library science" became "information science" and "Department of Library Science" became "Department of Library & Information Science" or "Department of Information Science". The only term that has not suffered a name change seems to be "library profession" as we witness today. Seen from a positive viewpoint however — these changes reflect the ability of the librarians to react to change and adapt to changes. But the enhancement of the library profession entails more than just a change in nomenclature. It entails having a deep understanding of what constitutes the library profession, what aspects of the profession should and can be enhanced and how they can be enhanced, bearing in mind that the goal of enhancement is increased professionalism. Professionalism in turn breeds excellence.

### **Defining the Library Profession**

What exactly is the library profession? Is librarianship a profession? Can we call the work we do — acquisitions, cataloguing/classification, indexing, abstracting, information retrieval (with or without technology), user education, reference — professional? Is library work "nothing more than the application of sets of skills and techniques" or just "a study of systems"?

It cannot be denied that the term "profession" is difficult to define. It has been given various definitions by various people at various times. It is an elusive term and various people have attempted to define it using their occupations as a basis, resulting in definitions that are coloured by occupational bias and vested interest. When Melvil Dewey stated that;

*"The time has at last come when a librarian may, without assumption, speak of his occupation as a profession".*

Little did he realise the struggle for professionalism that he had begun would continue today.

Contemporary understanding and usage of the term can be said to date from 1915 when Abraham Flexner suggested some criteria as the basis for determining whether or not social work could qualify as a profession. He suggested that a profession is:

- Intellectual and carried with it personal responsibility for the exercise of choice and judgement.
- Learned because its exercise was based on a substantial body of knowledge which could be passed on from generation to generation from practitioners to students.
- Practical in that its corpus of knowledge is put to a practical use of benefit to others.
- Organised into associations of practitioners.
- Characterised by an idealism which in theory, if not in practice, puts the aims and practice of the profession above mere money making.

Since then, Flexner was followed by several other exponents of the “traits” or “attributes” method of defining a profession, such as Carr Saunders & Wilson (1933), Morris L. Logan (1953), T. Parsons (1959), G. Millerson (1964), etc.

Together the attributes that they had put forward as worthy of a profession themselves could fill a thesis but the recurring attributes could be summarised as below:

1. Possessing a corpus of professional knowledge comprising theories and techniques/skills, preferably of a multidisciplinary nature.
2. Formal system of education and training, sufficiently long to enable the mastery of theories and techniques. This system should incorporate continuing education programmes and emphasise research and publication.
3. Possess a service principle that places the welfare of society above personal gains.
4. Be governed/regulated by a Code of Ethics, to ensure accountability in the performance of duty.
5. Maintain standards in all aspects of professional activity, such as work standards, educational standards, personal integrity, etc.
6. Be represented by a professional association.
7. Possessing legal and public recognition of professional status.



These attributes of course are not listed in order of priority and one is not more important than the other. A profession may have all or some of the attributes, depending on the level of professionalisation.

The 'attributes' above correspond to a large extent to the attributes of other professions, and in general have been accepted as a popular means of assessing the level of professionalisation that a profession has undergone.

In the same manner, these attributes will serve as a basis for the discussion of the topic — enhancement of the library profession. On the assumption that these are the attributes of the library profession, how could they be used to enhance the profession? In the language of management today, these attributes can be said to be the Critical Success Factors (CSF's) of professional development.

## **Enhancement of the Library Profession**

### ***Expanding and Developing the Corpus of Knowledge***

Every profession needs its own body of knowledge (theoretical foundation and specialised skills) to be exclusive, such that it sets it apart from other professions and establishes its identity as a profession. Medicine, Law, Engineering, Education, etc. have their own core of knowledge and mastery of their specialised core set them apart from each other and from the para professional group within their own category.

This core makes them so exclusive that, as an example, even if the doctor were to sit under the coconut tree with his stethoscope, he can still practise his profession. Can we say the same for the librarian? Can a fresh graduate without library qualifications undertake cataloguing and classification, indexing, abstracting after being trained for a week? I say yes! All he needs is intelligence, subject knowledge, general knowledge and the ability to look up AACR II and LCSH. Now with OCLC and Bibliofile CD ROM databases, why does one need the librarian? And if the fresh graduate can do what any librarian is trained to do, what then, is so special about librarianship?

The lack of the intellectual foundation has long been the weakness of the library profession. This has to be rectified if the library profession is to be enhanced. If we were to scrutinise the intellectual core of other professions, we will realise that they are generally multidisciplinary in nature and that they comprise theories and skills. In education for example, the theoretical basis is very broad encompassing psychology, sociology, management and administration, development, history, while at the same time pedagogy provides teachers with specific skills in teaching. What about librarianship? Would it not be sensible for us to broaden our

intellectual base to include Psychology (to study user behaviour, educational psychology, research psychology), Sociology (to understand the cultural/social environment/framework within which the library operates) Philosophy, Local History, Fine Arts, Communications, Languages, Law, Management, Computer Science/IT (including programming) while Research Methodology, PR, Indexing, Classification, Information Retrieval are examples of the professional/technical skills that could be taught.

The intellectual core in any profession does not merely provide facts but trains the person to reason, rationalise, solve problems — in other words, to think. Independent thinking is one dimension that, for now at least, the computer has not been able to substitute. Taking for example, the study of History, it is not the facts that are so important but the lessons learnt from the past. One learns to reason out the causes and events, understands how people think and behave at that particular moment in time and evaluate, with the wisdom of hindsight, whether or not certain events could have been avoided.

Expanding and developing the corpus of professional knowledge would place the library profession competitively with other professions. Mastery of it would provide librarians with identity, authority and autonomy — no one else could encroach into their domain. The lack of recognition that librarians in Asian countries suffer from is partly because they are constantly being compared with the more prestigious professions, such as medicine and law and engineering.

In most parts of Asia, the status of librarians suffer vis a vis doctors, lawyers, engineers. Even at universities, librarians have not been granted parity vis a vis the academic staff although India has been somewhat fortunate albeit not without a struggle. In Philippines, the status of librarians is safeguarded by legislation but these are only two out of the numerous others. In Japan, although libraries have had a long history, “librarianship has never been viewed as a professional in the European sense. Such is the case even now.”

Enhancing the profession through the expansion and development of the corpus of professional knowledge is tedious but if medicine can survive the years of development, why can't librarianship? The fastest way of developing the corpus would probably be through the educational system, particularly through research and publication.

### ***Upgrading Library Education and Training***

If librarianship is to be accepted at par with other professions, library education must be undertaken at tertiary level. Advocating librarianship as a university discipline, at least in Asia, is not for snob appeal. It is a

pragmatic and logical step to take because in most Asian countries, the salary scale is tagged to the qualifications obtained. Another reason why librarianship should be taught at universities is because research and publication activities are part of the lecturer's contractual obligations. Through research and publication the profession will be developed and enhanced. Yet another reason is the opportunities provided for continuing education at universities, such as postgraduate programmes (Masters, Ph.D.), seminars and conferences, study leave, etc.

University education could enhance the profession by controlling the entry qualification and providing the accreditation so crucial to maintaining standards within the profession. Library education in India, China, Japan and the ASEAN countries has developed tremendously over the last decade. Mainly conducted at universities, they undertake curricular reform to keep up with the latest developments. As example is China, where "traditional subjects [were] being deleted and new ones such as Information Theory, Library Automation and Cybernetics [are] being introduced".

If developing the corpus could enhance the profession, upgrading library education and training would provide librarians with the means to propel the profession to greater heights.

### ***Review the Service Principle***

The altruistic "no profit" service ideal that has governed library services for far too long is obsolete. It will be replaced by another the "cost effective" principle. For the idealists, it will be the end of a scholarly tradition for the pragmatists, it is not too soon. In countries where libraries are heavily dependent on the Government Treasury for every cent, it would seem logical to not only find alternative funding but to introduce fee based services as one alternative. While to the purists or idealists levying charges for library services is tantamount to blasphemy, most library managers must realise that the exorbitant cost of maintaining good collections and service for free cannot be justified.

### ***Enforcing the Code of Ethics***

Most professions are regulated by the Code of Ethics but unless enforced, the Code of Ethics will not achieve its objectives. Will the Code of Ethics enhance the library profession? If it succeeds in helping the profession to gain the respect and confidence of the public at large and its clients in particular, then the Code of Ethics will help to enhance the profession. But the difficulty with the library profession is that information work does not have the same "clout" as medicine or law. It is logical to assume that, using medicine and law as role models, accountability hinges on the protection of life and property. We do not protect life or property

and who bothers about wrong information? Especially if given free! However, in the event users are charged for services/information rendered, then library clients would presumably demand value for his money. Librarians would then have to be accountable.

### **Setting and Maintaining Standards**

Standards are crucial in the process of professionalisation because they represent quality and excellence. Like in other professions, standards for the library profession should not be static but should be upgraded as the profession becomes more professionalised. Standards are expressed in various ways. The mission statement of any institution itself is a standard. Standards can be set for work, behaviour, services, productivity, management, education, etc. Standards breed excellence, trust and respect and eventually earn librarians public recognition and confidence.

### **Professionalizing the Professional Association**

The role of the professional association in promoting the profession is well documented in the professional literature. It serves as the mouth piece of the profession, its representative and depending on its strength, provides leadership. However, whether or not the association can effectively undertake its role depends on several factors — level of professional awareness and support among its members, legal and public acknowledgement of its role, its political clout and most important — its ability to influence members of the profession as well as the public of its authority and ability to control matters of professional interest.

One way of assuming control and authority is to establish systems of control such as accreditation or qualifying board. In most countries in Asia however, the professional associations do not have the ability or capability to assume a leadership role and this renders the association incapable of enforcing the standards it may want to impose. Another weakness is the inability to command loyalty from its members because the institution employing librarians usually expect and do get their loyalty from their employees.

If the association is not in the position to command loyalty and assume leadership, can it be effective in the enhancement of the profession? In Asia, the strength of professional associations lies in its promotional role. They have been very successful in promoting continuing education (courses, seminars, talks, training) as well as producing publications. In some countries, despite the dynamism of the associations, they are not able to provide leadership.

The Malaysian Library Association is one such example. Dynamic though it is, registered as a society, under the purview of the Registrar

of Societies, it has to function as a society unlike the Malaysian Medical Association, the Malaysian Bar Council or the Malaysian Institute of Accountants.

### ***Attaining Legal and Social Recognition of Professional Status***

Attaining legal and social recognition of its professional status would definitely enhance the library profession. However, except for Philippines, thus far the only country in Asia that has achieved legislative status, it has remained elusive for the others.

While legal recognition is clear cut, social recognition depends on how society views the contribution of librarians and library work. In this aspect a lot would depend on how librarians project their role.

Currently, librarians call themselves “information professionals”. To get society to recognise this role, librarians will have to prove that they actually undertake information work. The onus is thus on the librarians to show what they are capable of. This is where librarians must use whatever tactics they have to project themselves, based on ability and quality. There is evidence of the librarians’ willingness to change and adapt to the challenges posed by developments. Many have adopted new concepts from other professions and applied them to librarianship. “Strategic Planning” is one, “Performance Measurement” is another. Both have currently become part and parcel of library management.

### ***The Library Profession in the Virtual Library Environment***

The electronic library is a reality in Asia and to what extent they can be networked to form the virtual library with the rest of the world depends on will and wealth. In many of the countries, the electronic library network is already in existence. Through Internet the whole of Asia will be networked.

Would global networking however enhance the library profession? To those who believe in the power of technology they believe the future of the library profession lies with technology. To those who believe computers are just means to an end (meeting user needs) they fear that the library profession would die a natural death when libraries are replaced by professionals who, via computers, can do the librarians’ work faster and more effectively. To the latter, technology is something that they fear. Ironically, doctors welcome laser surgery and computerised diagnosis/prognosis as new methods that would advance and refine their skills. But librarians view computerised indexing and cataloguing as new methods that would gradually replace their conventional skills and displace them. In a way they are correct if librarians believe that indexing and cataloguing are all that is librarianship.

In the final analysis, whether libraries are digitised or not, the image and status of the library profession depend on what librarians perceive the library profession to be. The future of the library profession rests with us librarians.

### **Library Information**

The University Library provides facilities and services to its faculty, students, staff, and other scholars and information users through a system of discipline- and research-based libraries.

Generally the University Library hold more than two million catalogued items consisting of books, periodicals, and large amount of electronic databases. In addition, they contain extensive collections of phonograph records, maps, and manuscripts. They receive a broad selection of periodicals, newspapers, and other serial titles, and sometimes they can also serve as the regional depository for that country's government publications.

Based on the survey of five-university library on the Internet, the following are some of the information items to be included in the university library Web site.

- Parent Organization
- Aims and Objectives
- Maps & Directions
- Rules and Regulations /Policies
- Membership Rules
- Organization and Administration
- Library Departments
- Working Hours
- Library Directory & floorplan
- Staff & Phone Directory
- User Orientation/ Directions
- Branch Library
- Library Statistics
- Library Budget.

### **Parent Organization**

A brief information on the parent organization and the role of the university library in achieving the objectives and goals of the parent organization.



**Aims and Objectives**

Each and every library is established to fulfil some aims and objectives of the parent organization. Without aims and objectives no library can exist.

The goals of the library are stated here. Generally the aims and objectives of the university libraries are

- To support Academic and Research Programmes
- Provide a single access point to a wide variety of on-site and networked resources in all formats.
- Facilitate access to library services for on-site and remote users.
- Provide on-line instruction to users about research processes and the effective identification and use of information resources.
- To utilize appropriate, up-to-date technology
- Take advantage of new developments as appropriate and fiscally possible.
- Support integration of capabilities with other information systems within the libraries and the University and with remote information systems.

**Maps & Directions**

Maps and Directions can give entire structure of the university Web site and it helps the user to reach the university safely. If the structure of a site is too complex then it guides the users to find out the particular information required by the users.

If the site is not too complex then too it is better to provide site map as it helps the users to a particular page of a Web site without going through the other pages which are required by them. It will also provide the geographical location of a library, or in other words, it informs about where a library is exactly located. It also helps the users to visit the library if they are interested.

**Rules and Regulation/ Policies**

General rules and regulations of the university library should be stated here. Policies may include decisions regarding acquisitions, collection development, resource sharing, electronic documents, etc.

**Membership Rules**

Who can be members of the library. In the context of Internet there can be a variety of members. The library can have members on the Internet with limited access to the information available.

### **Organization and Administration**

All university has its own organization and administration. A brief information should be given in the Web site. Organization and Administration includes Organization Chart and Committees and Workgroups.

### **Committees and Workgroups**

There are several committees and workgroups within the university infrastructure. It is very important to know all those as it will help in answering some queries and according to the need patron can meet to the respective committees and workgroups. All university web sites should describe all those to avoid further confusion to the users. The structure of all the committees and workgroups are described under the following headings. Committees and Workgroups includes.

### **University Library Committee**

It includes:

- *Self-perpetuating Committee:* The self-perpetuating committee is a creature of particular statute, which establishes the libraries themselves. Such a committee has got the sole authority and is independent as regards the control and management of library under it. It has not to report to any other higher body about its activities.
- *Ad hoc Committee:* An Ad hoc committee is a special committee for supervision and control of libraries. This committee is more or less independent and it has nothing to do with the Local Government Bodies. This committee is also called statutory authority committee. It has the advantage of being independent of politics. It takes decision expeditiously. It can co-opt men of intellect and foresight. This committee serves as the library authority.
- *Nominated/ Elected Committee:* A larger committee or an authority nominates or elects a smaller body for looking after certain bodies under it. It delegates certain functions to such a committee.
- *Recommending Committee:* This type of committee is found in England. It does not have any real power except that it simply gives certain proposals, which are subject to the approval of the library authority.
- *Reporting Committee:* This committee has sufficient powers to decide the matters within certain limits. Such decisions need no confirmation of the supreme authority but the decisions are reported to the latter for its information.



- *Executive Committee:* This committee is the most powerful of all the types except that of a self-perpetuating one since it has full powers in those matters which are delegated to it. It need not report its decisions to the library authority.

### **Administrative Council**

It includes Budget, Planning and Assessment.

### **Library Budget**

The import of the many definitions given in library literature bring to the fact that the budget apart from being a financial plan of the estimated revenues and expenditures for a given period of time, is forecast of the means of carrying the plan into effect, and is also an indicator of the amount of money assigned to a particular purpose.

### **Types of Budget**

- *On What Budget:* This is also called as the item Budget/ Line item Budget. In this budgetary statement, various statement, various items of expenditure-salaries, cost of documents, cost in relation to binding, photocopying service, maintenance, etc.-are listed successively. The extent of breakdown given in regard to each item of expenditure is different in different organizations and depends on the policy or procedure followed by the concerned organizations. This budget may be an annual recurring or capital budget.
- *Formula Budget:* Here the association of resources is based upon some known or assumed relationship between two or more variables which are pertinent to the services rendered. In this type of formula budgeting one can only determine the amount the library should get and how it should be spent.
- *Unit-Cost Budget:* It is also called as Performance Budget and is based presumably on what the unit does and what quantity of services it proposes or is required to perform. Here unit costs are calculated for each item of work or activity.
- *Lump-Sum Budget:* In this type of budget, the organization provides a certain amount arbitrarily. This apportioning is not based on any logic or rhythm or reason. It depends on the whim and fancy of the management concerned.
- *Programme Budget:* In this kind of budget, the proposed expenses are categorized by functions to be undertaken. It is a "To what purpose" budget and indicates to the management how the money allocated is expensed. A sophisticated version of budgeting is called as Planning-Programming-Budgeting System (PPBS) which aims

at analyzing the expenditure in relation to purpose by first defining objectives, then examining alternatives for achievement of objectives with corresponding costs before finally deciding the course of action to be taken. The purpose of PPBS, was to serve as a means of providing policy makers with an analytic evaluation of existing and proposed activities, whenever possible, with an quantitative measures of performance-that is, with costing of library operations. In other words, PPBS is a method of budgeting which aims at analyzing expenditure in relation to purpose and not by items of expenditures (salaries, documents etc.), and relates it to the results achieved. According to this method of budgeting, the components would be

- Objectives of the organization,
- Activities (and analysis of procedure) which relate to the objectives,
- Costs,
- Benefits and by-products,
- Analysis of alternatives.
- *Operating Budget:* The operating budget is a statement of estimated revenues and expenditures for a given period of time, say one year. This shows the annual recurring expenditure in relation to staff salaries, documents, and other expenditure, such as, binding, printing, etc.
- *Capital Budget:* The capital budgets are of the non-recurring type since items in this budget do not find a place, generally, in the annual budgets. They may be considered as part of long range plans of the organization. The items included under this are the costs in relation to buildings, furniture and equipment which are considered as assets.
- *Balance-Sheet Budget:* Balance-sheet budgets are those that give information pertaining to the amount still available for use for achieving particular goals on a stated date. In other words, it can be said that these budgets serve as aids in the management of the operating and capital budgets.
- *Zero-Base Budget:* Zero-Base Budgeting (ZBB) is a method of budgetary planning and presentation which includes objective setting, programme evaluation and operational decision-making involving managers and staff. It requires that the cost of all programmes, both current and new, be justified at the beginning of each budgetary cycle. In each fresh budgetary cycle, the previous sums appropriated are 'set to zero' and each proposal is justified afresh.

### **Components of ZBB**

- Identification and defining of decision units
- Assigning costs and benefits
- Preparation of decision packages for the decision unit
- Decision-making.

### **Library Assembly**

It includes:

- *Book Selection Committee:* The book selection work is a very responsible job. The success or failure of a library's programme depends upon it. A Book Selection Committee in university libraries generally consists of the Heads of various teaching departments, but in practice only two or three senior staff members of an academic institution constitute the Book Selection.

The selection procedure is as follows:

- Suggestions of the Heads of departments,
- Suggestions of the members of the library committee,
- Suggestions of the library staff,
- Suggestions from the readers.
- Book Sale Committee.

Under the auspices of and in close cooperation with the Friends of the Libraries, the Book Sale Committee will hold sales of donated books, recordings, and other library materials except periodicals to raise funds which will be divided between the Library Staff Association scholarship fund and the friends of the libraries endowment fund.

The activities of the Book Sale Committee is governed by guidelines approved by the Assembly after consultation with the Dean of the Libraries and the Director's Advisory Group. The guidelines must provide for the early choosing of dates for the sale that do not conflict with university-wide activities such as Honours Week or library professional organization meetings which numerous staff are expected to attend. Here minutes of the last three meetings should be given with the recommendations. The names and duration of the committee should be given properly with the contact addresses.

- *Election Committee:* The Election Committee will conduct elections as required under a certain Article and Section/s. They will design, distribute, collect, and count all ballots; retain the certified tabulation of the election results; and publish the names of the

newly elected representatives. The names and duration should be given with the contact addresses.

- *Public Relations Committee:* The functions of the committee will include the following: to highlight areas of interest and concern related to the public's awareness of the Libraries; to assess and encourage support for the Libraries among campus and Metroplex communities; to determine how and when to use such resources of the Libraries; and to secure appropriate administrative approval for all activities of the committee.
- *Publications Committee:* The Publications Committee will oversee all publications produced by the university libraries, in order to avoid conflicting information and to maintain a consistent quality of production. Individual publications will have their own editors, but the Publications Committee will act as the final editorial authority.
- *Scholarships and Awards Committee:* Each year, the Scholarships and Awards Committee will: determine how many libraries scholarships will be awarded to full-time staff and how many to part-time staff; determine the amount of each scholarship; and, at least one month before the deadline announce the opportunity to apply for the scholarships. The scholarship recipients will be chosen by the University Scholarship Committee. The Scholarships and Awards Committee will also arrange the selection of Outstanding Staff Awards recipients, as well as the Student Assistants of Distinction Awards.
- *Staff Development Committee:* The Staff Development Committee will develop training activities and programmes to help employees of the libraries perform their jobs better. These activities shall be consistent with library goals and staff needs and shall concern subject matter not covered in the technological training provided by LAN Management.
- *Review Committee:* This committee will review all the matters concerning the libraries. They are responsible to the Vice-chancellor of the university.
- *Circulation/ Reserves Work Group:* This committee will look after the circulation and reserve policy of the university library.
- *Collection Development Work Group:* This committee will look after the collection development policy of the university.
- *Digitization Work Group:* The functions of this group are:
- Collaborate,

- Share equipment and software,
- Prioritize projects,
- Coordinate and brainstorm future projects (archiving, core collections),
- Provide cost projections,
- Make in-house vs. outsourcing decisions,
- Maintain familiarity with all Libraries digitization projects,
- Pursue joint ventures with other departments and entities,
- Keep staff up-to-date on relevant web sites, projects at other universities, and their own projects,
- Investigate and take full advantage of funding sources,
- Determine equipment and software needs,
- Maintain an available equipment inventory.
- Electronic Information Resources Work Team.

It includes:

- *Cataloguing Implementation Work Group*: The objective of this work group is to choose the actual cataloguing code to be implemented in the library.
- *WebPAC Work Group*: The objective of this work group is to help the users by their public access catalogue.
- *Library Liaison*: This group deals with all sorts of library liaison activities.
- *Reference Services Work Team*: This work team deals with giving reference service to others.
- *Web Site Development Work Team*: Mission of the Web Site Development Work Team: To provide directed access to quality information and promote the services and resources of the University Libraries.

### **Library Department**

This section includes what are the information services and service units that cater to the users and the concerned contact persons. Library Departments are of following types:

**Archives Department:** The archives contain mainly manuscript collections. The archives also hold over one thousand oral history transcripts concerning various historical topics. It can be under University Records, Historical Manuscripts and Oral Histories.

**Circulation Department:** The circulation department checks out both circulating and reserve materials, places holds or locates on checked-out items, issues interlibrary cards, retrieves items from the Library Annex, collects fines, maintains checkout and patron records, and monitors the security, opening and closing of the building.

**Government Department:** The collection of Government publication is the sole objective of this department.

**Humanities and Social science Department:** The purpose of the Humanities and Social Sciences Department is to provide assistance with the information and research needs in the humanities, social sciences, business, and education.

**Interlibrary Loan and Document Delivery Department:** Interlibrary Loan supplements the University Libraries' materials by requesting items from other institutions.

**LAN/ PC Management Department:** The Libraries' LAN/PC Management Department is responsible for staff training, the management of the Libraries' network, personal computers, CD-ROMs, peripheral devices, and the Willis computer labs. It also coordinates activities with other campus computing entities.

**Media Library:** The Media Library serves the faculty, staff, and students by collecting, maintaining, and providing access to a variety of media materials.

**Periodicals Department:** This department deals with Periodicals section of the university, responsible for all sorts of house keeping operation for journals of the library.

**Reference Department:** This department deals with giving reference service.

**Special collection Department:** This department deals with special collection of the university in concern.

**Photocopy Service Department:** This department deals with photocopy service.

**Rare Book Department:** This department deals with managing rare book collection and helping in research activities to the researchers.

**Science and Technology Department:** Within each department mention should be made about the amount of collection, services, and hours of service etc.

**Working Hours:** The working hours of the library is mentioned here along with the holiday list. After visiting the Web site of a library if one

is interested in visiting the library then it helps them to decide when to visit the library. Generally in University Library the hours of service 80-100 hours/ week.

**Library Directory & Floorplan:** Here a complete directory of different branches of the library with their position (*i.e.* in which floor) should be given. If possible a complete map of each floor with the indication of each department can be given for better understanding.

**Staff & Phone Directory:** A complete list of Staff Directory can be presented in order of hierarchy. The items should include here are Name of the Staff, Designation, Phone No., Appointment time, e-mail address etc. Under each department the names of the staff should be organized alphabetically.

**User Orientation/ Directions:** This is absolutely necessary and it especially should be targeted to new users. If there is online registration of users, these pages can be automatically displayed. In addition, some of the pages can be targeted to prospective users and these will be highly useful in making a potential-user a user.

**Branch Library:** Here a small description about the existing branch libraries within the purview of university can be given. The other information include type and amount of collection, services offer, hours of service, rules and regulation if any etc.

**Library Statistics:** Library Statistics will cover the information like Collections, Staffs, Expenditure Materials, Salaries and other statistics.

### **Collections**

It provides the collection statistics of the university library and highlights its strength. It can give information like:

- Total collections (in volumes) in each type of library,
- Volumes added,
- Monographs purchased,
- Current serial titles,
- Government documents (total),
- Microforms (total),
- Computer files (total),
- CD-ROM (total),
- Manuscripts/Archives (total, in shelf-feet),
- Maps (total),
- Audio materials (total),



- Graphics, e.g. photographs (total),
- Films/ videos (total).
- Staffs.

It need not include the names of the staff. But inclusion may give a personal touch and the staff would be much more aware of users' impressions. However, the staff details may give an idea to the user regarding the size of the library and its various activities.

**Library Budget:** Provide the annual budget of the library along with the budgets of the recent past, preferably in graphical form. This may help users become aware of the dwindling budgets and may thus bring pressure on the authorities.

**Contact:** Contact persons and their addresses including e-mail addresses should be given. It will help in getting feedback from the user and sometimes it will help in knowing authenticity of the information.

**Search Facility:** If the user is looking for specific information that is not reflected in the content page of the Web site, an additional search facility will be of great help.

**Annual Report:** An annual report is the survey of the actual work done during the preceding year. An annual report is, perhaps, the best medium through which the Librarian can know the achievement and shortcomings of the library services alongwith the reasons thereof and thereby he can make requisite efforts to speed up the developmental activities. Annual report can attract the readers of the library. It can contain the information about the research in progress and the research undertaken. This particular information helps the researchers in avoiding the duplication of research. The annual report of a library should contain the information like:

- Clientele,
- Book Stock,
- Technical Service,
- Finance,
- Miscellaneous.

### **Library Services**

This section provides information about different types of services provided by the library to satisfy the needs of the users. Some of the services which most of the university libraries provide are:

- OPAC
- Circulation Service



- What's New
- Current Contents
- Books of Interest
- Reservation Service
- Documentation Service
- Interlibrary Loan Service
- Online Search Service
- Reference Service
- Referral Service
- Indexing and Abstracting Service
- Current Awareness Service (CAS)
- Selective Dissemination of Information (SDI)
- Bibliographic Service
- Webliographic Service
- Publications
- Supporting Service
- Instruction Service
- Bulletin Board Service
- Special Collection Service
- CD-ROM Service
- Online Book Suggestion
- Access to Internet and E-mail
- Links to other library sites/ OPACs
- Intranet Implementation.

**OPAC:** Online Public Access Catalogue (OPAC) is the most widely provided information service on library Web pages. It is hardly the case that a library has a Web page without OPAC. It helps users to browse/ search the catalogue remotely, even from homes. It also gives an idea to the user about the status of the document whether it is issued or available.

**Circulation Service:** The circulation function in libraries involves every use of library materials and the successful performance of the function is a measure of the effectiveness of all other duties to which librarians devote themselves. The best-equipped library located in the most modern plant and staffed with the most capable librarians would be a mausoleum of recorded knowledge if the circulation function were omitted.

The processes and services, which result in bringing users and library materials into productive relationship, are the circulation function in libraries. The circulation functions include hours and telephone number of the circulation desk, lists of eligible borrowers, Responsibilities of the borrowers, Loan periods, Charging Discharging procedures and Renewal procedures.

### **What's New?**

Similar to the "Recent additions" or "Monthly additions", to the library, this service helps the users become aware of the recent acquisitions. One advantage of this facility is that it can be updated easily. Images of cover pages of the books can be kept, without having physically removed them from books. In addition, reviews of the books collected from various magazines can be displayed in these pages.

**Current Contents:** Content pages of the recently received issues of the journals can be provided, either as an image or as a text, hyper-links can be provided to the abstracts of the articles.

**Books of Interest:** The university library can compile a Web page giving information about the recent release of books that users would be interested and might suggest them to be acquired by the library. Such information can be collected from the publishers' catalogue or from the known Web sites of the publishers. This greatly helps the library collection to be uptodate.

**Reservation Service:** In case a document has been loaned, then a user, who needs it, can get it reserved. So that when the document is returned then the user can be informed and he/she can get it issued. Online reservation facility should be there as many users need not come to the library to reserve a book, in that case online reservation facility helps them a lot.

**Documentation Service:** The art of collecting, classifying, organizing and dissemination of information is called documentation. It consists of documentation work and documentation service. Documentation work is the process of preparing documentation list. It is provided in anticipation of demand, whereas documentation services are provided on demand only.

**Inter-library Loan Service:** An inter-library loan is one made by another library to the University Library, so that a researcher in the university may have access to materials which the university does not own. Copies, rather than original materials, may sometimes be supplied.

**Online Search Service:** The ideal university library should provide customized searching of computerized databases. Through online vendor the library can access various types of databases, covering a variety of

subjects. The databases have access to journals, books, conference papers, reports, government documents and other sources. Most have a printed counterpart and the online files are usually updated more frequently. Some databases do not have a printed counterpart and online searching is their only access.

Computerized searching is faster and has the ability to search for more than one concept at a time. The service is designed to meet the information needs of the university's students, faculty and staff in that order of priority. Since the library utilizes the computerized literature searching to supplement its own collection, costs will vary according to agreements made, database searched and the status of the patron.

**Reference Service:** Reference Service is the hub of all the activities of a library. Reference service is 'a sympathetic and informed personal aid in interpreting library collection for study and research'. Samuel Rothstein gave the following distinguishing criteria of reference service. The provision by librarians of personal assistance to individual readers in pursuit of information. The recognition by the library that such assistance is an indispensable means of a definite responsibility to provide it. The existence of a specific administrative unit to furnish such assistance comprised of personnel specially equipped in the techniques of reference work.

According to Dr. Ranganathan, "Reference Service is the prepotent achievement of modern humanism in library science and it is a contact between the right reader and the right book at the right time and in the right personal way".

The objectives of Reference Services are:

- Providing of information using reference books in response to specific queries of the users.
- Giving instructions in the use of, and guidance in the choice of documents.
- Giving referral service for inquiries which the information centre/ system can not answer.

According to Dr. S. R. Ranganathan there are following four kinds of reference service.

These are:

- Initiation of the freshman.
- General help to the general reader
- Short-range Reference Service.
- Long-range Reference Service.

- *Initiation of the freshman:* When a new reader becomes a member of the library he is initiated into the technicalities of the library and large stock of the library. If he is left totally unnoticed, there is a danger that he may feel bewildered and may not be able to use the library resources. It is essential to create confidence in him so that he uses the library without doubt or fear. He should be properly guided as to the location of various kinds of books. He should be told the method of finding out the requisite reading material. Readers of this kind should be fully guided as to how to become a member of the library and to use its resources.
- *General help to the General Reader:* Readers of this kind are not new to the library but they still want some kind of help so that they may be able to get their requisite reading materials. They must be told as to how to use the catalogue and various sequences of the library. It means that such readers do not ask any particular question but they would like to know the methods of using the library resources in a better way.
- *Short-Range Reference Service:* Short-range Reference Service consists of providing readymade answers to particular questions. Time is the essence of his kind of service. No special effort is to be made to find out the requisite information.
- *Long-range Reference Service:* This kind of service is just the reverse of short-range reference service. To cull out information, lot of time has to be devoted and the sources from which information is got out are not ready reference books but lengthy reports and treatises, which need, prolonged search for finding out the adequate and proper information.

**Referrel Srvic:** Normally reference staff attempts to bring users in contact with documents likely to contain required information. Similarly reference staff can tell about the persons and institutions, which may be able to provide information to the users seeking information.

**Indexing and Abstracting Service:** Indexing and abstracting, which follow preliminary selection and acquisition of documents, involve the process of assigning descriptors to each document to identify the data or information. This would involve a comprehensive and highly condensed presentation of information. This results in indexing and abstracting services/ products that indicate to a user the type of data/ information contained as well as parameters of data points. Some of the products emanating from these services are, Abstracts of technical papers, Patent abstracts, Digest for management, Digest for technical division, Digest for operator, technical note etc.

**Current Awareness Service (CAS):** Current Awareness Services are devices meant for the speedy announcement of newly acquired information or documents. Timeliness is the essence of this service, and it is therefore also called as an alerting service. The main objective of this service is to keep the research, development and management personnel of the university and other interested persons to get the current development in their respective fields of interest as quickly as possible. Current Awareness Services are to be designed with the main emphasis on speed of announcement, ease of use, and minimum time required for compilation work.

Some of the Current Awareness Services that have been developed are: Current Titles, Research-in-progress bulletin, Selective Dissemination of Information (SDI), Newspaper clipping service, etc.

**Selective Dissemination of Information (SDI):** H.P.Luhn is a pioneer in this field. According to him, "SDI is that service within an organization which concerns itself with channeling of new items of information from various sources to those points within the organization where they can usefully serve someone's interest. It endeavours to prevent indiscriminate distribution of new information and avert the resulting danger of not communicating at all". The basic concept behind SDI consists of matching information/ documents with the profile (interest) of each individual of the clientele. The profile can be single user or a group working on the same project or some limited subject field. Those item matches are brought to the attention of the user. In an automated system this service can be performed effectively. The aim being that user should neither be provided too much information nor made to miss information essential towards his requirements. The steps involved here are:

- Users Profile,
- Documents Profile,
- Matching,
- Notification,
- Response or Feedback,
- Readjustment or rejuvenation of Profiles.

**Bibliographic Service:** A bibliography is an organized list of primary or other sources relating to a given subject or person. Traditionally, this is the one of the important services a library attempts to provide. Using a Web page, bibliographic details of documents can be presented through user-friendly search facility. This service can further be enhanced by combining it Document Delivery. "Uncover" (URL: <http://uncweb.carl.org>) is one such bibliographic service with document delivery facility. In a

digital environment, this can be highly customized to the extent of making it a SDI service. It should be noted that the present HTML is not suited to present bibliographic data, as there are no tags for the bibliographic descriptive elements. There are two solutions to this problem 1) Adding HTML tags to the output of the library database. This is normally done by CGI (Common gateway Interface) scripts 2) Alternatively, a library can use XML (Extended Markup Language) to define tags for bibliographic data elements, so that entries in the bibliographies can be presented in a kind of catalogue format. The compilation of a bibliography involves the following steps:

- Definition of the subject,
- Scope of the subject in terms of the coverage to be achieved by the bibliography,
- Items of information to be included for each document,
- Kinds of entries to be prepared,
- Arrangement of entries to be followed,
- Physical form on which the entries are to be prepared,
- Form of bibliography in which it is to be finally presented to the users.

Some of the libraries compile bibliography on a particular subject only on demand from the users. This section provides details of this service.

**Webliographic Service:** List of Web documents (list of URLs) available on a specific topic across the Internet can be compiled into a webliography. Here, hotlinks can be given to the documents on the Web, so that the user can click on the links and actually access the Web document. It should be noted that OCLC is doing some research work on cataloguing Internet sources in order to provide content designators to the bibliographic data elements of the Web documents (<http://www.purl.org.oclc/cataloging-internet>).

**Publications:** Publications of the library or of the parent institutions can be on the Web page. Many universities having printing press and publication division. If the library has an independent Web page along with that of the institute, a link may be provided to the publication's page. Alternatively, the library can maintain in its Web page information about the university publications.

**Supporting Services:** The supporting services include;

- *Translation Service.*

The non-English language portion of the world's scientific and technical literature required by scientists, engineers, and technologists probably



amounts to as much as 50 percent. At present, the most expedient way to make this body of foreign language material available to the scientists and engineers of the system is by the provision of a translation facility.

### **Scope of Technical Translation**

The technical translation activity would have the following objectives:

- Establishment of a Translation abstracting service,
- Provision of an adequate responsive and anticipatory translation service,
- Maintenance of a Translation Bank,
- Cover-to-cover translation of selected journals,
- In-service training for building up a cadre of highly skilled specialized translators,
- Establishment of cooperation and coordination with International Information Systems.
- *Reprography Service.*

The art and method of document reproduction broadly defined as “Reprographic Methods”, have come to stay as a basic necessity in every aspect of modern life, more so in the field of communication and dissemination of information. The advantage of reprography has found innumerable applications in information centres and their scope is practically unlimited. The advantages are:

- Procuring copies of out-of-print material or unpublished works such as laboratory notes;
- Securing the contents of valuable documents;
- Publication in limited editions;
- Saving storage space;
- Acquisition of copies of portions of books, periodicals, etc. without having to acquire the whole of the original etc.
- *Printing Service:* Apart from providing access to documents by the supply of copies, the reprography unit would also be bringing out the abstracting periodicals, current awareness services, cover-to-cover translations and other information publications. It may also be required to bring out the organizations Technical Journal, Conference Seminar and Symposia papers, Proceedings etc. Therefore, printing facilities are required to be set up. In a computer-oriented automated environment the lithography system can make use of computer printout directly.

**Instruction Service:** This service can also be called as User Education. This service aims to provide knowledge and skills necessary to find out his own way. The objectives of user education are:

- A general orientation to available facilities and resources
- The teaching of basic research skills and strategies and
- The teaching of the organization of the literature in various disciplines, as well as basic reference tools in each discipline.

Thus the achievement of the objectives will facilitates recognition on the part of users of their own information needs as formulation of those needs.

The user education constituted of the four interrelated components. These are:

- User awareness,
- Library orientation,
- Interest profiling,
- Bibliographic instruction.

Once users have been made aware of the library as a primary source of information, then they must be oriented of library facilities. Thus user awareness is the initial stage, preceding library orientation. Interest profiling should precede bibliographic instruction. Library orientation and bibliographic instruction form the basic components of user education. Library orientation precedes bibliographic instruction. Library orientation is supposed to lay groundwork for bibliographic instruction whereby the users can become effective users.

**Bulletin Board Service:** Very often, researchers and academicians need to discuss their individual findings and study with fellow academicians. The quickest and easiest way of doing this would be to have a type of Discussion Forum or Bulletin Board Service on the Internet, which would be a kind of bulletin board for members to “pin their notes” for others to see. Generally Bulletin Board Service is used to invite people’s interest in special resources and services: to house interests in selected books on a particular topic; to present short, graphic summaries of important national and local news; and to announce programmes and lectures. The bulletin boards should be installed in places where too many readers come.

**Special Collection Service:** The Special Collections Unit of the university library will have its mission to provide access to unique research collections. These collections of primary and secondary resources are acquired, organized, and preserved by the library and are made available to qualified researchers. All the book materials in the collection are



catalogued and accessible through the online catalogue. Access to the original records in the archives, collections of personal papers, business records, political papers, oral histories, and maps is provided by indexes and finding aids in the unit. Any qualified person doing scholarly research is permitted to use material housed in the Special Collections Unit.

**CD-ROM Service:** CD-ROM is a high capacity storage media, which is widely used in libraries due to its various advantages. Libraries store different reference books as they take lots of space on the shelf and also because of their heavy weights. Different abstracting and indexing journals are now available on CD-ROM, for example, LISA (Library and Information Science Abstract), ISA (Indian Science Abstract), etc. The libraries those have infrastructure to use CD-ROM provide this service to the users. It is a way of providing bibliographic services using CD-ROM. Another reason of libraries using CD-ROM is that some documents are available in CD-ROM. To give access to those books libraries provide CD-ROM service.

**Online Book Suggestion:** This is a good service usually offered by the university. One can suggest a book for the library to acquire via e-mail. For this the person in charge of this matter should have e-mail facility. The user should provide the following items of the documents to be acquired.

- The name and department of the user who is suggesting.
- The status of the user (*e.g.* undergraduate, graduate, faculty, staff) with e-mail address.
- For each item suggested, one should provide Author (required), Title (required), Publisher, Year of publication, Price, ISBN number.

**Access to Internet and E-mail:** This is a new and good service and those libraries provide it that has Internet access. It allows the users to access Internet and get the relevant information of their interest. It also allows communicating with others by providing access to E-mail.

Through e-mail renewal facility, the library can open reservation facility. If users are familiar with Internet then they can be allowed to access Internet. Otherwise library staffs help them to get what they want.

**Links to Other Library Sites/ OPACs:** It is not uncommon among the library Web pages to provide link to other nearby or important libraries. It becomes rather mandatory if the library is a participant of a library network.

**Intranet Implementation:** All the library services and the information about it need not be provided to the entire Intranet community. Some of the facilities and services can be made a prerogative to the faculty and the students of the parent institution. In such a case, Intranet on the campus

wide network (LAN), can be used to make such information available to the local users.

## **Library Online Resources**

### ***Library Online Catalogue***

Generally all university library having Online Public Access Catalogue (OPAC). Here information about the OPAC should be mentioned. Search facility through Subject, Title, Author, Author/ Title, Call Number, Subject Keywords, Title Keywords, ISBN/ ISSN Number etc. should also be there. Reserve facility by course name, by faculty member will add the advantages of the catalogue. Facility of getting indexing and abstracting service can help in researcher, so it will add the value of the online catalogue.

### ***Online Databases***

A database is a collection of related data stored in a central location or in multiple locations. Libraries provide access to their databases through their Web pages. The catalogue of a library informs the users about the books or journals, which contain the information of their requirement. To get the original information, one has to access the electronic journals or books. The online databases provide access to journals and books online. Some of databases are restricted to the users of a particular library and some of them are available for others also.

Some databases are password protected and some are free. It may need to pay the cost to access a database or it may be free also. Generally, the databases are arranged by subject. The databases can include references sources like Proquest Direct Research Library, OCLC, Encyclopedia Britannica Online, SilverPlatter Online, CARL Uncover, ERIC etc. All these reference sources contain thousands of different types of database and mostly these are free. It will be very useful to the ordinary users and also researchers.

### ***Reference Sources***

Reference Sources can help the research and developmental activity of an university. Some of the reference sources which can add the value are in Reference Sources.

### ***Proquest Direct Research Library***

***Proquest Direct Research Library:*** ProQuest gives instant access to one of the most extensive collections of published material in the world. One can search through thousands of journals, periodicals, and newspapers in Bell & Howell Information and Learning's vast archives. To bring that information to the desktop, ProQuest provides a unique mix of article

searching, information access, and information delivery. ProQuest helps professional researchers and students find what they need quickly, conveniently, and economically.

**OCLC:** OCLC is a nonprofit, membership, library computer service and research organization dedicated to the public purposes of furthering access to the world's information and reducing information costs. Researchers, students, faculty, scholars, professional librarians, and other information seekers use OCLC services to obtain bibliographic, abstract, and full-text information when and where they need it, in a form they want, at a cost they can afford.

OCLC helps libraries provide affordable electronic access to a rich range of information for users— abstracts, full text, indexes, and bibliography—whether the user is in a library, office, or home.

**Encyclopedia Britannica Online:** Here's opportunity is there for 30 consecutive days of free access to the 32-volume Encyclop)ia Britannica— plus thousands of newly added articles, graphics, and related Internet links. Through membership anytime one access this source.

**SilverPlatter Online:** SilverPlatter is the leading provider of electronic information to researchers and librarians worldwide. Their solutions allow librarians and knowledge workers in academic, medical, and corporate libraries to offer seamless desktop access to the highest quality research information.

### Research Databases

They publish over 250 premium electronic databases covering a broad range of disciplines.

**Internet Service:** The Internet Subscription Service provides hassle-free access to SilverPlatter databases via the Internet.

**Search and Retrieval Software:** SPIRS (SilverPlatter Information Retrieval System) is the most widely used cross-database search and retrieval software in the world.

**Networking Software:** ERL Technology provides efficient access to critical information from any location, across any network or Intranet, on all major platforms.

**Full-Text:** The SilverLinker Database integrates bibliographic references and the corresponding full text articles, wherever they exist.

### MEDLINE

MEDLINE (MEDlars onLINE) is the National Library of Medicine's (NLM) premier bibliographic database covering the fields of medicine,

nursing, dentistry, veterinary medicine, the health care system, and the preclinical sciences. The MEDLINE file contains bibliographic citations and author abstracts from approximately 3,900 current biomedical journals published in the United States and 70 foreign countries. The file contains approximately 9 million records dating back to 1966. Coverage is worldwide, but most records are from English-language sources or have English abstracts. Each MEDLINE record is identified with a unique identifying number called a MEDLINE UID (MUID in PubMed). Citations for MEDLINE are created by the National Library of Medicine, International MEDLARS partners, and cooperating professional organizations. MEDLINE records are incorporated into PubMed weekly, and are also assigned a PubMed unique identifier (PMID).

### **CARL Uncover**

UnCover is a database of current article information taken from well over 18,000 multidisciplinary journals. UnCover contains brief descriptive information for over 8,800,000 articles which have appeared since Fall 1988. UnCover offers the opportunity to order fax copies of the articles from this database. UnCover is easy to use, with keyword access to article titles and summaries.

UnCover Reveal is an automated alerting service that delivers the table of contents of your favourite periodicals directly to the e-mail box. The Reveal service also allows users to create search strategies for their favourite topics.

### **ERIC**

ERIC, the Educational Resources Information Centre, is a federally-funded project of the U.S. Department of Education, Office of Educational Research and Improvement. The ERIC database is an internationally-accessible collection of practically-and research-oriented documents for educational practitioners and researchers at all levels. In addition to all these there can be links to the electronic databases which can be arranged subjectwise. A union list of serials can be created to facilitate the users. A guide can be provided to the users about how to search the databases. In addition to this subject-oriented users' guides and the general guide about the sources of information can save the time of the users.

### **Course Assignment Guides**

The Course Assignment Guides page provides online guides to Library sources designed to assist students working on assignments for particular courses. These lists are prepared by Reference librarians in consultation with the faculty teaching the courses. They are displayed for the length of the semester, then removed.

### General Interests

This particular topic contains information of general likings. Recent topic, burning topic or topic of general interests can be put here. Some of the general topics are How to Evaluate Information on the Web;

*Writings Tips*

*Copyright*

*The year 2000 Problems*

*Internet Research areas.*

*In addition to all these any university can put some Internet Tutorials site also.*

How to evaluate information on the web:

The World Wide Web has tons of information, but not all web sites are equally valuable or reliable. A researcher must be able to evaluate information on the Web. Web sites must be critically evaluated. Some of these criteria are:

Evaluating Website is a Snap:

S = Source, Somebody created this site? Who?

N = Nature, Why does this site exist? Purpose?

A = Appearance/Accessibility, Does this site function efficiently?

P = Page Content, Is the information accurate and reliable?

Some other thing should be borne in mind, these are:

1. *Content Specialist:* Does the site cover the topic comprehensively? Accurately?

Can anybody understand what is being said? Is it written above or below your level of understanding?

What is unique about this site? Does it offer something others do not?

Are the links well-chosen? sufficient?

Currency: Can that website tell: the date the information was created? the publication date? the date the material was last revised? Are these dates meaningful in terms of the subject matter?

Would you get better information in a book? an encyclopedia?

Would you include this site in your bibliography?

2. *Authority/Credibility specialist:* Who is responsible for this site?

What are his/her credentials?

Have the authors of the site cited their own sources?

What is the domain name? Does it end in.com,.gov,.edu? Is that a meaningful clue in evaluating the site?

Would you include this site in your bibliography?

3. Bias/purpose specialist: Why was this site created? Is it a personal, commercial, government or organization site?

Is there any bias? Is only one side of the argument presented? Is there a hidden message? Is it trying to persuade you or change your opinion? Is the bias useful to you in some way?

Can you distinguish facts from opinion?

Would you include this site in your bibliography?

4. Usability/design specialist: Is the site easy to navigate (user-friendly)?

Is there a well-labelled contents area?

Do all the design elements (graphics, art, buttons, etc.) enhance the message of the site? Is there consistency in the basic formats of each page?

Are there any errors in spelling or grammar?

Do the pages appear clean, uncluttered?

Do the links on the site work?

Check whether the website included in the bibliography?

Use evaluation criteria based on the needs. So, in summary we can conclude that the evaluation criteria depends on:

### **Authority of the Source**

Who is the author?

Author's credentials, occupation, experience?

Balance, objectivity

Does the author represent an institution or organization?

Will author affiliation bias the information?

### **Currency**

Is the information up to date?

When was the page last updated?

Site Organization

Is the site easy to use?

Are formats and speed acceptable?

### **Purpose**

- Who is the intended audience?
- Is the purpose to inform or persuade?
- Are there advertisements on the page?
- Compare with other sources
- Are other sources better (periodicals, books, etc.)?
- Is there a cost for the service?

### **Writing Tips**

The following web sites can give the full description about this writing tips. These are:

**Rules of Writing:** This site is a concise guide to some of the most commonly violated rules of writing. It is intended for all writers as an aid in the learning and refining of writing skills.

**Common Errors in English:** This site addresses deviations from the standard use of English as judged by sophisticated users such as professional writers, editors, teachers, and literate executives and personnel officers.

**Elements of Style:** Online version of William Strunk Jr.'s 1918 edition of Elements of Style. Includes elementary rules of usage, principles of composition, elements of form, and commonly misused expressions.

**Online English Grammar:** This site is can give a alphabetical list of grammar problems, practice tests, and a grammar clinic to post individual problems.

### **Common Style Manuals**

APA Style.

### **Bibliography Styles Handbook**

This Handbook summarizes and illustrates the bibliographical formatting rules for three different citation styles: the American Psychological Association (APA) style, the new Modern Languages Association (MLA) style, and the old MLA style.

### **How to Cite Information from the World Wide Web**

This site giveHow to cite documents retrieved from the World Wide Web, APA style.

### **Psychology with Style**

APA hypertext guide to writing research reports for students and instructors of experimental and research methods courses. Summarizes



the Publication Manual of the American Psychological Association (4th edition).

### **MLA Style**

#### ***Bibliography of Writing Styles***

This Handbook summarizes and illustrates the bibliographical formatting rules for three different citation styles: the American Psychological Association (APA) style, the new Modern Languages Association (MLA) style, and the old MLA style.

#### ***The Columbia Guide to Online Style***

Provides examples of MLA-Style citations for FTP, WWW, telnet, and gopher sites as well as synchronous communications, e-mail, and newlists.

### **MLA Style**

Guidelines on MLA documentation style, authorized by the Modern Language Association of America.

### **Other Styles**

#### ***Chicago Style-Works Cited, or References***

Includes examples of citing books, articles, encyclopedia entries, dissertations, reprints, government documents, papers presented at conferences, performances, videocassette recordings, interviews, and secondary sources in Chicago style.

#### ***Documentation Guide-Turabian***

Basic introduction to citation style for the 6th edition of Kate Turabian's *A Manual for Writers of Term Papers, Theses, and Dissertations* (Chicago: University of Chicago Press, 1996).

#### ***General Guidelines for Citing Government Publications***

Hints for citing government publications; maintained by the Government Documents Department at the University of North Texas Libraries.

### **Copyright Basics**

This site answers the following questions: what is copyright; who owns the copyright; what can be copyrighted; how long can a work be copyrighted.

#### ***Use of Copyrighted Materials***

This site discusses how copyrighted materials may be used and the guidelines in place governing this use.



### **Fair Use**

This site describes the Fair Use statute that allows the use of a copyrighted work without permission and discusses the four factors to consider when applying fair use.

### **Distributed Learning**

Explores electronic reserves and what can and cannot be copyrighted in the distributed learning environment.

### **Web Copyright**

This site examines the issues of caching, linking, DOIs, and metatag infringement.

### **Resources**

Contains links to useful Web sites dealing with copyright.

The Year 2000 Problem: Internet Resources.

### **Overview**

**The Problem:** Until recently, the date in virtually all software programmes and hardware components has been represented by two digits instead of four, in order to save computer memory. In the year 2000, a computer or software programme that can't tell whether the date "00" is 1900 or 2000 might either crash or misinterpret the data. This potential failure has come to be known as the Year 2000 (or Y2K) problem.

This situation is compounded by the leap-year problem. By definition, every year divisible by four is a leap year, except for years divisible by one hundred, which are not leap years—except for years divisible by four hundred, which are leap years (an exception to the exception). A computer system that uses the same representation for 1900 and 2000 may not recognize that February 2000 has 29 days.

**Y2K Compliance:** Definitions of what it means to be Y2K-compliant vary depending on what industry, organization, or software vendor you consult. Most companies and government agencies, for obvious reasons, will be extraordinarily optimistic and reassuring in estimating their own level of compliance. First Chicago NBD (which recently merged with Banc One to form Bank One Corporation) has been working on the Y2K problem since 1995. Their Year 2000 site lists the following criteria for compliance:

**General Integrity:** No value for the current date will cause any interruption in operation.

**Date Integrity** Date-based functionality must behave consistently for dates prior to, during, and after year 2000. Explicit/Implicit Century. In

all interfaces and data storage, the century in any date must be specified either explicitly or by clear logic techniques such as windowing.

**Leap Year** The year 2000 must be recognized as a leap year, and systems must process the date February 29, 2000, properly.

Note that even if a company or agency's own equipment and software are compliant, that company or agency (and its clients) could still be adversely affected by the Y2K problem if its suppliers or the infrastructure (transportation system, communication system, etc.) are not compliant.

**Consequences of Non-Compliance:** Identifying and upgrading all systems and equipment that represent the date with two digits are enormous jobs.

Computer systems with the potential of crashing or malfunctioning are found in virtually every modern convenience that our current society depends on, including elevators, heating and air conditioning systems, ATM machines, credit cards, cash registers, automated medical equipment, cars, telephones, fax machines, copiers, cellular phones, security systems, vault doors, radar systems, traffic lights, power stations, water and sewage systems, telephone exchanges, and television cable systems. The Y2k problem is aggravated by the close interconnections among information systems in today's society. As mentioned earlier, failure in one system could have serious impact on others.

Since nothing like this has ever happened in the history of the world, nobody really knows exactly what the consequences of the Y2K problem will entail. Predictions range from a few mild and temporary inconveniences

to a total breakdown of civilization and the end of the world as we know it. The truth probably lies somewhere in between. We do know that the something must be done to avoid serious consequences, and the solution will undoubtedly prove to be enormously time-consuming and expensive.

The U.S. National Institute of Standards and Technology (NIST) estimates that about 167,000 lines of code per staff-year can be analyzed, modified, and tested. This means that large corporations can expect to spend between \$5 million and \$10 million on corrective action. The Gartner Group, the world's leading independent advisor to business professionals making information technology decisions, estimates that Fortune 500 companies will spend between \$10 million and \$40 million each. Worldwide, the figure is \$300-600 billion.

### **Achieving Compliance**

**Companies:** NIST recommends the following procedure for organizations and companies to achieve Y2K compliance:

- 1 Select a product to assist in managing the inventory of software and databases involved. Select one or more products to assist in analyzing the software and estimating the extent of the problem. Some of these products will also modify the software and data automatically, but cannot do so for every case.
- 2 Inventory applications, libraries, databases, extraneous files, documentation, and other items that have importance within specific systems. Identify who is responsible for each item.
- 3 *Analyze the Applications and Data:* Estimate modifying the source code alone to change those locations that perform date computations and logic operations based on dates. Perform a second estimation that includes modifying databases and all source code that references data fields and all source code affected in the first estimate.

If there is an insignificant difference between the two estimates, the recommended course of action is to modify both the databases and the source code. It may be less expensive in the short run to modify only the source code, but more expensive in the long run if maintenance problems crop up over time due to the date processing fixes.

- 4 Assemble a team of programmers, application experts, database designers, and project management based on the overall system requirements. Once estimates are known, the number of personnel required can be determined, particularly in view of the automated tools selected for use.
- 5 *Modify the System:* Three major options are: a) modify the source code to manipulate and perform computations on dates with century digits included; b) use a sliding window time frame to determine date context for computations; and c) incorporate packed date fields and use specialized subroutines for performing the computations. All three of these are expensive and may lead to further maintenance problems in the long run.
- 6 *Test the Modifications:* Allow 40-50 percent of the overall project resources for testing, even more if the database is modified. This includes testing documentation to ensure that directions are correct and correspond to the changes made.

### **Web-Based Services Expected from Libraries**

Academic scenario, over the years, has undergone a tremendous change assuming new dimensions influenced by the technology driven applications. Management education is no exception to this. Traditional commerce and management education methods are observed to be inadequate. Quality

service package delivery is a formidable task for all institutions of business education (Gupta, 2003). The long-term sustainable advantages in the business education require more attention to the issue of service, quality and cost in the national and international markets.

Libraries are mainly entrusted with a host of predetermined tasks like acquiring, organizing, preserving, retrieving and disseminating information to the users. Right from ancient times to the present Internet era, the primary objective of library has always been this. However, the way this purpose has been achieved has drastically changed. Information technology has influenced the very nature of business and management libraries.

They are undergoing significant changes today not only in outlook but also in function, services, methods and techniques for collection development, processing and dissemination of information (Singh & Krishna, 2004). The conventional set up of brick and mortar libraries that store information within a constrained physical space have given way to data centres that integrate data sources around the globe by way of networking. Libraries have not yet explored their full potential to the full (Miao, 2001). With the advancement in technology and its direct application to libraries, business and management libraries are becoming lean and agile libraries that streamline information supply. The pervasive nature of the Internet, coupled with platform independent database connectivity is turning library portals more and more effective.

The main purpose of this study is to study the availability of websites at management institutes and the extent of library information hosted on it. The study also aims to examine the reasons behind why websites have failed get the attention of majority of users and to identify the library services that they wish to carry through the internet.

### **Web Portals and Libraries**

A Web Portal can be defined as a website for a specific audience that aggregates an array of content and provides an array of services (Pienaar, 2003). They are the sites on the World Wide Web that typically provide personalized capabilities to their visitors. They are designed to use distributed applications, different numbers and types of middleware, and hardware to provide services from a number of different sources. Content linked in library portal is superior to the open access content available on the Web (Joint, 2005). Authentication software, commonly known as Web Access Management (WAM) are available that allow the library to govern the access to licensed electronic content (Myhill, 2004). Commonly referred to as simply a portal, it is a website that offers access to a broad array of resources and services of libraries such as e-journals, online

databases, Web OPAC, new additions and any other static information about library services.

The developments in information and communication technologies (ICT) and their subsequent absorption in library and information science (LIS) have forced information professionals to change the way they are functioning at present. Because of their popularity with the users, an overwhelming attention is being given to the web-based information services in libraries.

LIS community has realized that the academic world is increasingly becoming web-based. Those institutes who wish to attract prospective students and the faculty members must show significant improvements in the institute's infrastructure. Libraries with mere books and journals may no longer lend a credible support to the academic fraternity.

Having a tech savvy library and information centre with exhaustive information resources in all formats has become unavoidable. Libraries are procuring more and more electronic sources like electronic journals, electronic books, online databases along with locally digitized theses and dissertations. The efforts of libraries in providing users with an integrated way of checking the availability of a source in all possible formats have necessitated a properly designed web portal (Cox & Yeates, 2003).

Management libraries are also supposed to define and redefine their services and continuously keep their efforts on value addition to the services offered by them. Proliferation of electronic resources has posed several challenges like multiple logins, multiple interfaces and resource discovery. Web portal offers effective solutions to these challenges (Groenewegen & Huggard, 2003).

### **Need for the Study**

Information and communication technologies (ICT) have brought a lot of conveniences to the library users (Gupta, 1996). Information being accessible at their desktop, the productivity of the students and faculty members has increased. As libraries continues to be flooded by more and more electronic resources, future students will become more and more dependent on them (McGeary, 2005). Libraries in business and management institutes use propriety or in-house software packages for library management.

Even though there is a growing trend in libraries to move towards e-resources, some of the libraries still depend upon books and journals. Print sources continue to dominate the library environment in such cases. In this scenario, basic library services like online public access catalogue (OPAC), reservation, accessing current awareness bulletins, pay for the

library dues and document delivery needs to be done at the convenience of users. A literature search on the LISA database and scanning the journal articles, conference and seminar proceedings revealed lack of availability of such literature which studies the web-based services expected from libraries in the management institutes. Hence, this need for the study.

### **Objectives of the Study**

The objectives of the study are:

- to study the availability of institutes' websites and the extent of library information hosted on the websites;
- to study the regular use of the Internet by users and their frequency of visit to institutes' websites; and
- to identify the library transactions that users wish to carry out using the Internet.

### **Hypotheses**

The hypotheses of the study are:

- Institutes have failed in attracting the library users to their websites as they provide only static information about library and its services.
- The majority of the users in management institutes use the Internet on a regular basis.
- Most of transactions users do at the library should be carried out through the Internet at their convenience.

### **Scope and Limitations**

The scope of the study is limited to studying the web-based services expected from libraries in All India Council of Technical Education (AICTE) approved management institutes affiliated to the University of Mumbai. The limitation is that this article covers only the day to day library transactions like online catalogue, reservations, etc. Access to online resources is not studied as it is understood that they will have to be web-based only.

### **Methodology**

This article is based on part of a questionnaire survey conducted for the doctoral studies at Karnatak University, Dharwad. This survey covered the management institutes in Mumbai City, Maharashtra State, India to understand and measure the impact of information technology applications on library resources and services. In all 24 management institutes approved by All India Council of Technical Education (AICTE) and affiliated to the



University of Mumbai (Appendix I) were surveyed. Different questionnaires were administered to librarians and users (faculty members and students) to understand the usage pattern of the Internet and the web-based library services that are expected. The questionnaire was designed to be quick and easy to complete. Among others, the questionnaire specifically contained questions on:

- Availability of institute website
- Extent of library information on the website
- Regular use of the Internet by the users
- Frequency of visit to the institute website
- Web OPAC availability
- Library transactions wished to be carried out using the Web.

The questionnaire was piloted with few select management institutes and users and their comments were incorporated into the final version. For better results, questionnaire method was also followed by paying personal visits to the library so that the researchers can discuss with the librarian and users at the institutes. Out of 24 management institutes, 22 institutes responded to the survey by returning the questionnaire, thus resulting into a response rate of 91.66%. The collected data has been duly analyzed and presented below.

#### **Availability of Institutes' Websites**

Management institutes, new or old, pay particular attention to design and host their own website to showcase and create awareness about their profile. In this age, having a suitably designed website has become as important as their physical building itself. It is found that all the 22 institutes who have responded to this survey have their own website.

#### **Extent of Library Information on Institutes' Websites**

Table presents data about the extent of information available about library on the institutes' websites. It is observed that almost all management institutes 20(90.91%) have only general information about library on their websites.

##### **Extent of Library Information on Institutes' Websites**

<b>Extent of Information on Website/Portal</b>	<b>No. of Management Libraries</b>
General Information	22 (100.00)
Library Rules and Regulations	2 (9.09)
Library Staff Details	0 (0.00)
Current Awareness Service / Selective Dissemination of Information Bulletins	0 (0.00)
OPAC	0 (0.00)
Any Other	0 (0.00)



Faculty members and students were asked about their Internet usage. Table mentions that an overwhelming number of faculty members 52(86.67%) and 175(92.11%) students have indicated the use of the Internet on a regular basis.

#### *Regular Use of Internet*

<b>Regular use of Internet</b>	<b>Faculty Members</b>	<b>Students</b>	<b>Total</b>
Yes	52 (86.67)	175 (92.10)	227 (90.80)
No	6 (10.00)	14 (7.37)	20 (8.00)
Not sure	2 (3.33)	1 (0.53)	3 (1.20)
<b>Total</b>	<b>60 (100.00)</b>	<b>190 (100.00)</b>	<b>250 (100.00)</b>

It is also observed that 6(10.00%) faculty members and 14(7.37%) students indicated that they do not use the Internet regularly. A negligible 2(3.33%) faculty members and 1(0.53%) student are not sure about their Internet usage habit.

#### *Frequency of Visit to Institutes' Websites*

As an Institute Website/Portal is an access point for all resources and services, it is necessary to know the frequency of users' visit to the website. Table records the data about it.

#### *Frequency of Visit to Institute's Website*

<b>Frequency of Visit to Institute's website</b>	<b>Faculty Members</b>	<b>Students</b>	<b>Total</b>
Daily	7 (13.46)	19 (10.86)	26 (11.45)
Weekly	9 (17.30)	35 (20.00)	44(19.39)
Fortnightly	18 (34.62)	60 (34.28)	78 (34.36)
Monthly	18 (34.62)	61 (34.86)	79(34.80)
Not at all	00.00	00.00	00.00
<b>Total</b>	<b>52(100.00)</b>	<b>175 (100.00)</b>	<b>227(100.00)</b>

It is observed that about 7(13.46%) faculty members and 19(10.86%) students visit their institutes' websites daily. Nine (17.30%) faculty members and 35(20.00%) students prefer to visit weekly and about 18(34.62%) faculty members and 60(34.28%) students visit the website fortnightly. About 18 (34.62%) of faculty members and 61 (34.8%6) of students visit the website on a monthly basis.

The poor number of visits that the institute website receives is because not all institutes give any dynamic and useful information on the website. These websites contain some static information about history of the institute, faculty profile and some description about resource units like library and computer lab.

**Web OPAC Availability:** Online public access catalogue (OPAC), when made available on the Web is called Web OPAC. Information may

be available in any media; it is the catalogue that ensures maximum exposure and subsequent use of information sources.

Web OPAC's have provision of boolean operators. While searching library collection using OPAC, we can use operators like AND, OR, NOT and make our query more specific. Web OPAC's also provide facilities like personalized onscreen display, save options, etc. It is surprising to know that none of the management libraries surveyed has its catalogue available on the Web.

### **Library Transactions and the Internet**

Users were asked for an explanation as to what are the library transactions they wish to carry out at their convenience through the Internet. The observations are given in the table. About 40(66.67%) faculty members and 140(73.68%) students indicated that they wish to search books' database. Thirty five (58.33%) faculty members and 116(61.05%) students indicated they wish to know the availability of a particular document. About 47(78.33%) faculty members and 158(83.16%) students, highest number of users, wish to do a refined search of books, using all possible approaches. Over 33(55%) faculty members and 140(73.68%) students indicated that they wish to reserve a book while 38 (63.33%) faculty members and 123 (64.74%) students indicated that they wish to access current awareness bulletins.

#### **Library Transactions Wished to Be Carried Out Using the Internet**

<b>Category</b>	<b>Faculty Members</b>	<b>Students</b>
To search the books database	40 (66.67)	140 (73.68)
To know the availability of a particular document	35 (58.33)	116 (61.05)
To search books using all approaches	47 (78.33)	158 (83.16)
To reserve a book	33 (55.00)	140 (73.68)
To access Current Awareness Bulletins	38 (63.33)	123 (64.74)
To pay library dues	11 (18.33)	54 (28.42)
To pay for fee based library services, if any	11 (18.33)	63 (33.16)
To know more about services rendered by library	41 (68.33)	150 (78.95)

About 41(68.33%) faculty members and 150(78.95%) would access the website to know more about services rendered by library. Relatively low preferences were given to activities like to pay library dues; to pay for fee based library services, if any. A close scrutiny and comparison of responses reveals that faculty members and students agree with each other on what transactions they wish to carry out using the Internet.

### **Findings**

- All the management institutes have their own website. However, the institutes' websites make a cursory mention of the library as

a resource unit and provide only general information about library. Very insignificant number 2(9.09%) of libraries have provided library rules and regulations on the website. Important details like library staff details, Current Awareness Bulletins/Selective Dissemination of Information (CAS/SDI) bulletins and OPAC is not made available on any institute website. Observations confirm the first hypotheses that the institutes have failed in attracting the library users to their websites as they provide only static information about library and its services.

- The majority of faculty members 52 (86.67%) and students 175 (92.10%) use the Internet on a regular basis. Observations from table confirm the second hypotheses that the majority of the users in management institutes use the Internet on a regular basis.
- In spite of the majority of users being regular users of the Internet, most of them do not visit institute website regularly. Their visits are scattered and range from daily to monthly.
- It was observed that users wish to carry out library transactions like searching for a document with all possible approaches, reservation, access library bulletins, pay for library dues and to know more about library resources and services. Observations from table confirm the third hypotheses that most of transactions users do at the library should be carried out through the Internet at their convenience.

### **Suggestions**

The survey and the subsequent analysis of the data and the findings of the study have enabled the researchers to provide some practical suggestions about starting and improving the web-based services expected from management libraries.

The main suggestions for improvements are as follows:

- Websites should be developed into a more informative portal with detailed information like staff details with contact information, library bulletins like new additions, CAS and SDI bulletins, etc.
- Libraries should make the portal interactive by hosting the Web OPAC, announcements about new library resources and services, links to the websites of interest to the business and management studies.
- Library portal should provide a facility for users to access library databases and put a claim for document reservation.

- Every effort should be made on a consistent basis to update the library portal frequently. This will certainly entice users to library portal and then to the library resources and services.

Developments in information and communication technologies (ICT) have a profound impact on every sphere of academic activity. Library and information management is not an exception for this. Business and management libraries have so far not adapted the innovations of Internet and networking to the fullest extent.

Earlier, card catalogue was called as the “*Mirror to the Library*”. Now in this age of the Internet, it is the library portal that is being called as the “*Mirror of the Library*”. Library portal reflects the strengths and weaknesses of the libraries very effectively.

They are also the tool through which libraries are trying to reach out to the tech-savvy user. Libraries should make consistent efforts to provide web-based services to their users.

The survey has revealed that management libraries in Mumbai city are lagging behind in exploiting the full potential of the library portal. It is hoped that libraries at the management institutes will attend to this lacunae by developing a fully functional web portal as soon as possible.

### **Appropriate Library Behaviour**

#### ***Print the Appropriate Library Behaviour Policy***

By entering Carnegie Library of Pittsburgh you are making a commitment to act courteously toward all other persons here; act respectfully with regard to public property; and follow all rules of this facility. Enjoy the library and allow others the same opportunity.

PLEASE observe the following:

- Keep all valuables and personal property with you at all times. The library is not responsible for lost or stolen items.
- Supervise children at all times.
- Follow library computer policies.
- Use cell phones in designated locations, such as the lobby or outside.
- Engage in activities associated with the use of a public library.

Customers not reading, studying, using library materials or attending events may be required to leave the building.

In order to provide a safe and comfortable environment, the following are NOT PERMITTED in the library:

- Destruction or theft of library materials or property
- Use of alcohol or illegal drugs
- Disorderly, disruptive or boisterous conduct
- Threatening, harassing or intimidating language or behaviour
- Outside food; uncovered beverages
- Smoking and use of tobacco products
- Sleeping
- Weapons
- Bathing or shaving in public restrooms
- Solicitation of any type
- Pets or animals, other than authorized service animals.

Customers are expected to maintain an acceptable standard of personal hygiene. Creating a hazardous or physically offensive condition-including unpleasant body odours that may offend other library customers as well as infested clothing or personal effects-is unacceptable. Shirts and shoes must be worn at all times.

To provide an orderly and pleasant public environment, any staff of this building, including security staff, is authorized to determine whether a library customer is not abiding by these or other Carnegie Library of Pittsburgh rules and regulations.

The library reserves the right to respond to any and all conduct not expressly set forth herein but which is deemed by library staff to unreasonably interfere with the use of the library by other customers or interfere with the performance of their duties by library employees.

Any customer who violates these rules and regulations may temporarily or permanently be denied the privilege of access to all Carnegie Library of Pittsburgh facilities. A customer whose privileges have been denied may have the decision reviewed by the Library President or Deputy Director. Appropriate law enforcement authorities will be notified promptly of any unlawful activity.

The Children's Department strives to provide welcome environment for all of its users. For the safety and enjoyment of all who use the library, a responsible adult or caregiver must accompany children in the Children's Department.

While in the Library, parents and caregivers are responsible for the safety and behaviour for the safety and behaviour of the child.

## **Unattended Children**

An unattended child is a child of any age who is apparently unaccompanied by an adult. Parents, guardians, teachers and caregivers may not leave children alone or in the care of other children who are unable or unwilling to provide adequate care. Supervising adults must be close at hand.

As in all public places, “stranger danger” is a real concern. Library staff cannot prevent children from interacting with or leaving with persons who are not the appropriate chaperone.

Staff may refer to Allegheny County Children and Family Services for those children who are left unattended in the Library and whose basic needs for food, rest, parental supervision or attention are not being fulfilled.

If the Library is closing, at regular time or in an emergency situation, and a parent or guardian of a child cannot be located in the building, the City of Pittsburgh Police Department will be called.

The Library is not responsible for any consequences of parents forfeiting their responsibilities.

## **Emergency Closing**

It is the policy of the Carnegie Library of Pittsburgh to recognize that on occasion, inclement weather or other conditions may prevent the library from opening or may cause it to close early. The Library will close for weather related emergency conditions whenever the City of Pittsburgh closes during the weekdays.

Because of terrain, there are occasions when one or more of the branches libraries must close because of an emergency situation or the direct impact of weather conditions on neighbourhood(s) where the branch is located.

Closing the Carnegie Library of Pittsburgh during regular business hours is highly unlikely, but in the event of severe weather conditions call the Library’s mini-message board at 412-622-3116 and/or listen to radio station KDKA for announcements regarding closing. Media notification is made each day the facilities are to be closed.

## **Meeting Room**

As part of its service to the community, the Carnegie Library of Pittsburgh provides meeting room space in some facilities for use by cultural groups and neighbourhood and civic organizations. Meeting room

space is made available by the library “on an equitable basis, regardless of the beliefs or affiliations of individuals or groups requesting their use.” (Article 6, Library Bill of Rights).

Meetings must be for purposes consistent with the objectives and goals of the Library. These include meeting community information needs, individual enrichment, and the support of the educational, cultural, civic and recreational activities of the community. Use of library space may be subject to the approval of the Deputy Director.

Meeting room facilities are available in many of the agencies of the Carnegie Library of Pittsburgh. Groups are invited to request use of meeting facilities by contacting the agency head. Since facilities and furnishings vary from agency to agency, group representatives may arrange a visit to a facility to view the space before booking a meeting.

Agency managers can provide meeting room applications and offer further details regarding eligibility, fees, reservations, equipment and other concerns.





## Manual of Library Networking

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Since Library Networking is meant to promote and facilitate sharing of resources available within a group of participating libraries, several factors are to be considered for planning such on a network. The following are very important:

- (i) Member libraries must justify need for a network. The development of a viable network demands planning not only among the network members but also between the members and users themselves.
- (ii) Member libraries must agree upon a network policy is to be implemented. The policy must clearly state:
  - (a) *Objectives of the Network*-e.g the main objective may be to share the resources among the member libraries. It may be achieved in several ways, for example,
    - Users of the member libraries may be allowed only to refer the documents in any of the other participating libraries.
    - Limited number of periodicals/book may directly be issued to users of all the member libraries.
    - Providing photocopies of the articles/monographs
    - Cooperative collection development programmes
  - (b) *Network Structure*: Member libraries should adopt that structure of a network, which will fulfil the purpose for which libraries use it. The lack of arrangement in developing a network structure undermines both the approach of functions and planning.
- (iii) Member libraries must identify the funding agencies and mobilize the resources in advance. The financial resources must freely flow while implementing the system. If necessary, network fee may be

collected from each of the member libraries. The examples of library networks in the western countries suggest that all networks based on a fee structure can be maintained without grant and are viable in the long run.

- (iv) For resource sharing among member libraries, it is necessary to create bibliographic tools like union catalogues and union lists based on the resources available in the participating libraries.

Depending on the objectives or type of network model, databases of library collections should be developed. If the network is of star type, a centralized database consisting of all the records in all member libraries is necessary. If the network is of any other type, database for each of the library collections has to be developed separately.

- (v) For the purpose of creating databases, it is essential to agree upon a standard. All libraries should follow a standard MARC format, AACR-II, a standard thesaurus like Library of Congress Subject Headings (LCSH) etc. uniformly.
- (vi) Although efforts should be made to have one classification scheme in all participating libraries but use of different numbers should not become a hurdle as search requests are mostly by authors, titles, editors and subject descriptions.
- (vii) Member libraries must agree upon indexing system to be followed. In a centralized database system (a star network), it is preferable to adopt a single systems of indexing, *i.e.* POPSI, chain indexing or any other system. However, in a decentralized or in a hierarchical system, each library may have a freedom to adopt an indexing system of their choice. In such cases, the software must be developed to switch from one database to another database and then one indexing file to another indexing file while searching.
- (viii) For the success of network in a long run, each of the member libraries must have a policy to automate every function of the library – acquisition, cataloguing, classification, serials control, circulation, SDI, current awareness services etc. – in the shortest possible time. This helps the library to have computer culture which is required to design, develop, maintain and to operate several databases, to reduce the cost of library operations as well as network operations.
- (ix) The major problem in each of the member libraries when attempts are made to prepare the machine-readable records for the existing catalogue. Prior to creating such records, one has to identify

frequently used and infrequently used documents. Then prepare the machine-readable catalogue appropriately for the frequently used documents or alternatively use the existing machine-readable databases by down-loading from CD-ROMs or from other databases and reformatting them, one can select the appropriate records for their respective database.

- (x) The network should be able to recommend to participating libraries the type of hardware and software they need for their in-house functions and for networking purposes. Hardware should be selected considering the number of entries the participating libraries can generate within the next 3-5 years. The hardware at the Central Host speed with which participating libraries generate records and the network pools them into the Central Host.

The network software may or may not support the in-house operations of the libraries in the beginning but eventually the network software should not only be able to create union catalogues or full text databases, etc. but also get integrated with the in-house operations.

- (xi) If there is no adequate trained manpower in each of the member libraries, attempts should be made to train or/and recruit library personnel.
- (xii) In addition to the databases, hardware, software and trained manpower, it is preferable to have certain communication facilities such as Fax, Telex, Telephone, etc. as a part of the network system in each of the member libraries for the effective working of the network. E-mail and INTERNET facilities should be available with the libraries and they should be able to access international databases, preferably individually or through the network host to begin with.
- (xiii) Inter-libraries loan services should grow and may be interlinked with the search of the union catalogues. Delivery of documents should be fast, either electronically through fax or through courier or Mail. Rationalization of acquisitions needs to be undertaken.
- (xiv) The member libraries should be willing partners, ready to buy hardware, etc. and should be willing to send professional staff for training. They should be willing to pool bibliographic records to the Central Host of the network besides adhering to other network obligations.
- (xv) A performance criterion should be developed and agreed upon to evaluate the working of the network.

## Hardware and Software Requirements

### Hardware Requirements

Each of the member libraries must have at least some of the following hardware. However, the main library (Central Host) may require most of the hardware mentioned below, but with additional disk space. Hardware specifications are given below:

#### I. Server:

- Pentium @233 MHz with 64 MB RAM
- 1.2 GB HDD
- 32 x CDROM Drive
- 1.44" Floppy Drive
- Colour Monitor (SVGA)
- Windows-NT Operating System
- MS-SQL Server 6.5

#### II. Client:

- Pentium @233 MHz with 32 MB RAM
- 1.2 GB HDD
- 1.44" Floppy Drive
- Colour Monitor (SVGA)
- Windows-98 Operating System.

#### III. Other Hardware;

- Fax (with dedicated phone line)
- Modem (with dedicated phone line)
- Telex
- CD-ROM drive
- At least two determine printers
- One letter quality printer (preferably laser printer)
- Cartridge type drive.

### Software Requirements

Each of the participating libraries must have the following:

- Software for effective network operation as well as the library automation
- DOS (latest version) and/or
- UNIX (latest version, to begin with, it may be optional)

- LAN (Novel/Ethernet, to begin with, it may be optional)
- Software for E-mail (at least PROCOMM)
- Word processors
- DBMS packages
- IR packages CDS/ISIS
- Library automation: Libsys/Granthalaya/any other similar packages
- Programming languages: C/C++

### **Software Evaluation**

Software evaluation is quite often a difficult task. We have to consider the following procedure, criteria and features to evaluate software packages.

**Procedures for Evaluation:** The following procedures may be considered to evaluate software packages:

- Select a software after carefully examining the existing literature
- Examine carefully its literature and documentation
- Compare it with various other packages, keeping in view the following points;
  - Is it easy to understand?
  - Is a separate training required?
  - Is it menu driven?
  - Can it handle records of variable sizes?
  - Is it easy to edit a record?
  - Is it difficult to update the files (inserting or deleting records?)?
  - How much memory and hard disk space are required?
    - On-site evaluation
    - Post installation service (if the software is corrupted for various reasons, will the vendor replace it?)

**Criteria for Evaluation:** Some of the criteria for evaluation of software are::

- Ease of operation
- Quality of documentation
- Hardware limitations
- Speed of operation
- Security in multi-user environment
- De-bugging facility and proper error messages while executing
- Support from vendor.

**Features of Software:** Some of the important features of software are:

- User friendly
- Provision to on-line interaction, especially while editing inputting, retrieving and in data management.
- Provision to obtain outputs in various formats
- Compatibility and portability.

**Factors to be considered:** Finally, one has to consider several factors while acquiring a computer. These are:

- Memory and Storage Capabilities;
  - memory size
  - auxiliary storage devices like tape, disk, cassette, etc.
- Availability of input output devices;
  - availability of terminal
  - speed and capabilities of input and output devices such as the ability to process lower case letters and special symbols.
- Facilities to extend the memory and input-output devices
- Maintenance facilities provided by the manufacturer
- Compatibility with;
  - other machines especially with locally available machines
  - with main frame computers, which may be available in the parent organization
- Availability, capabilities and portability of software;
  - availability of computer for popular languages
  - capabilities of operating system
  - availability of special purpose software are.

Therefore, we should take into account various specifications regarding establishment of a Library Network. The objectives, functions, requirements for hardware and software and structure of the network should be pre-defined before the establishment of a library network.

## **Library Networks: Indian Scenario**

### **Networking in Indian Context**

Libraries are storehouses of information and knowledge. In this modern world, access to information holds the key to development. The rapid and exponential growth of information has made it necessary for librarians and

information scientists to employ new techniques to cope with the massive proliferation of literature in all subjects fields. Research in the science and social sciences has led to high productivity in document publications. To bring this vast amount of information under bibliographic control and to render it useful and accessible to potential users is a task of great magnitude which the information people face. So through the application of communication techniques and electronic data processing, library and information centres have now begun to realize the need of computers and associated facilities as indispensable for steady and accurate storage, processing, retrieval and dissemination of information and above all sharing resources among libraries.

For libraries to use their resources more efficiently and effectively for the users is a great task. This task can be solved to a great extent by resource sharing and cooperative functioning among libraries. And for this, networking of libraries, applying latest modern techniques is a must.

In India, networking of libraries is even more necessary than in the developed nations. The important factors that may be considered for networking of resources (Libraries holding resources) in India are:

1. It is not possible for all the organizations and agencies to design a system to cater to its resource needs because their main aim is to provide resources rather than designing the system for providing resources. So they have to purchase an appropriate latest system to cater to their needs. Generally, it is very difficult or rather impossible to find a system which could entirely satisfy its needs. In India, manually such technologies are purchased from abroad and afterwards people face a number of maintenance problems. So while opting for networking, annual hardware maintenance, some initial training is required.
2. The cumulative collection of scientific serials held by many important libraries in India is quite poor when compared to USA, UK and other developed countries while in India, some libraries have a very good collection, the majority of libraries suffer from very inadequate collection. There is a great need to consider the entire resources of the country as a single entity that can be available to the entire user community of the country. Networking the libraries is the best way to make resource sharing very effective in order to ensure equitable availability of required information.
3. Literature being generated as a result of research activities being carried out is doubling every five years. Over 10 million journal articles are published every year besides news items, editorials and articles appearing in popular print media. It is not possible for all



the libraries and information centres to acquire all the bibliographic material at one place due to storage problem as well as paucity of funds. Even to maintain a reasonable level of acquisition of journals, books and reports, calls for heavy budgets in libraries. Therefore, networking with other institutions, libraries, information centres, etc. is easy and economical way to get what a particular centre does not have in its capacity.

4. Budget to the libraries/information centres/institutions and restriction on staffing has also forced institutes to opt for networking in the country and this is on the increasing trend. As for example, it is not possible to give a laser printer to each individual in many of the organizations, so best way to provide printing facilities to each of them is put the printer in the network and let all the computers users share it by way of networking operating system. Similar methods can be adopted to share other hardware resources like Modem, CD-ROM drive, etc.
5. India is a vast country with caste, cultural and linguistic diversities. Planning for their development is done at the centre only. Planning for such a big country by sitting in the capital requires an extremely fast flow of information from all parts of the country to the centre. This can be done effectively by networking all the information centres in the states with the centre. Poor infrastructure is a hindrance in this flow of information. With the introduction of better telecom facilities like optical fibers, satellite communication, powerful computer, this is likely to increase but still many parts of the country do not have these facilities.

Because of the above mentioned reasons, resource sharing and cooperative functioning through networking have become inescapable for libraries and information centres in this country.

## **National Efforts and Status of Networks**

### ***National Efforts***

There have been many attempts in the country in the last two decades in computer application to library and information activities. During last so many years, libraries and information centres have become more earnest to computerize their operations and services. While NISSAT (National Information System for Science & Technology) has been promoting an integrated approach in library automation in the country, the efforts have been by and large, at the institutional level. Some of the major organizations engaged in computerized information handling are:

- BARC-Bhabha Atomic Research Centre, Mumbai
- DESIDOC-Defence Scientific Information and Documentation Centre, Delhi
- DRTC-Documentation Research and Training Centre, Bangalore
- IISc-Indian Institute of Science, Bangalore
- IIT-Indian Institute of Technology (Delhi, Chennai, Kanpur)
- INSDOC-Indian National Scientific Documentation Centre, New Delhi
- NIC-National Informatics Centre, New Delhi
- NISSAT-National Information System for Science and Technology, New Delhi
- PRL-Physical Research Laboratory, Ahmedabad
- TIFR-Tata Institute of Fundamental Research, Mumbai.

Besides the above, University Grants Commission (UGC), Department of Electronics, Department of Telecommunication, Planning Commission and other various Departments of Government of India have also been engaged in establishing various networks. There are possibilities of mounting bibliographical databases on these networks for providing online access to access.

<b>1958</b>	: 1958 Scientific Policy Resolution. It was adopted at the instance of Pt. Jawaharlal Nehru. It emphasized the fostering of scientific temper in people. In pursuance of this agenda, several committees and commissions were appointed to look into specific issues and come up with necessary recommendations.
<b>1959</b>	: Sinha Committee Report
<b>1965</b>	: Ranganathan Report to University Grants Commission (UGC)
<b>1972</b>	: V A Kamath Report
<b>1977</b>	: Establishment of NICNET by NIC (1975)
<b>1983</b>	: Technology Policy Statement. It emphasized the need for a technology information base.
<b>1984</b>	: Working group of the Planning Commission headed by Dr N Seshagiri recommended to the govt. the need for modernization of library services and information during Seventh Five Year Plan (1985-90)
<b>1986</b>	: NISSAT initiated the establishment of CALIBNET, Calcutta
<b>1988</b>	: The National Policy in Library and Information System submitted in 1988. It recommended using of information technology on a national level.
<b>1988</b>	: The UGC established INFLIBNET
<b>1992</b>	: NISSAT supported the establishment of DELNET, DELHI
<b>1993</b>	: NISSAT supported the establishment of ADINET, Ahmedabad.
<b>1993</b>	: INSDOC supported the formation of MALIBNET, Chennai.
<b>1994</b>	: NISSAT supported the establishment of MYLIBNET, Mysore
<b>1995</b>	: NISSAT supported the establishment of BALNET, Bangalore

### **Planning Commission Efforts**

The Planning Commission, Government of India, has been taking considerable interest in library resource sharing and library networks. Its efforts in these areas have increased since the Seventh Five Year Plan covering 1985-90. The Commission appointed a working group on modernization of Library Services and Informatics in November, 1983. In July 1984, the working group submitted its report. It recommended among others, interlinking of library systems through library networks. This report was to be considered for the Seventh Plan.

The Commission appointed another Working Group which submitted its report in May, 1989. It again recommended among others interlinking of library systems in the country.

The Planning Commission appointed in Feb, 1995, a Core Task Group to prepare an approach paper for enhancing inputs of Science and Technology for library resource sharing.

The Commission again constituted a working group on Libraries and Informatics under the Department of Culture, Ministry of Human Resource Development, Govt. of India, which report was to be considered for the Ninth Plan for the period 1997-2002. The report of the Working Group of the Commission includes many important recommendations for the networking and modernization of libraries in the country.

All these initiatives by NISSAT, UGC, Planning Commission and other departments of Govt. of India have led to increased efforts to the establishment of library networks and library automation in the country.

### **Networks in India**

Current computer Networks in India can be divided into three categories:

#### *I. Networks connecting Educational and Research Institutions all over the country*

- a. *ERNET – Education and Research Network:* It was launched by the Department of Education (DOE), Govt. of India in late 1986 with financial assistance from UNDP (United Nations Development Programme) to provide academic and research institutions with electronic mail facilities. It is currently used by DSIR Labs, research centres and academic institutions.
- b. *SIRNET – Scientific and Industrial Research Network:* It was established by INSDOC in late 1989 to interconnect all the CSIR laboratories and other R&D institutions in India. Its main

objective is to harness the vast S&T information resources available with national laboratories and inculcate the habit of resource sharing among themselves. Its ultimate aim is to link the entire scientific community of the nation with the national library system and the international links to achieve efficient scientific communication.

- c. *OPNET – Open Education Network*: Open University Network – Many institutions are venturing into the field of education and are offering professional and technological courses by using communication technologies. They are using television, computer communication, email and network to reach the students. Indira Gandhi National Open University (IGNOU), which is an apex body for open and distance education, is engaged in the task of developing a network of open universities in India called OPNET. This is a network of physical, intellectual and academic resource organized under the aegis of the Distance Education Council (DEC), an independent arm of IGNOU and distance education in India. All the open universities are partners of OPNET. The resources that are pooled together include academic programmes, norms and sharing programmes, delivery mechanisms and interactive software for student services. The OPNET will be an umbrella network with the subnet of every partner university for delivery of their own courses.

## II. *Networks connecting the libraries in the country*

- (a) INFLIBNET – established by UGC in 1988, operations began in 1991. It is a network of university and college libraries. It has also provided financial assistance to a large number of university libraries in India.
- (b) CALIBNET – established by NISSAT in 1986. NISSAT decided to establish a network of scientific libraries in Calcutta. At a meeting in 1986 in Calcutta, DSIR initiated action for preparation of a feasibility study for networking about 40 libraries in Calcutta. CALIBNET was the first library network visualized. At present, it has now become the centre for CD-ROM databases which are acquired from outside sources. Libraries can access these CDs. The basic purpose of the library network is to share the resources available in participating libraries. However, no resource sharing is done as there are no union catalogues prepared. This activity, is however, in progress.
- (c) DELNET: established in 1988 by India International Centre with the initial financial support of NISSAT and later officially

registered as a society in June 1992. Its main objective is to promote sharing of resources among the libraries located in Delhi and outside Delhi. It is the first operational library network in India.

- (d) MALIBNET – The need for interconnecting libraries and information centres in Chennai was visualized by INSDOC in 1991. INSDOC undertook a feasibility study which was completed in March 1992. MALIBNET was registered as a society in Chennai in Feb. 1993.
- (e) PUNENET in Pune in 1992  
ADINET in Ahmedabad in 1993  
BONET in Mumbai in 1994  
MYLIBNET in Mysore in 1994  
BALNET in Bangalore in 1995.

All these networks are supported by NISSAT. They have not, as yet, created their value added databases such as union catalogues, though work is in progress. They are, at present, mostly offering Email and CD-ROM facilities

### III. Others;

- (a) *NICNET*: It was established by National Informatics Centre (NIC) in 1977 and started in the late 87's. It was launched basically for getting and providing information from/to district levels to facilitate planning process. It links for regional nodes at Delhi, Pune, Bhubneswar and Hyderabad and has established 32 nodes at state and union territory levels and 439 nodes at district headquarters. By 1991, NICNET has achieved success in the creation of databases and networking. It also provides E-mail and other facilities to users using its already existing infrastructure.
- (b) *INDONET*: India's first data communication and computer network was started in March 1986 by CMC Ltd. It was launched as a solution to the growing need for providing timely well processed data to various institutions. In the First phase, they have mainly networked Mumbai, Calcutta and Chennai. Later, Delhi and Hyderabad were also linked as additional stations. INDONET presently has an international gateway which provides access to world wide packet switched networks like USA's Global Networks Systems (GNS) and Internet.

### **Present Scenario of Library Networking in India**

The present status of library networking in India is that most of the libraries covered by some network are creating databases of their holdings and in automating the library activities. Generally, the periodical holdings are attempted first in building up the databases as it takes less time than for the other types of library documents.

This is followed by the databases of holdings of books, reports, dissertations, standards, etc. The Library Network Centres, *i.e.*, the coordinating agencies of the networks also are concentrating on acquiring them to provide the user with access to the total records.

They provide such access either by email or online through the telephone network. In addition, these centres also try to provide a common software for database development and automation of library activities and services.

However, this scenario networks doesn't provide a growth of ideal library networks in India. From the above table, it can be seen that except DELNET and INFLIBNET, most of the other library networks have yet to develop databases of library holdings in a significant way. Even these two networks have to go a long way, to cover in their databases, the entire holdings of all the participating libraries.

Unless this is achieved, the networks would not be able to achieve significant resource sharing as well as rationalization in library acquisitions. Most of the networks are, however, making efforts towards this end by conducting training programmes for the staff of the participating libraries in data capturing, database development and automation of library activities and services.

### **Networking of Public Libraries**

The public libraries in the west have developed into a true community information and reference systems with such computerized data access and facilities for providing a variety of information to the general public from housing and social security to legal and medical aid and temperature and travel schedule.

In India, development of public libraries has not been a priority and their growth as a result has been uneven. Public libraries which could serve as the backbones of literacy mission, suffer for want of adequate funds, trained staff, modern equipment, good and adequate collections, proper reading rooms and stacking and user facilities. In order to provide to the public, access to the latest information and educate them, public libraries have to be technologically advanced so that they have access to INTERNET and international databases and networks.



Table below gives the details of status of some important library networks in the country.

Name	Yea of Starting	Promoting Agency	Whether registered as a society	Database development & other activities
<b>ADINET</b> (Ahmedabad)	1993	Society, INFLIBNET & NISSAT	Yes	<ul style="list-style-type: none"> <li>• Library holding database in progress</li> <li>• Library automation in progress</li> <li>• Training programme</li> <li>• Database of current periodicals in member libraries</li> </ul>
<b>BALINET</b> (Bangalore)	1995	NISSAT	Yes	<ul style="list-style-type: none"> <li>• Activity will start after getting financial support from NISSAT</li> </ul>
<b>BONET</b> (Mubai)	1994	NCST & NISSAT	No	<ul style="list-style-type: none"> <li>• Online union catalogue of periodicals</li> <li>• Online request system for ILL</li> <li>• E-mail and Internet access</li> <li>• Online searching of foreign database</li> <li>• Database on computer and as are software</li> <li>• CD-ROM database searching</li> <li>• Database of contents of Indian periodicals</li> <li>• Software for OPAC</li> </ul>
<b>CALIBNET</b> (Calcutta)	1992 (1986)	NISSAT	Yes	<ul style="list-style-type: none"> <li>• Library automation in progress</li> <li>• Access to Internet and Dialog</li> <li>• CD-ROM database searching</li> </ul>
<b>DELNET</b> (Delhi)	1990 (1988)	Society, NIC & NISSAT	Yes	<ul style="list-style-type: none"> <li>• Books database</li> <li>• Multi-lingual book database</li> <li>• E-mail service</li> <li>• Union list of current periodicals</li> <li>• Database of Indian specialists</li> <li>• Online searching of foreign databases</li> </ul>

According to UNESCO public library Manifesto 1994 (Revised);

*“The public library acts as a living force for education, culture and information and as an essential agent for the fostering of peace and spiritual welfare through the minds of men and women”*

The Manifesto recommends that:

*“The public library network must be designed in relation to national, regional, research and special libraries as well as libraries in schools, colleges and universities”.*

So there is a need to establish a public library network which is in conformity with the other networks in the country. Due to lack of up-d-date, actual number of public libraries could not be ascertained, however, nearly about 60,000 exist in the country.



They can't be called libraries in the real sense as most of them are simply reading rooms. Most of them are without computers and the librarians working in the distances in general, are not conversant with the application of computers in libraries. Training of library staff in the computer applications for library operations and services becomes one of the basic requirements of automation and networking.

In the rural areas, as rural settlement are generally scattered and their libraries are neither up-to-date nor well staffed.

Since the level of users is not of a high standing and also various problems in information infrastructure, it is not possible in the first phase to connect rural libraries with the public libraries network for networking purposes. However, with the wide use of telecommunication technology, it is possible for institution located in remote area to join the network.

Therefore, we notice that if the public libraries are to really reach the public and achieve the status of national network system, the adaptation of new sophisticated techniques and technologies is a highly important pre-requisite. We must change with the times and learn from the latest trends in the west.

For this, we have to develop the infrastructure of public libraries and give attention to the manpower development, training given in the use of computers, AACR-II, use of MARC format Library Congress subject headings, handling of software, etc. and use of electronic mail and INTERNET.

### **Major Library Networks and Their Services (India)**

The chapter includes major library networks, *viz.* DELNET, CALIBNET, INFLIBNET and MALIBNET, operating in the country. All these networks provide various services, and their activities extend from automation of library activities to specialized services intended for their members and interested users.

#### **Delnet**

Delhi is growing as a major centre of information resources in India. These resources cater both to the specialized and the general users. They are located in activities, information and documentation centres, institutional libraries, research libraries, government libraries, public libraries, department libraries besides the libraries of the universities, colleges and schools. During the recent years, increase in information has led to increase in the demands of the users. It has been noticed that in this area of information explosion, libraries in India are generally ill-equipped to handle and retrieve information effectively, the financial

resources and the space requirement for housing library collection are limited in almost all of the libraries. No a single library can afford to house every necessary document even in the area of its interest. Resource sharing, thus assumes great importance at this juncture the option left with the forward looking librarians has been to promote the sharing of resources by automation and networking. With this objective, in January 1988, the India International Centre initiated efforts for the establishment of Delhi Library Network (Now Developing Library Network).

DELNET is the first operational library network in India. It was started as a project of the India International Centre in January 1988 with the initial, financial and technical assistance by National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Govt. of India. It was registered as a society in June 1992 under the Societies Registration Act of 1860 and is currently being promoted by the National Informatics Centre (NIC), Planning Commission, Govt. of India and India International Centre, New Delhi.

### **Objectives**

The following are DELNET's main objectives:

- to promote sharing of resources among the libraries by developing a network of libraries, by collecting, storing and disseminating information and by offering computerized services to the users.
- to offer guidance to the member libraries on cataloguing database services, circulation, acquisition, serials control, online services, selection of hardware and software, etc.
- to coordinate efforts for suitable collection development and reduce unnecessary duplication wherever possible.
- to establish a referral centre, to monitor and/or facilitate catalogue search and maintain a central online union catalogue of books, serials, and non-book materials of all the participating libraries.
- to facilitate and promote delivery of documents manually and mechanically.
- to develop specialist bibliographic database of books, serials and non-book materials.
- to develop a database of projects, specialists and institutions.
- to possess and maintain electronic and mechanical equipment for fast communication of information and delivery of electronic mail.
- to coordinate with other regional, national and international networks for exchange of information and documents.

- To undertake facilitate and provide for the publication of newsletters/ journals devoted to networking and sharing of resources.

### **Membership**

At present, DELNET has Two Hundred and Forty Three libraries as its members, including both institutional and associate-institutional members: in India 235 and outside India 8.

Fees Details: Following are the fees details for its members.

*Admission Fee* : Rs.5,000

*Institutional membership*: Rs.7500/-per year (For libraries with 10,000 or more book collection).

*Associate institutional membership* : Rs.10,000/-per year (For libraries with less than 10,000 books).

*Overseas Institutions*: Admission fee: US \$100/-

Annual Membership fee: US \$500/-

The membership is progressively increasing and includes universities, diplomatic missions, college, government department, institutions and public libraries. Some institutions from far off places like Shimla, Bhopal, Punjab, Andhra Pradesh, Lucknow and Pondicherry in India have also joined DELNET as members. DELNET's membership has increased from 103 in Feb'99 to 243 to date (August, 2001).

### **DELNET Activities/Services**

**Promotion of Database Creation:** For effective networking, standard bibliographic data should be available in machine readable form with the libraries. So, efforts were made from the very beginning to promote the standardization of databases in the DELNET libraries. Experts were sent to the libraries to solves day-to-day problems. A panel of experts was seeing maintained for this purpose. Regular meetings of the librarians and computer specialists were organized to discuss mutual problems and the areas of cooperation.

Nevertheless, there have been some libraries in Delhi that took keen interest in database creation on their own. But the practice of regular meetings for database creation and resource sharing continue. DELNET provides technical assistance to member libraries in the following areas:

- creation and maintenance of bibliographic databases
- serials controls
- user services
- hardware and software requirements

- union catalogue preparation
- current awareness and SDI services
- authority data compilation
- subject profiles construction
- abstracting services
- inter-library loan and user services
- document transfer/copying facilities
- access to local, national and international databases.

**Resource Sharing:** DELNET saved foreign exchange worth Rs. 10 million by rationalizing subscriptions to foreign periodicals during 1991, 1992 and 1993 through resource sharing. This was mainly achieved in the fields of physical science, medical science and agricultural sciences. It is hoped that in the years to come, DELNET would be able to save more foreign exchange for India through sharing of periodical resources.

In 1991, a courier service was started on contract basis with a private agency for inter library lending among the participating libraries but it was not very effective. Later, DELNET has introduced its own courier service with the financial help of NIC. The service is well used.

**Standardization:** A standardization committee of DELNET has been meeting from time to time. The standardization committee takes into account the following areas:

- Communication format for interchanging bibliographic data
- Input output format
- Bibliographic description: Mandatory and optional data elements
- Classification scheme and subject headings
- Thesaurus
- Authority files
- Language scripts into roman script
- Forms of heading
- Identification numbers, codes and abbreviations
- Data input for abstracting and indexing
- Search/command language.

It was noticed that colon classification, universal Decimal classification and Dewey Decimal classification were mostly used in Indian libraries and therefore, it would be almost impossible to impose a standard classification scheme on all libraries. It was decided to use Dewey Class Number.

As searching by class numbers was done by very few librarians, it was decided that the participating libraries could search by the classification numbers or they could pass on such requests to DELNET central office for necessary action. With regard to the standardization of subject headings and to usage DELNET recommends the use of LCSM.

Specialized libraries may use additional thesauri that are available in each major discipline such as social sciences, humanities and science and technology.

**Online Databases:** DELNET has around twenty databases available online for its users. These are:

- Union Catalogue of Books: UCF
- Union Catalogue of Books: MARC Format
- Union List of Current Periodicals
- Union Catalogue of Periodicals
- Database of Periodic Articles
- Indian Specialists Database
- CD-ROM database
- Union list of Video recordings
- Union List of Sound Recordings
- Union List of Newspapers
- Union List of Serials of Management Libraries
- Union Catalogue of Hindi Books
- Multilingual Books: Sample database
- Urdu Manuscripts Database
- Database of Theses and Dissertations
- DEVINSA Database
- Serials: Petroleum and Natural Gas
- Books in-Print Database
- Jain Database
- Directory of Libraries.

### **ILL Online**

DELNET members can place their inter-library loan requests through our ILL online facility, which is available on the union catalogue of books database. The member requests appear on the main server, which are monitored by DELNET staff at regular intervals and the books are acquired

and supplied to the requesting library through the courier. Photocopying charges for journal articles etc. and courier charges for sending books to member libraries outside Delhi are extra.

Table gives the DELNET databases and their records:

DELNET DATABASES	NUMBER OF RECORDS				
	March'96	Dec'97	March'98	Feb'99	Nov'2000
1. Union Catalogue of Books (Record holdings)	1,50,227	2,07,185	39,68,54	4,72,754	7,01,324
2. Union Catalogue of books (MARC) (Record holdings)	-	-	16,000	16,965	20,000
3. Union List of Serials	-	16,000	16,000	16,146	16,497
4. Union Catalogue of Serials	-	3,105	6,935	10,203	10,599
5. Database of Periodical Articles	-	48,605	60,000	1,15,103	1,91,432
6. Specialists Database	-	1,200	2,000	2,000	2,000
7. Multilingual Books (Sample Database)	-	-	-	-	-
8. CD-ROM Database	0	0	138	138	1,064
9. Union List of Video Recording	-	-	-	1,217	1,983
10. Union List of Sound Recording	-	-	-	500	500
11. Urdu Manuscripts Database	-	-	-	210	210
12. Union List of Newspapers	-	-	-	70	70
13. Database of Theses & Dissertations	-	-	-	251	16,587
14. DEVINSA Database	-	-	-	20,000	20,000
15. Union List of Serials, Petroleum & Natural Gas	-	-	-	871	900
16. Union List of Serials : management Libraries	-	-	-	800	800
17. Union Catalogue of Hindi Books	-	-	-	3,000	3,000
18. National Bibliographic Database Pilot Project	-	-	-	30,000	

### DEL-LISTSERV

DELNET has created a Listserv service called DEL-LISTSERV to provide the current awareness service to users and allow the member libraries to receive the latest daily information from the INTERNET automatically in the form of electronic mail. The following listservs have been created and are available online through DELNET:

- Net-happenings – This Listserv appraises the users about the latest new sites along with their web addresses on the INTERNET and has proved to be a major source of information for the users on the INTERNET.
- Med-clips – This medical clippings listing discusses the various topics of medical interest like AIDI, cancer, etc. and is informative in nature.
- IFLA – This Listserv allows the users to get the latest information from the International Federation of Library Associations and Institutions, which includes the issues of concern to library and information professionals.

- LIBJOBS – Through this Listserv, the library professionals are able to find out daily, the jobs/vacancies available throughout the world.

### **Book: New Arrivals**

This is a new service through internet giving a list of recent publications in all subjects. The service covers education, management and physical sciences. Other subjects can be introduced on demand.

### **Book Reviews from INTERNET**

This is an INTERNET service of reviews of latest published books covering different subjects. The service covers in the field of Arts and Music, INTERNET and military history. From time to time, other subjects will come into this fold.

### **Current Contents**

This service gives the current contents of the latest issues of journals. It is particularly useful for rationalization of periodicals and resources sharing in member libraries.

### **Index to Hindu**

DELNET has started offering Index to Hindu online to its members. Indexed news items are available on the system covering different periods of the Chennai edition. More updates and archival data is being added into the system regularly.

### **Retro-Conversion**

DELNET offers retro conversion facilities to the libraries through specialized agencies and also facilitates the use of modern tools such as CO-ROM's and online facilities for retro-conversion.

### **Referral Services**

DELNET maintains a referral centre that provides reference facilities to participating libraries. The referral centre also looks after the access to the central databases and monitors access to international databases.

### **Document Transfer/Copy Facilities**

DELNET provides the facility for transferring or copying of the documents to its users.

### **Training Programmes**

DELNET conducts training programmes in the use of DELNET services, software, E-mail, AACR II and LC subject headings, Internet, etc.



from time to time. Information about future training programmes is available on request.

### **Lectures and Workshops**

DELNET organizes lectures by networking specialists working in different parts of the world. The lectures are open to members, specialists and users in general. DELNET also organizes national workshops, seminars and meets on library networking from time to time. DELNET had organized National Annual convention on Library and Information Networking (NACLIN) in 1998 & 1999.

### **Newsletter**

DELNET publishes a newsletter in order to spread the message and increase the awareness about library networking in India. Through this Newsletter, DELNET communicates to its members the progress, it is making in various fields. The Newsletter is also a forum for communication on the advances, achievements and needs of the libraries and their services.

### **INTERNET**

**Electronic Mail:** DELNET provides RENNIC Email facility to its member libraries, which is introduced by National Informatics Centre. This gives them access to both national and international E-mail users and also to INTERNET users. DELNET Email reaches the libraries, institutions and individuals in India as well as abroad having E-mail connection. Email is being used not only for communication between institutions but also for inter-library-loan requests.

Subscription rates for E-mails are as follows:

**Full INTERNET (TCP/IP) Connectivity:** DELNET is providing full INTERNET SLIP/PPP dial up access at a concessional rate of Rs. 8,500/-per annum for Rs. 500 hours of connect time through NIC to the member libraries. Also the shell account facility for INTERNET access is available for Rs.4,000 per annum for 500 hrs of connect time. A number of DELNET member libraries are already availing these facilities. These rates are subject to change by NIC.

**Web Page:** DELNET has a web page on INTERNET. This enables all INTERNET users the world over to know about DELNET and its activities. The web page also includes a list of Member-libraries along with their E-mail addresses. The Web page is being updated from time to time.

### **Products**

**DELSIS:** A major breakthrough has been achieved by DELNET with the launch of DELSIS, a powerful library networking software. DELSIS

(DELNET System for Information Services) is an integrated modular system, which supports DELNET online databases.

It has been developed by DELNET on a Relational Database management System called BASIC plus, a product of Information Dimension Inc. of USA, which has been provided to DELNET courtesy National Informatics Centre, New Delhi. It handles not only the Online Public Access Catalogue (OPAC) but also has the administrative tools for building up the union catalogues on BASISplus. It provides powerful and extensive facilities for online enquiries for books, serials, biographical details about the specialists and supports the cataloguing of books in Indian languages.

Features of DELSIS:

- DELSIS is a user friendly menu driven package
- Its versatile options allow the users to retrieve the information quickly.
- It contains the modules for Online Public Access Catalogue as well as the modules for the creation of databases e.g. addition, deletion, inserting of records etc.
- The Online Public Access Catalogue (OPAC) components of DELSIS can meet the needs of the users, irrespective of whether the user has little computer experience or is familiar with using computers to perform various library tasks.

**DEL-WINDOWS:** DELNET has released the DEL-WINDOWS version 1.0 after the successful creation and implementation of DELSIS Unix version. It is an efficient tool for creating and retrieving bibliographic databases and catalogues.

DEL-WINDOWS can convert the simple PC into a powerful management information system. Some of the *salient features* are:

- It is simple and easy to use. The novice library professionals and end users can interact with the software without any prior training.
- It is user-friendly with adequate windows-menus for data inputting and search capabilities.
- It provides the option for creating the bibliographic records either using ECF or the MARC format.

**DELSEARCH:** DELNET has opened a new chapter in the information retrieval procedure by devising a new database access mechanism through DELSEARCH. It is an off-line remote database access system through E-mail. It is the first of its kind and is the most economical and user-friendly remote database access system. It helps institutions, information specialists, research scholars, librarians and users interested in bibliographies and

tutorial information on South Asia. It allows them to search the DELNET union catalogues through E-mail and is a great tool for research scholars. The software is developed on UNIX platform and allows the users to send their search requests through E-mail. As soon as the query is received by the system in the form of an E-mail, the respective databases are searched for the query word and the results are returned to the addressee immediately. The searching of the database does not require any human intervention and the searches are done by the system automatically.

### **The Future of DELNET**

The future of DELNET is very promising. Its membership with India and outside India is going to take a quantum jump. The DELNET databases are growing in number and size and as a variety of information on South Asia is becoming available through DELNET, it is expected that all institutions outside India specializing in South Asian studies to take DELNET membership. DELNET databases are going to be accessible through INTERNET which will made accessibility very fast. INTERNET users in India are increasing and it will increase DELNET presence in different parts of India. DELNET has already created software, *viz.* DELDOS and DEL-WINDOWS for creating MARC records.

These software will so on be developed to perform library operations as well. There developments are likely to give more revenue to DELNET and provide justification for more and more libraries to join DELNET. As a resource, it is hoped the DELNET will grow faster as a service based resource sharing model in India.

### **CALIBNET**

It was the first library network visualized and started by NISSAT. At a meeting in 1986 in Calcutta, DSIR initiated action for preparation of a feasibility study for networking about 40 libraries in Calcutta. CALIBNET now is a society under West Bengal Societies Registration Act 1961 and responsible for Calcutta Library Network, a project sponsored and supported by NISSAT. NISSAT also contributed to the development of MAITRAYEE software package based on INGRESS 5.2 for CALIBNET. This package was developed through CMC Ltd. And given to CALIBNET. So far, no data has been created in machine readable from using MAITRAYEE. At present, CALIBNET has become a centre for CD-ROM databases.

### **Objectives**

CALIBNET has made significant studies towards fulfilling its dual objectives:

- Launching its library network programmes, facilitating remote online access to the holding data of Calcutta libraries and other specialized databases as well – a significant step towards bibliographic resource sharing amongst Calcutta libraries; and
- Providing electronic access to globally available information, imbibing its information centre approach.

Both are essential for advanced learning and scholarship. In the process, CALIBNET aims at covering a wide panorama of information end-user interests, with diffusion of new electronic information technology as the primary concern.

### **Present Status**

#### *Software Developed and Library Network Launched:*

Intense in-house research and development efforts have now achieved the Library Network capability by three significant studies:

- A multi-user storage and retrieval software 'SANJUKTA' to support CALIBNET's centralized Database (CDB) and to provide online access to its from remote locations.
- A conversion software package 'PARAPAR' to support interchange of bibliographic data between USMARC, UNIMARC and CCF files and also from non-standard formats to standard ones.
- Evaluation of a centralized Database (CDB) of holdings data of Calcutta libraries, and specialized databases as well.

These apart, CALIBNET'S pioneering study and research led to its publication of the "Guidelines for Implementation of UNIMARC in Indian Libraries". This will be an invaluable aid for the national database development programme under consideration, that favours adoption of UNIMARC format.

With the support of SANJUKTA, the centralized database hosted on CALIBNET server and located at the Network Service Centre, can be accessed and searched online by any one from a remote location, provided one is equipped with a computer, a telephone, a modem and a password from CALIBNET.

The efficacy of SANJUKTA has been tested by successful remote logging of the CALIBNET server at Jadavpur, hosting the CDB from a workshop venue at Great Eastern Hotel, Calcutta. Online access to the locational information of bibliographic resources via the CDB and sharing up such resources amongst the libraries of this metropolis is now a reality.

The capability of PARAPAR was established through exercises and tests on sample records furnished by a major library in New Delhi and

conducted in-house at Calcutta at their instance and eventually demonstrated at a workshop-cum-meeting in New Delhi.

### **The Centralised Database**

Since library network capability has been established, the most crucial and indispensable activity is to develop the basic resource – the Centralized Database (CDB), that constitute the very backbone of any library network – by inputting the holding data of Calcutta libraries. The centralized database, launched only recently, currently held around 30,000 record covering:-

- conference documents held by Calcutta and contiguous libraries.
- social science management and economics, behavioural sciences, quantitative methods, computer science, etc. including predominantly journals held by management libraries in South Asia libraries of Indian Statistical Institute and the Indian Institute of management, Calcutta and
- Index to contents of serials published by Asiatic Society in previous two centuries.

### **Library Network**

The Centralized Database (CDB) is the bedrock of CALIBNET and its development essentially calls for a cooperative movement, whereby each library par rakes in the movement by contributing its own holdings data to be incorporated in the CDB and thereby enrich it. The CDB needs to be now augmented by inputting holdings data of as many libraries as possible and getting the data continuously updated. Optimum coverage of libraries, which alone will progressively transform the CDB into a truly resourceful online searchable central pool of Calcutta's bibliographic holding data, is now on with the cooperation of libraries.

### **The Participating Libraries**

The responses from institutional libraries are very encouraging. The libraries of following institutions have extended cooperation by way of furnishing their respective machine-readable database and current journal subscription lists:

1. Calcutta University
2. Jadavpur University
3. Indian Statistical Institute
4. Indian Institute of Management
5. Central Research Institute for Jute and Allied Fibres

6. Anthropological Survey of India
7. Botanical Survey of India
8. Geological Survey of India
9. Zoological Survey of India
10. Bengal Engineering College (a deemed university)
11. National Atlas and Thematic Mapping Organization
12. Bose Institute
13. University College of Medicine (Calcutta University).

These are being now inputted into the CDB. In coming years, holding data of many more libraries are expected to go into the CDB.

### **Library Networks Abroad : A View**

International programmes like UNISIST of UNESCO, Universal Availability of Publications (UAP) and Universal Access to Information (UAI) of IFLA and a few others have helped in promotion and coordination of information services through out the world.

Global Information Systems, characterized by decentralized input, centralized processing and decentralized distribution such as INIS, AGRIS & DEVSIS have been evolved towards universal bibliographic control and dissemination of literature.

International information networks/centres such as Lockheed/Dialogue, SDI/Orbit & ESA/IRS hold various databases in several disciplines and offer on-line services to users through out the world.

### **Library Networks in USA**

The library networks in USA are in a most advanced level of development. Networking is based on three major areas of technology-creation of bibliographic information in machine-readable format for storage & retrieval, hardware and telecommunication mechanism for transmission of information.

The major point of success of library network depends upon availability of machine-readable catalogues in the constituent units. A great progress has been made by USA in this regard. Three foremost bibliographic utilities and networks in USA are:

- *On-line Computer Library Centre, Dublin, Ohio (OCLC)*
  - Established in 1967, it was formerly known as a Ohio College Library Centre
  - It includes all type of libraries-academic, government, public and special. It has nearly 27,000 libraries as its members.



- It has developed its own telecommunication networks besides various products and services. It has 30 million bibliographic records with 520 million holdings locations in its union catalogue. The database increased at the rate of 400,000 records every month.
- *Research Libraries and Information Network (RLIN), Stanford, California*
  - Established in 1978 it supports the cooperative programmes of research libraries group comprising libraries and other research institutions.
- *Western library Network (WLN), Olympia, Washington*
  - Established in 1972 it provides on-line computerized services to promote resource sharing and automated library functions.

Besides these, there are various other library networks, some of which are listed below:

- *SOLINET*-Southeastern Library Network
- *Metropolitan libraries Network of Central Oklahoma* is a multiple library network.
- *OLC*-Oakland library Consortium, Pittsburg, Pennsylvania.
- *PLAN*-Panhandle Library Access Network Inc.
- *AMIGOS*, Dallas
- *BCR*-Bibliographic Centre for research, Aurora
- *CAPLON*, Washington
- *ILLNET*, Springfield
- *INCOLSA*-Indianapolis library Cooperative Services Authority, Indianapolis
- *MINITEX Library Information Network*, Minneapolis
- *MLC*-Michigan Library Information Network, Lansing
- *MLNC*-Missouri Library Consortium, St. Louis
- *NEBASE*-Nebraska Library commission, Lincoln, NE.
- *MELINET*, Newton, MA
- *PALINET*, Philadelphia
- *PRLC*, Pittsburg, PA
- *VALINET*-veteran Affairs Library Network
- *FEDLINK Network Operations (FNO)*, Library of Congress
- *LIMS*-Library Management Information System.



### Networks in UK

- *BLCMP (Birmingham Libraries Cooperative Mechanization Project), Birmingham*: It contains 13 million bibliographic records of books, serials, music, maps, Audio-visuals, etc. in its database. There are more than 60 libraries comprising public libraries, college libraries, university libraries and special libraries using its catalogue.
- *LASER (London and South Eastern Library Region)*: It is an independent company under the University of London. It promotes library cooperation among 80 libraries in London and South East England and has more than three million records in its database.
- *The British Library*: Though not a network, it has nearly 21 databases including BNB(British National Bibliography) holding 15 million bibliographic records
  - *Blaiseline (British Library Automated Information Service)*- The automated information service of the British Library services offers search services to its users.
  - *British Library* holds one of the largest patents database in its Patents Information Network. About forty million patents are held and the database is growing at the rate of one million patents per year.
  - *Business Information Network*
  - *BIDS (Bath Information and Data Services)* offers several services in the field of public health, medicine and also provides access to British Library databases.

### Networks in Canada

*The National Library of Canada* promotes decentralized networking through the use of protocols conforming to the Open System Interconnection (OSI) reference model.

- It has nearly 10 million bibliographic records in its online database.
- It adds 800,000 to 1,200,000 records per year to its database and holds 1 million authority records.
- Besides its 275 concurrent users, it has 600 external institutions across Canada that use its union catalogue. It provides an in-depth ILL service to non-Canadian who need Canadian publications
- *CISTI- Canadian Institute for Scientific and Technical Information*
  - It holds books and conference proceedings, over 50,000 serials and millions of technical reports from around the world.

- Maintains union catalogue of 50,000 serial titles with over 20,000 current titles.
- It offers a number of services such as CAN/OLE (Canadian Online Enquiry Service), Document delivery, CAN/SND (Canadian Scientific Numeric database service) online at a very cheap rate to users outside Canada on several scientific subjects.
- *UTLAS International Canada-formerly University of Toronto Library Automation System*
  - Established in 1971, it was the first library network utility in North America to go private by becoming a subsidiary of International Thomson Library Services (ITLS)
  - It is a computer based service organization for Libraries and information industries
- *Ottawa Public library*
  - It has an online database of more than 1 million volumes
  - It offers highly advanced service to the general public.

### **Australian Libraries Gateway**

The Australian Libraries Gateway (ALG) is a free Web-based directory service which has improved access to information about more than 5,400 Australian libraries, their collections and services since March 1998. It aims to be a directory of current information about every library in Australia, a tool for worldwide users, for both library professionals and the general public.

The Gateway has been developed on behalf of the Australian library community by the National Library of Australia and received initial funding as part of Australia's Cultural Network (ACN). While the Australian Libraries Gateway site is hosted by the National Library of Australia and staff there, are responsible for maintenance, individual libraries are responsible for maintaining the currency of the information about their own library on the Gateway (via online forms and passwords, fax, telephone, email and/or post). Many resources, such as library catalogues, online exhibitions and image databases, are maintained remotely by libraries around Australia-the Gateway simply links to these resources. There are various other library networks which are working around the world:

- Library Network of Southwest Germany
- Nordic Libraries: Information Servers
- Strasbourg University Library Network
- LIBWEB

### **LIBWEB: Library Servers via WWW (Libraries on the WEB)**

Here documents are maintained on server <http://sunsite.berkeley.edu>, Berkeley Digital Library Sun SITE (Software, Information & Technology Exchange). The Berkeley Digital Library Sun SITE builds digital collections and services while providing information and support to digital library developers worldwide. This is sponsored by The Library, U.C. Berkeley and Sun Microsystems, Inc.: The Library, 385 Doe #6000, University of California, Berkeley USA 94720-0001. Any library having a new or correct URL can add to the list by filling on-line form and submit. The bookstores, publishers, or other companies without a specific library connection are not listed.

Libweb currently lists over 6100 pages from libraries in over 100 countries. Following are the no. of libraries as the LibWeb members in the different countries:

United States (4555)

Academic Libraries (2077)

Public Libraries (2141)

National Libraries and Library Organizations(26)

State Libraries (51)

Regional Consortia (85)

Special and School Libraries (175)

Europe-

Scandinavia (113). It covers Denmark, Finland, Iceland, Norway, Sweden.

British Isles (199): England, Ireland, Northern Ireland, Scotland, Wales.

Western Europe (217): Belgium, France, Italy, The Netherlands, Portugal, Spain.

Germany and Central Europe (192): Austria, The Czech Republic, Germany, Hungary, Slovakia, Switzerland.

Southeast Europe and the Balkans (29): Bulgaria, Croatia, Cyprus, Greece, The Republic of Macedonia, Romania, Slovenia.

Baltic States (34): Estonia, Latvia, Lithuania, Poland.

Russia, Ukraine, and Eastern Europe (21): Belarus, Moldova, Russia, Ukraine.

Africa and the Middle East (57)

Asia (186).

It covers the following countries:

Bangladesh(2), Brunei(1), China (16), Hong Kong(11), India(18), Indonesia (3), Japan (55), Kazakhstan (3), Korea(1), Macau (1), Malaysia (13), Pakistan (3), Philippines (6), Singapore (5), South Korea(18), Sri Lanka (6), Taiwan (7), Thailand (16), Uzbekistan (1) Australia, New Zealand, and the Pacific (103) Canada (252) Alberta(32), British Columbia(45), Manitoba(6), New Brunswick(4), Newfoundland (31), Northwest Territories (1), Nova Scotia (15), Ontario (66), Prince Edward Island (1), Québec(38), Saskatchewan(12), Yukon(1) Mexico, the Caribbean, Central America, and South America (83)

From the above figure it can be guessed how much developed are the library networks in USA, Canada and European countries as compared to the developing nations around the world.

### **Possibilities of Network Based Information Services in India**

Today with the emergence of global network infrastructure, wherein local networks (LANs), national and regional networks and international networks are rapidly getting interconnected, a host of networked information services have evolved over the years. Library and Information networks are designed to support basically library and information services.

Library networks offer these services:

- Union Catalogue
- Current awareness & SDI services
- Authority data
- Library automation-Acquisition and fund accounting, serials control, book and journals maintenance, user services, creation and maintenance of bibliographic databases, etc.
- Inter Library user services
- Document Transfer/copy
- Access to national/ international databases.

The details of the above services have already been discussed in the context of Library Networks and their Services. The development of INTERNET has drastically changed the way communication among different libraries, professionals and users is taking place these days. Communication services offered by computer-to-computer networks like INTERNET include electronic mail, file transfer and remote log-in. E-mail is a store-and-forward messaging facility available on all the networks. It is probably the most widespread of the three network services because it is often the only way to exchange information among the networks. Users

on the networks can also invoke file transfer commands (ftp file transfer protocol on INTERNET) to copy computer files. Remote log-in is the most sophisticated service provided on the networks through programmes like TELNET on INTERNET which allows a user at one site to work on a computer at another site.

Network information service applications are developed using these above communication services. An important requirement for wider use of the services is the inter-connectivity, at least for E-mail, among the various networks in the country, including library specific networks like DELNET, CALIBNET, INFLIBNET, etc. Possibilities of offering different network based information services are many; a few have been described below:

***Monitoring Information Resources and Services on INTERNET :***

There is urgent need for setting up a network information monitoring facility, consisting of a core group of two to three staff members and a suitable computer connected to ERNET (Education and Research Network which connects the major academic institutions in the country) or similar other networks connecting major library and information centres in the country.

Main responsibility of this group should be to systematically scan and monitor information resources and services on INTERNET and provide relevant information to Indian users. Two interesting applications / services that can be offered from this facility are:

- i. Creation and maintenance of a directory of S&T information resources on INTERNET. This can form the basis of both on-demand and in-anticipation referral service. It is also possible to put this directory on ERNET, accessible by all users on ERNET and other networks in the country, by E-mail
- ii. Creation and maintenance of an Infoserver consisting of bibliographic data downloaded from open-domain bibliographic information sources available on INTERNET, e.g. pre-prints of Astronomy and Astrophysics, content pages of top Biological Science journals. Data accumulated in such fashion can be freely made available to our researchers.

***Creating an Electronic Discussion Forum for Library and Information Science :*** An electronic discussion forum is an E-mail based conferencing medium for a group of people, geographically far apart, to discuss issues related to their profession or discipline. A forum for library and information science can be established to discuss, for example, issues related to library practices and use of new information technologies in libraries and information centres.

Such a forum can also act as an electronic news medium for sharing information pertaining to new initiatives, plans, projects, information sources and services, international development, etc.

While a few real-time electronic discussion forums (also called Bulletin Board, Computer conference, interest group, discussion group, discussion list, etc.) exist today, majority of them use e-mail to set up an informal discussion by interconnecting people of specific interest over a network. Members of such forums can exchange messages with others irrespective of the network they are on and their geographic location.

The software used for setting up an electronic discussion forum is known as a mail server. Mail servers are electronic mail delivery systems, which when they receive a message can resend it to a group of users/subscribers whose e-mail addresses are maintained as a mailing list. Each subscriber sees all the mail forwarded by the server and if he/she wants to add his/her comments on the issue, sends in a message to the server.

Many discussion forums also archive the messages and support batch search and retrieval from the archive. Several hundred such electronic discussion forums exist globally today. They are bringing radical changes in the conduct of research and scholarly communication. One example of a discussion forum for librarians and information specialists is the Public Access Computer Systems (PACS-L) forum, moderated from the University of Houston, USA. PACS-L participants discuss many topics ranging from specific hardware and software considerations to issues involving online catalogues, CD-ROMs, networking and locally mounted databases.

While such a forum will improve communication among the professionals in our country, it will also encourage librarians to develop more sophisticated network skills and to explore more fully the potentials of electronic communication.

***Creating E-mail based Bibliographical Database Servers :*** While online, interactive searching of bibliographic databases is a desirable feature, e-mail based access is an interesting and less expensive solution considering the computing and network technologies currently used by our libraries and information centres. It is not difficult to create an e-mail based front-end to a bibliographic database, which will receive user queries, formulated in a specific syntax, by e-mail, carry out the search and the results to the user, by e-mail.

***Monitoring, Filtering and Re-distribution of Discussion Forum Postings:*** As already mentioned earlier, several hundred discussion forums exist today on INTERNET on a wide variety of topics. The messages posted on these forums are an important source of information, raw knowledge and often untried new ideas. There is a need to identify important forums,



in the context of our research priorities, scan these regularly, extract significant postings, and re-distribute these among our researchers. Such messages could also be archived into a database. Such a service will help our scientist to become part of the international network of scientists in their field of specialization and get to know the latest developments and research results, well before these appear in published form. This will have positive influence on ongoing research and stimulate new directions in research. Furthermore, such a service will relieve an individual researcher from the burden of getting to know what discussion lists exist, procedure for their subscription, usage, etc. Even if this were to be possible, this will result in 'network flooding' due to multiple subscribers to the same list and subscription of multiple lists by one person. The cumulative time saved by use of a single facility of this type will be enormous. Thus we see that networks are radically changing the way information is disseminated. Several useful network information services can be provided to researchers in the country using just e-mail facility. More sophisticated network information services could be evolved as the time progresses. This would also give the Library/Information professionals the required time and experience to plan for better coordinated efforts.

## **Problems and Implications of Library Networking**

### **Problems**

As we have seen in the book, Library Networks help us in the dissemination of information in cooperative manner where all the concerned libraries pool their resources, and use them, thus ensuring the optimum utilization of resources. But behind setting up a library network and utilize its services, there is a lot of problems facing the Library/Information professionals. Some recent studies have shown the following as major problems to be considered:

- *Status of Libraries:* The status of Libraries, especially in developing countries like India is not so good. No much importance is given to libraries and library professionals compared to other fields. There is lack of growth of libraries in our country due to negligence on the part of the Government as well as lack of will on the part of the library staff.
- *Lack of Education and Training:* Library Networks need educated and trained staff to sustain and run smoothly. Due to attitude of certain traditional library staff, they hesitate to learn new technology which is essential in this age. Library automation is pre requisite for starting a Library Network. Library automation can not be achieved without learning new technology



- *Technical and Training Facilities Problem:* There is problem of availability of training facilities. Every Library/Information staff should be given training in the field of networking and library automation. In our country, every library/information centre should be provided with adequate training facility which is not so in the present context.
- *Lack of Finance:* Initially Library Networking needs resources for the development and contacts with other institutions for its expansion, which is lacking in the country.
- *Problems at Centre:* Even if an institution manages some funds there is problem of resource allocation. Often imbalance resource and personnel creates problem for further development of the networks.
- *Software problems, language problems in shared cataloguing systems, database design problems, etc.*
- *Compatibility Among Systems/databases.:* Actually various networks employ different techniques for the construction of the database of their holdings. They do not follow any common approach. So there is problem of compatibility among various systems and databases.
- *Problems with Standardization:* In India, due to presence of various regional languages, there is problem of standardization. Any standard can not be so much effective.
- *Problems in Acquiring Information from International Inter Government Organizations:* In several countries, various government organizations do not show willingness in providing information. It might be due to internal security problem or simply hide the information from others in Science and Technology fields.
- *Problems while Searching On-line:* The world over, various networks are established in different languages. There are multiple command languages. One has to study various systems and databases for searching purpose.
- *Independent Development of Major Networks:* This is a major problem in our country. The development of Library networks in isolation creates the problem of standardization and coordination among various networks. Also a new library network has to spend much more resources in developing a network. If a new starting-network employ the methodology of an already developed and successful network, it can certainly minimize the cost for developing the network. With mutual understanding they can themselves consult each other in their respective fields of expertise.

### **Implications of Networking**

The implications of Resource Sharing Networks can be categorized into five types. They pertain to staff, activities, cost, technology and time.

- *Implications Pertaining to Staff:* Networking means sharing of special staff skills in specific areas for training, answering of information requests, bibliographical assistance, processing, etc. It emphasizes the importance and need for higher level of reference assistance to readers. For this to achieve, it implies the need for training and retraining of reference librarians to meet the demands of networking and sharing. Networking will surely demand from librarians and library administrators more time, skill and patience than are presently required of them. In addition, it requires a change in the attitudes of librarians and other staff.
- *Implications Pertaining to Activities in Libraries:* Collaborative development of resources including provision for cooperative acquisition of rare and research materials, and for strengthening local resources for currently used material is expected for successful running of a network. The development of multimedia resources is essential. There is need for identification of primary patron groups and provision for assignment of responsibility for information service to all within the network. Identification of levels of service that provide basic as well as special needs of patron groups, and distribution of each service type among the needs is required.

There must be provision for “referral” as well as “relay” and for “document” as well as “information” transfer. Critical implications of growth of networks would lead to questions of limits of size and growth, optimal size for computerized bibliographical network, etc. Development of evaluation criteria and procedures to provide feedback from users and operators and means for network evaluation and modification to meet specified operational utility needs to be developed.

- *Implications Pertaining to Cost:* Networking goal of improved access implies that it involves real cost and, therefore, it cannot be viewed as a panacea or easy means to reduced expenditure of member libraries. It means sharing of cost of telecommunications networks and of common functions of network by the member libraries.
- *Implications Pertaining to Time:* Availability through Networking implies delay in obtaining a particular item not held locally. Access to larger and larger resource/collection would cause access/search time to go up. However, this access time is much lower than the traditional manual search within a library.

- *Implications Pertaining to Technology:* After all a technology helps a person in getting or developing a new-one in a comfortable manner in less time and with less cost, not sacrificing the accuracy. So, a Networking System should be simple to use if electronic excommunication by an unforgiving operating system is to be avoided.

From the above considerations, it can be said that tomorrow's automated network libraries will cost more than today's automated libraries, but still less than the future cost of single traditional libraries. Initially, a library network needs resources to sustain, but on long run, benefits accrued by the networking will surpass the loss of revenue.

### Discussion and Conclusions

With the advent of electronic information era and network based information services, libraries all over the world are computerizing their services and connecting their library resources in electronic form. India is estimated to have around 65,000 libraries that include public libraries, college libraries, university libraries, and departmental and other libraries. Computerization of library services has been slow in India so far and it is expected to turn into a movement in the coming years given the requisite attention and fillip. How the libraries are evolving the world over and the current status in India are summed up in the following table:

S.No.	Library Type	Characteristics	Current Status
1.	Traditional Library	<ul style="list-style-type: none"> <li>• Holdings in hard copy form.</li> <li>• No computerization</li> </ul>	>97.1% libraries
2.	Automated Library	<ul style="list-style-type: none"> <li>• Automation of library functions – computerized catalogue, circulation, acquisition, etc.</li> <li>• Holding mostly in print form</li> <li>• A few electronic resources</li> </ul>	< 3.1 libraries
3.	Electronic Library	<ul style="list-style-type: none"> <li>• Fully automated functions</li> <li>• CD-ROM networking</li> <li>• Resources in electronic and conventional form</li> </ul>	< 100 libraries
4.	Digital Library	<ul style="list-style-type: none"> <li>• Fully automated</li> <li>• All resources in digital form</li> <li>• High speed optical fiber LAN</li> </ul>	Experimental
5.	Virtual Library	<ul style="list-style-type: none"> <li>• Library without walls</li> <li>• Provides access to resources</li> <li>• Library without resources</li> </ul>	Research

From the table we notice that, in most of the libraries in India, IT applications have yet to take root. They are still using the traditional and orthodox systems in their library services. Whatever small automation of library function and services has been done, it is in academic and

government libraries. Public libraries are lagging behind, they have not properly planned to make use of modern tools in their public libraries.

Librarians in India can no longer be silent spectators of IT revolution. Libraries in the industrial and academic environment as well as public libraries in the USA, UK, Japan and other developed countries are making full use of the information technology tools. We, in India, must change with the times and learn from latest trends adopting sophisticated technology in libraries and information centres in order to keep pace with advanced countries.

Modern technology has given an excellent opportunity for library professionals to manage themselves better. Therefore, all librarians should be perfectly familiar with the benefits of modern technology and perform efficiently. The automation and subsequently library networking is technologically desirable and economically feasible, in the long run, in modern libraries to provide accurate and instant information through resource sharing in optimum way.

Libraries and library networks are making efforts to get over the impediments they are facing. However, while they may be able to solve some of the problems through cooperative efforts among themselves, they would need the help of supporting or funding agencies to solve many other problems, particularly those related to standardization and quality control. For instance, trained manpower is not available for the data conversion job and to develop databases.

Also, none of the University departments provide adequate training in this activity. This situation therefore necessitates engaging raw library and information science postgraduates, providing training to them and then using them for the job. The libraries should however not recruit personnel on regular appointment for the creation of databases covering their back collections (retrospective conversion) as the recruits would not have adequate work once they finish.

They should prefer to engage external services on contract basis for this job to clear the backlog and the regular library staff should take care of the updation of the databases on a regular basis.

Using contract service has the risk of poor quality input, but it could be overcome by enforcing strict quality control measures. But again majority of the libraries do not have funds for creating the databases.

***The Following Possible Solutions are Suggested:*** The library networks should first compile detailed rules and procedures which should be in tune with existing standards for the databases developments as well as network operation and then ensure their proper implementation by the

participating libraries. Usually many common publications exist in the acquisitions of different libraries. The individual libraries must therefore check, before filling an input sheet, with the network office/database to see if that title has already been included in the database and if so, download the entry instead of doing it all over again. If such checking is done among the networks themselves, there would be considerable savings in human efforts and expenditure.

The government and the funding agencies must provide financial support for database creation in libraries and library networks, as the expenditure incurred on this will pay back in terms of rationalization of library acquisitions, resource sharing and increased use of information. It may be possible to have allocation of funds for this purpose in the annual and five year plans of the Government, if the matter is taken up by the library and networks through proper channels.

As an incentive to large libraries for sharing their resources with small libraries, a system of credits and debits may be introduced. That is, a library would get a credit point by lending a document and a debit point by borrowing a document. These points may be settled in monetary or other acceptable terms at regular intervals.

The Network managements must organize practical based training programmes as frequently as necessary to train the staff of the participating libraries. It would be good if teachers in library science schools are also trained along with practicing library professionals so that these teachers would, in turn, train their students year after year.

The network management must also provide common software on a cost-to-cost basis for use in libraries on request. It would be worthwhile to get such software developed, if it is not already available. For such software, through backup technical support must be ensured either directly by the networks or through some contract arrangement.

The database development contractor must be encouraged to come up in large numbers to create databases on contract including retrospective conversion. This would speed up the time consuming task of data conversion. Since a large number of libraries and information centres intend to create databases, it will be lucrative business for these contractors for a number of years.

## Networking of Libraries and Resource Centre

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Astronomers have always had a special need for rapid communication over long distances. More recently the increase in international collaboration has given an incentive to explore the latest electronic innovation, namely the electronic mail and internet access for faster communication. These have become an integral part of scientific organisations and libraries (Rajashekar & Sreenivasa Ravi, 1993) Previously, communication among libraries and library personnel was through traditional methods like the post and teleprinter links. In some cases, the telephone link was used in urgent cases. Now, the internet concept has changed the scenario even in Indian libraries. Libraries are able to access databases outside the country without much difficulty. This has revolutionized not only the information seeking behaviour of the scientists but also the role of the librarians. Librarians are working towards maximum utilization of resources available and in this context we are thinking of networking all astronomy libraries in India.

### Why Networking

1. For better resource sharing
2. To reduce costs
3. For speedy delivery of documents
4. To keep abreast of new developments
5. To give access to advice from colleagues with similar problems through a newsletter.

### Participating Libraries

There are eight scientific institutions in India, for which astronomy is the major research area.



***Indian Institute of Astrophysics Library (IIA)***

It is more than 200 years old and has a rich collection of books and journals in Astronomy and Astrophysics. Some of the astronomical journals start from volume 1 dating back to the nineteenth century. The library has most of the old observatory publications. They form an important part of the collection as many astronomical catalogues are published here which are still used by our scientists.

***Inter-University Centre for Astronomy and Astrophysics Library (IUCAA)***

It is an autonomous institute, located in Pune, and has been established recently. The main areas of research are Astronomy and Astrophysics, General Relativity and Gravitation. Though the library of this institute is new, it has succeeded in building up a very good collection of books and journals in Astronomy and Astrophysics. The majority of astronomy journals are received by airmail at IUCAA.

***National Centre for Radio Astrophysics Library (NCRA)***

It has a wide collection of materials on radio astronomy and astrophysics. This institute is located in Pune, close to IUCAA.

***Nizamiah Observatory Library***

This Observatory is very old and functions under Osmania University, Hyderabad. The present library was established in 1961 and it has a fairly good collection of old books and journals. The Observatory has been receiving reprints and publications from the beginning of this century from all over the world on exchange basis, so the library is rich in old material.

***Physical Research Laboratory Library (PRL)***

The Physical Research Laboratory, located in Ahmedabad, has a library, funded by the Department of Space. The Institute carries out research in many areas of Physics. In addition, it also concentrates on Astronomy and Astrophysics, Infrared Astronomy and Radio Astronomy.

***Raman Research Institute Library (RRI)***

The Raman Research Institute Library has been developed around the library started by the nobel laureate Prof. Raman and is also located in Bangalore. With his diverse interests in different branches of science and deep interest in reading, Prof. Raman had added invaluable books to the library. It has a rich collection of astronomy and astrophysics books. Its preprint collection is also a valuable resource for sharing.

***Tata Institute of Fundamental Research Library (TIFR)***

Tata Institute of Fundamental Research Library, Bombay was established in 1945. In addition to books in various branches of physics



it has a large collection of books and journals in the areas of astronomy, astrophysics and space physics.

### **Uttar Pradesh State Observatory Library**

Located in Nainital, the library has built up a vast collection of books and journals in astronomy in the short span of 45 years and is very keen on expanding its collection and services.

### **What to Share?**

Books	Policy Decisions
Journals	FORSA Forum
Observatory Publications	Current Events
Preprints	Newsflash
Catalogues	
Lists of Publications	
Recent Additions	
Newsletters	

Table below gives the total collection and the services offered by the individual libraries. The table shows that four libraries have automated their library catalogues using the same library software called LIBSYS and two libraries use a software called SLIM.

LIBSYS is a fully integrated multi-user library system designed to run on a wide spectrum of hardware and software platforms and it can also import databases built on other software (*e.g.* SLIM). This is one of the important criteria which will make this networking feasible.

### **Resources and Services available at FORSA libraries**

<b>No.</b>	<b>Library</b>	<b>Software</b>	<b>Coll.Books</b>	<b>Coll.Jour.</b>	<b>Jnl.Sub.</b>
1.	IIA	LIBSYS 3.X	13,300	18,400	142
2.	IUCAA	SLIM 2.0	10,000	4,000	150
3.	NCRA	SLIM 1.1	5,400	3,300	104
4.	NIZA.OBS. Library		5,340	3,995	10
5.	PRL	LIBSYS 3.1	16,500	25,000	197
6.	RRI	LIBSYS 3.X	19,613	23,273	137
7.	TIFR	LIBSYS 3.2	55,000	56,000	656
8.	U.P.State Obs.Lib.	Acquiring LIBSYS	8,273	8,061	76
Total			133,426	142,029	

From table, it is evident that the collection of books and journals of all the libraries put together is not very large and will occupy less than 2 GB space.

### **Networking Models**

1. Interconnecting all astronomy library homepages.
2. Creating an integrated library database.
3. Establishing connectivity using search-engine architecture.

#### **Model I**

In this model, which is the simplest, the home pages of the participating libraries will be linked.

Many research organisations in India have designed their home pages and libraries are also a part of their homepages. Similarly, member libraries of FORSA also have their independent web pages and they are accessible on the internet. Since these web pages will exist independently, a scientist looking for a document will be able to trace it eventually, if not immediately (Madalli 1998). At present, only six libraries out of the eight FORSA libraries have internet connection, but we hope that the other two libraries will be able to get their home pages soon.

#### **Model II**

In this model, the databases of all individual libraries will be merged. Since the total collection of books is 133,426 and there are 142,029 journal volumes we will not be requiring more than 2 GB space for an integrated database. The merging of books and journals will be effected with the help of a unique feature like the ISBN numbers. Since the physical location is one of the fields in the data entry form, it is not difficult to reflect it in the merged database. This has a major advantage from the user's point of view. It will be less time-consuming, since the scientist will have to access only one server where the integrated database will be located. The LIBSYS software, used in most of the libraries, has the facility to display the availability status of the document. It is mandatory for the library personnel to maintain, rather than update this integrated database.

It could either be a commitment from an exclusive group of people or it could be done remotely from individual locations. We are also planning to create a profile of all member libraries as the common web page, which will be linked to the integrated database. In the event of any exclusive feature of a particular library being listed, it is easier to access that feature from the common web page. For example, in our library we have many old documents, which will be catalogued in a database and any individual interested in the archival material can access that database from the

common web page. The availability of electronic journals will be another feature which could be accessible only by the individual institute's scientists, though it will be a listed item in the common web page. Incorporating too many icons and graphics in a web page is a time-consuming factor at the time of retrieval.

Keeping all this in mind, we will design soon our common web page to facilitate an easy navigation and retrieval through the internet, not only for our scientists, but also for the international community. We are also gearing up our library staff to undertake training in handling the network, especially hypertext linking.

Though we have a very good technical support from the software company, we are getting equipped with basic knowledge of software maintenance and also the optimum usage of the features of this software. Funding for this joint project is envisaged from member libraries and also from the Department of Science & Technology of the Government of India.

### **Model III**

In model III, which is a sophisticated model, the databases will be connected with the help of search-engine architecture. In the March 1997 issue of *Scientific American*, Lynch (1997) describes one such model called HARVEST which derives indexing terms using software called "Gatherers" that reside at web sites. By doing so, the search engine can avoid downloading all the documents from a web site which would burden the network traffic.

The search engine's server takes the help of the Gatherers to create a file of keywords that can be processed into an index for querying by users. Lynch says that "eventually, the librarian's classification and selection skills must be complemented by the computer scientist's ability to automate the task of indexing and storing information.

Only a synthesis of the different perspective brought by both professions will allow this new medium to remain viable." If this concept can be applied to the library database, it will be an efficient tool for future retrieval and international cooperation.

India has taken advantage of the wide range of scientific information available through computerised networks. It has already geared up to having modern communication facilities (including satellite communication), adequate electricity, subsidised communication costs, rationalisation of taxes on computer equipment, etc., which gives us a thrust to fully participate in the new information age. The astronomy librarian of Australian National University has expressed a desire to be a part of this network, thus extending the network to the Asia Pacific region. When this

network is realised, it will have a broader subject coverage to include physics and mathematics, along with astronomy. Eventually it will be an international cooperation with more new ideas and suggestions.

### **Digital Libraries and Education**

This article builds on work in the past few years, triggered by Ticer course [Roes, 1999] and consulting activities, notably for the Dutch Open University and the Amsterdam University for Professional Education. It attempts to identify strategic issues for libraries wishing to pursue a more active policy with regard to the changes affecting higher education due to the increased use of information and communication technologies (ICT). The article starts out by sketching the changes currently occurring in education.

A study of the literature, carried out while preparing a new strategic plan for the libraries of Amsterdam University for Professional Education, identified five major areas in which libraries can develop strategies to enhance services for their patrons. The following domains are discussed: digital libraries and digital learning environments; digital portfolios; information literacy; collaborative course design; and the relation between physical and virtual learning environments.

Next, possible implications for library staff regarding the changes are discussed. The article concludes with thoughts on alignment between library strategy and the strategy of the library's parent institution.

### **The Changing World of Education**

Undoubtedly, there are profound changes going on in the educational system. These changes are needed because of ever growing pressure in the school systems themselves, partly because society itself is changing into one in which knowledge work becomes ever more important, and partly because of the very information and communication technologies which are transforming our economies.

Both of these factors evoke change and offer a solution to the problems with which the educational system struggles. Carol Twigg and Michael Miloff [Twigg and Miloff 1998] analyzed the changing learning situation in the United States, and their analysis is also to a great extent valid for the European situation.

By confronting trends and technological developments, they arrive at a vision of a "global learning infrastructure" in which the role of schools and universities will be drastically changed, a radical transformation of the educational system. They see the following trends:

- The number of students is still growing.

- Different types of students are asking for education; participation of women, older students, and students from ethnic minorities is growing. Different students bring different experiences with them.
- Increasingly, work and study are combined, and that leads to a need for more flexible learning arrangements in which the campus or school building is no longer central to the educational process.
- More generally, there is a trend towards lifelong learning.
- Lifelong learning leads to an emphasis on “learning to learn”. Knowledge becomes obsolete at an ever-increasing rate in a knowledge economy, and knowledge workers need to be able to refresh their knowledge on a regular basis.
- Because of the differences between students, there is a need to accommodate different learning styles, customization and alternative learning routes. Courses have to take more into account the different experiences and backgrounds of students.
- Higher education institutions have long had a monopoly in providing education, but increasingly, companies and public bodies possess knowledge that can be reused for educational purposes, partly for in-house training (knowledge management) but also to offer to external markets.
- Education is under constant budget pressure, thus there is a need for more efficient and effective education.
- Students more and more are behaving like consumers who want to make informed choices about how and where they want to be educated, which implies students are no longer committed to one institution.
- Teaching staff will exhibit more job-hopping behaviour than they did in the past.
- There are too many dropouts in the current educational system.

Information and communication technologies (ICT) have the potential to offer a solution for at least part of the problems mentioned above. According to Twigg and Miloff [Twigg and Miloff 1998]:

- Through the Internet, course material can be offered independently of time and place. Modularization makes it possible to offer different and flexible learning routes.
- An ever-increasing number of students have access to the Internet, whether at home or on campus. Costs of Internet access will continue to drop.
- More and more information is made available through the web. Search engines assure the accessibility of this material. Groupware

allows (a)synchronous communication between teachers and students—worldwide.

- Online market research is quick and easy, and this market information can be combined with transaction log data allowing institutions to monitor consumer (*i.e.*, student) response on an ongoing basis.
- In principle, a worldwide competition for education is possible and it is already apparent in the market for MBA courses. Carol Hughes [Hughes 2000] also foresees increasing competition in the delivery of information services for higher education, implying that libraries might lose their monopoly position in information services to their parent institutions. (Hughes' e-book company, Questia Media, is an example of a new competitor.)

In summary, Twigg and Miloff [Twigg and Miloff 1998] envisage a global learning infrastructure. One might envisage learning environments of the future as:

- being student-centred
- being interactive and dynamic
- enabling group work on real world problems
- enabling students to determine their own learning routes
- emphasizing competencies like information literacy to support lifelong learning.

Through these elements listed above runs a common theme: the adoption of more active learning styles in which students take more responsibility for their own learning goals and for the ways in which to realize these objectives. Active learning implies that students don't limit themselves to resources supplied by their instructors, but also that the students search for new materials themselves in order to solve problems at hand and to develop their competencies continuously. Since libraries in higher education find their *raison d'être* in supporting research and education, a relevant question is how libraries can and should transform themselves in order to cope with the changes in our educational systems. The following five strategic areas will be discussed in the next sections of this article:

- digital libraries and digital learning environments
- digital portfolios
- information literacy
- collaborative course design
- the relation between physical and virtual learning environments.



## Digital Libraries and Digital Learning Environments

Digital libraries seem, no, *are* natural complements to digital learning environments. They are able to integrate the freely available information on the web with the more formal literature for which (increasingly consortium) licenses on electronic versions are arranged with publishers. These licenses enhance and replace traditional collection development policies. Digital libraries facilitate time and place independent information services for students, needed especially if active learning styles become more commonplace.

Digital libraries are already available 24 / 7 from anywhere in the world, offering flexible arrangements for students / knowledge workers. Much work done over the past decade in developing digital libraries will have an important pay-off for educational innovation. The main issue, of course, is whether more active learning styles will become the norm, since many of today's courses are of a rather "self contained" nature in which educators present students with texts to work through in a linear way and assessment is too often based on whether or not a student is able to reproduce the texts prescribed by the teacher.

Two approaches in this respect can be identified. The first one, which takes the needs of specific courses as point of departure, can be seen mainly in the UK in projects like INSPIRAL and ResIDE [INSPIRAL and ResIDE]. INSPIRAL is a research project in England that investigates issues involved in linking virtual (or digital or managed) learning environments with digital libraries.

It looks at technical, institutional and end-user challenges, with an emphasis on the last two aspects, and analyzes stakeholders' and learners' needs. Its point of departure seems to be how teaching staff can best be supported when designing digital learning environments and enriching these environments with resources available in digital libraries. This tailor-made approach is very much apparent in the ResIDE project where the focus is on the teachers and their courses. This model can be seen as analogous to the work of reference librarians putting together reserve collections to support courses.

Another approach, apparently more popular in the United States, has a different, more macro way of looking at digital library support for learning environments and concentrates on learning resources in general. An example of this approach is the National Science Foundation (NSF) national science, mathematics, engineering, and technology education digital library (NSDL) programme [Wattenberg 1998, Zia 2000]. This programme seeks to bring together a vast, centralized collection of learning resources supporting all possible kinds of education, ranging from K-12



to graduate and lifelong learning, into one big library for the nation—and even beyond. As such, the NSDL approach is consistent with the large scale of many of the other NSF digital libraries projects.

To libraries and librarians, the NSDL approach seems more threatening; however, I think in both options there will still be a need for library staff to support educators with respect to the selection of adequate resources for a given course.

Librarians pursuing this aspect are well advised to learn more about the standards (*e.g.*, IMS / Instructional Management Systems) being developed to protect investments in content development from the rapid developments in technology used in digital learning environments [Bacsich et al. 1999]. The issue here is that instructional content should be easily transferable from one platform to another. Related issues are integration with administrative systems and authentication.

Donald Beagle [Beagle 2000] warns that another, related question, *viz.* compatibility of digital learning environments and library systems, is a neglected issue so far. The main problem seems to be managerial short-sightedness. In the Netherlands, for example, the common opinion of administrators seems to be that work on digital libraries doesn't need special attention anymore—for which some valid arguments can be put forward—and that the subject of ICT in education is an entirely different one from the subject of digital libraries. The point, of course, is that this view fails to incorporate the advantages of digital libraries, which are natural complements to digital learning environments.

### **Digital Portfolios**

Digital portfolios are new tools for student assessment and they are more than that as well. Initially, digital portfolios were developed as an alternative way of assessing student progress, with more emphasis on the learning process and the material results a student achieves throughout a course of study. By showing material results, the student can demonstrate that certain competencies have been acquired. At the same time, as a personal tool [Tillema 1998] the portfolio offers students the ability to closely monitor their own progress and to set new learning goals in the planning of their education. Additionally, a portfolio, which continues to grow during training, can be used in job interviews to show prospective employers the candidate's background in a much richer way. Digital portfolios work especially well in situations where students work with assignments to solve real-life problems and are free to manage their own learning process. In discussions with educational innovators at Amsterdam University of Professional Education, the idea surfaced that (elements of)

digital portfolios can be of wider use than just for assessment of an individual student's progress. Since the portfolios contain material results, these results might also be of interest to future students on which to build, much in the same way as the information chain works in scholarly work. By taking a knowledge management approach to digital portfolios, these results can be shared over the Internet or, more likely, the intranet. This implies a new task for the library in the management and indexing of these student portfolios in such a way that they too can be integrated with other information resources offered by the library. In this sense, digital portfolios are an extension of the first domain identified—digital libraries and digital learning environments—but now include the intranet. The emphasis here is on the institution as a knowledge organization, and the integration of that knowledge with other information resources.

### Information Literacy

Adding digital portfolios to the ever increasing amount of information available leads to a third domain in which libraries can play a more active role in support of educational innovation: information literacy. The concept of information literacy can be traced back to the 1970s and was originally connected to democratic ideals. Throughout the years, the view of information literacy has evolved towards a more technical one and has been connected to the development of the information society [Webber and Johnston 2000], a term which is now being replaced by the notion of the knowledge economy. A well-known definition of information literacy is the one developed by the American Library Association [ALA 1998]:

*“Information literate [people] are not only able to recognize when information is needed, but they are also able to identify, locate, evaluate, and use effectively information needed for the particular decision or issue at hand. The information literate person, therefore, is empowered for effective decision making, freedom of choice, and full participation in a democratic society.”*

There are many more definitions of information literacy, but they all share an emphasis on personal competencies, which are usually broken down by the chain: recognition of an information need, development of a search strategy-query formulation and selection of sources, evaluation, synthesis, and effective use of the new information. Sometimes, correct citing is also seen as a crucial competency. In addition, information literacy is often mentioned together with the concept of critical thinking skills. Notice also how information literacy is conceptually closely linked to terms like “active learning”, “problem-based learning”, “student-centred learning”, “lifelong learning”, and “learning to learn”.

It is impossible to imagine an information *illiterate* knowledge worker. Hannelore Rader [Rader 1997] remarked that “[l]ibrarians are uniquely qualified to assume an active role in the new teaching environment because of their skills in collecting, evaluating, organizing and providing access to information.” Information literacy can be seen as building on, but going way beyond, traditional library instruction. Increasingly, librarians will be involved in teaching classes—sometimes in close cooperation with faculty, sometimes in general skills courses. An important trend in the last few years is that library staffs are developing internet-based instruction modules. The Texas Information Literacy Tutorial <<http://tilt.lib.utsystem.edu/>> is an excellent example of this latter approach, which has gained widespread recognition in the library community.

### Collaborative Course Design

Of course, librarians who are building expertise in developing web-based course material can also use this expertise in a more broad sense. The idea here is that—in contrast with the traditional situation in which teaching staff develops courses on their own, and choose the way they teach and assess student progress (the teacher as king of his class)—learning environments of the future will be designed by multi-disciplinary teams of experts. Experts in developing course material, programmers, graphical designers, and experts in assessment, all will work together in designing rich modularized learning environments that offer alternative learning routes to different types of students.

However, many learning environments build on a model for which origins can be traced back to early distance education. In this model, students are given a “box” containing all the material for a course they need to master, so-called self-contained courses. An approach that, of course, made sense in traditional distance education where library support has always been a rather cumbersome issue [Unwin, Stephens and Bolton 1998]. Alan Bundy [Bundy 2000] remarks that digital learning environments lead some educators to use the technology to gain even more control over students.

But if the emphasis is on developing competencies needed to become knowledge workers, and if work and learning are more interconnected, one might expect that learning environments will become more open. Students in such a model are expected to go beyond the primary learning materials offered by teaching staff and are expected to explore independently other information sources as well.

Again, if more active learning styles become the norm, then one can foresee a role for librarians in the multi-disciplinary teams developing

learning environments such as those mentioned above. Librarians can add links to the resources—print and electronic—available in their collections and on the web. They can explain how information resources in a particular subject field are organized and how students can find their way in subject areas that are relatively new to them.

A nice example of this approach is the module DEsite <<http://cwis.kub.nl/~dbi/instruct/eu/>> developed at Tilburg University to explain the complexities of the decision making process in Europe. The module was developed in close cooperation between legal scholars and library staff. Lawyers explain the technical and legal aspects of the decision making process, and library staff show how to trace the many documents produced in this process in the jungle of European Union databases and web sites. Together they have built a learning environment that individually they could not have produced easily. The DEsite model shows the synergy that is possible, and the result is a rich learning environment for students and an electronic reference tool for lawyers active in this field.

### **Physical and Virtual Learning Environments**

Techno-enthusiasts tell us that virtual learning environments will suffice to satisfy the needs of future students. This is not to imply that people won't be working together, but they will do this work time and place independently using groupware. This picture of a world of students and knowledge workers lonely behind their desktops denies the important social aspects of learning and working. John Seely Brown and Paul Duguid [Brown and Duguid 2000] remind us of the importance of the social context in which people give meaning to information and refer to (real, not virtual!) communities of practice as ideal learning environments. Noriko Hara and Rob Kling studied student frustrations with purely web-based learning environments [Hara and Kling 1999] and the results of their study reinforce this point. Students encounter many technical problems and miss the direct feedback inherent to class room situations where even the body language of the teacher gives important clues. Next to virtual learning environments, the physical learning environment will remain of importance too, and the two will probably coexist for generations to come.

The (physical) library is a learning environment ideally suited to support more active learning styles. Kerstin Friden [Friden 1996] studied the effects the introduction of problem-based learning had on the use of the library. She found that students made use of the library much earlier in their training, and the use was more intensive and more equally spread over the year. If we look at recent developments in library architecture in the United States [American Libraries 1999] some trends in library functions become more visible. There is a clear trend towards more client-

centred buildings instead of the collection-centred ones of the past. Some libraries experiment with lounge-like facilities and offer pleasant reading rooms, not just for individuals but also for groups. Integration of libraries with computing facilities is a clear trend, one that will present even more of a challenge now that multimedia computers are becoming the norm. Increasingly, the term “learning environment” or “learning centre” is used for this kind of facility. It shows that, next to digital learning environments, there is also a need for physical learning environments where students and teachers find a wealth of resources and facilities, and where they can work, on their own or together, in order to learn and teach.

### **Implications for Library Staff and Organization**

The linking of digital libraries to digital learning environments, standards issues, knowledge-sharing, support in education, more active support of educational processes, classroom instruction, development of course modules in multi disciplinary teams, rethinking and redesigning library buildings—all these issues have obviously profound implications for library personnel. Richard Biddiscombe [Biddiscombe 2000] sees a strong need for the library itself to become a learning organization. We might add that, now more than ever, lifelong learning becomes important for library staff.

Hannelore Rader, a pioneer in this field, emphasizes leadership and innovative attitude of library personnel. She stresses the importance of developing partnerships between library staff and faculty. This requires a proactive approach: look at what is going on in education in your institution and show where library resources can enhance learning environments. In her view, library staffs have an advantage: they can build on their expertise in digital libraries, and they have a head start in using modern technology. Ultimately, in Rader’s view, librarians should become partners in educational innovation.

Patricia Iannuzzi [Iannuzzi 1998] reported on developing library-faculty relationships at Florida International University. Organizational culture is the main obstacle in developing these relationships, and it takes time to change this culture. At Florida International University, the introduction of information literacy was seen as an opportunity for rethinking the role of the library. Iannuzzi warns that librarians think too much about how to integrate information literacy in new initiatives, instead of wondering how information literacy can help these initiatives to succeed. Finally she gives some practical advice: keep informed, meet the key people, and get involved. It can be expected that more active library support of educational innovation will give rise to new types of jobs. Some early examples are the academic technology specialists at Stanford



University in the United States <<http://acomp.stanford.edu/atasp>> and the learning technology officer at the University of Edinburgh in the United Kingdom [Alexander 2000]. The academic technology specialist is a hybrid function, combining library and ICT expertise, and the specialist's task is to support teaching staff in the use of new technology. Most of the time (about four days a week), these specialists work with faculty in their offices and classes, the remaining day of the week is used to exchange experiences. Edinburgh's learning technology officer acts as a bridge between library and academic staff to ensure that library expertise is properly exploited, a definition that seems a bit too library-centred.

On a larger scale, there could be organizational consequences. Much in the same way that digital library projects have led to closer cooperation, and sometimes mergers, between libraries and computer centres, educational innovation leads to closer cooperation between libraries, computer centres and educational support units. Examples of such cooperation include the University of Newcastle, Australia [O'Brien and Sidorko 2000], and the DINKEL Institute of Twente University in the Netherlands <[http://www.dinkel.utwente.nl/dinkel\\_en.html](http://www.dinkel.utwente.nl/dinkel_en.html)>. Another option is to explore the possibilities of networked organizations in order to mobilize and combine the many different competencies spread throughout higher education institutions.

### **Institutional and Library Strategies**

This article has sketched interesting challenges for librarians wishing to pursue a more active role in educational innovation. An important final question is whether there are organizational and strategic preconditions that must be met in order to succeed. In their reports on the America Library Power project, Carol Collier Kuhltau [Kuhltau 1999], and Norman Webb and Carol Doll [Webb and Doll 1999] stress that the most important condition is that there is a basic agreement between administrators, teachers and library staff on what kind of education an institution wants to give. Those schools advocating more active learning styles will benefit especially from increased cooperation. The pay-off for students is an increase in information literacy and critical thinking skills, core competencies for knowledge workers.

Even if there is no shared institutional vision on education, there is no excuse for librarians to wait and see. It just implies that they have to find alternative routes. One nice thing about networked organizations is that one can build them without the consent of administrators. With or without an institutional strategy, it is still a librarian's task to support teaching and learning, and to develop relationships with faculty further and in the direction of supporting their teaching. Librarians should talk

with students and find out in which ways librarians can best accommodate student learning. Librarians can start small and develop ideas and projects in close cooperation with their patrons.

Looking at examples of colleagues at other institutions to find out what works and what doesn't—and why—is a good place to begin. Librarians have, and can develop further, unique skills to support educational innovation and they have the opportunity to act as role models within their institutions. After all, library work *is* knowledge work.

### **Emerging Developments of Audiovisual and Multimedia**

In developing countries today, there is a gradual emergence of the realization that knowledge and information will be the engines to drive their economies in the 21st century. Kenya is no exception. Libraries, places where information has always been stored and offered to users, have been affected the most by current technological developments. For long, most Kenyan libraries (both academic and public) have based their strength on the 'presence' of print information offering textual information whose use is connected with actual presence in the libraries themselves. However, the emerging trend points to the realization that these libraries exist in an era of information explosion, hence must make use of the current technological developments in providing a variety of new formats through which information can be stored and disseminated.

The Kenyan libraries are therefore beginning to be confronted with the information explosion created by new technological developments. The capacity of the book as the only carrier of information is beginning to burst its seams. This has made many Kenyan libraries to contemplate and redefine their positions within the current information trends. The Kenyan library organization has the following four categories: academic, public, special, and school libraries. Their systems of information provision have distinct borders as they are oriented towards specific areas of focus.

#### **Academic Libraries**

These comprise 5 state university libraries, 8 private university libraries, 4 polytechnic libraries, several teacher training and institute libraries. These libraries serve to support research, teaching / learning and other literature work oriented toward specialized scientific areas of the users.

#### **Public Libraries**

The bulk of Kenyan public libraries is formed by the Kenya National Library Service (KNLS) branches. The others are City and Municipal libraries. The KNLS was established through an Act of Parliament in



1965. Its functions include: offering mobile library services in rural and remote areas, reference services, free advisory services to schools, services for the blind, conducts national book week exhibitions, and also have AIDS corners.

### ***School Libraries***

These comprise primary, secondary, and special school libraries. They serve primary and secondary school children who, through promotion strategies, are encouraged to explore school library collections for learning and leisure. They support the Kenyan educational system.

### ***Special Libraries***

These comprise Private, Research, Diplomatic Mission, Parliament and Government Ministries libraries. They function to provide specialized information specific to their organizations.

### ***The Emerging Developments***

Times have changed considerably since the late 1980s, when the demand for audiovisual librarians to establish collections particularly in public and academic libraries, was the faintest idea in Kenya, though simmering. The emerging trend in these libraries today, is portraying a move towards AV. and Multimedia resourcing as the volume of information has become the deciding factor in modern library collections.

### ***Resourcing in Academic Libraries***

Changes in Kenya's educational system have engendered changes in teaching / learning approaches and pre-empted a shift in practice in the resourcing requirements in academic libraries. Factors motivating the shift include: the proliferation of courses, the expanding student population, the gradual recognition of student sophistication with the use of media audiovisuals, the increasing demand for continuing education and distance learning, requiring a wider utilization of information in various formats. According to the author's research findings, the following range of AV. and Multimedia resources were available in most of the libraries visited: slides, audiotapes, radio, microforms, computers, photocopiers, videos, films telephones, televisions, internet access, fax, CD-ROMs, CD-I, OPACs. A good number of new technology is being acquired by these universities to provide the users with ready reference they need, computer data banks and OPACs of library collections are popularly used for research purposes.

### ***Resourcing in Public Libraries***

The AV. and Multimedia resourcing in these libraries is still minimal. The integration of technological advances in these libraries is therefore,

still dismally slow. While the condition may be attributed to the government imposition of financial constraints on organizations using public funds, the other worrying factor is the librarians misconception concerning budgetary needs for stock acquisition-too often the “book-fund-first syndrome” prevails. A survey of the users of these libraries indicated that their literacy levels also contribute to the poor AV. and Multimedia resourcing. In fact, the majority of the users in regional branch libraries are primary and secondary school going children. Those who visit them for leisure reading have minimal educational levels, though in some regions graduate school teachers also make extensive use of these libraries. Though the old trend of media resources centre not being associated with public libraries still holds, the generation user profiles are causing ripple effects making librarians to think of establishing AV. and Multimedia resources as a means of retooling for better services.

Currently, the KNLS headquarters in Nairobi is adequately equipped with AV. and Multimedia resources. The library services here serve users with higher literacy levels and with varied information needs. Media resources commonly found in most of the KNLS branches include radios, and cassette recorders. Whether full use is made of them, is not clear. But when the author made two visits, one to a branch library in Eldoret and another in Kisumu, she found in each of them a radio, cassette receiver, and a television set working in the children’s sections. This was encouraging. The main claims that can therefore be made for the Kenya public libraries (*i.e.* KNLS branches and city libraries) are: that shortly after Kenya’s independence in 1963, though dominated by print, they have made along history of providing both information and leisure for the local communities in Kenya; such services have attracted many people into their reading rooms and made the public to identify libraries as important points for information search and important component of the society.

### **Staffing for Multimedia Resources**

In both academic and Public libraries, there is a shortage of qualified personnel to ensure the best collection of AV. and Multimedia materials and maximize the potential of technologies and other facilities. The evolution of new tools in capturing, storing, retrieving and disseminating information have caused a considerable shift in the roles of librarians. Thus, the demand for qualified librarians with skills for management of AV. and Multimedia resources is at present high in Kenyan academic and public libraries. And the increasing demand for academic and Public libraries to cater appropriately for the disabled, especially the blind, justifies the AV. and Multimedia resourcing in these libraries. It means then that the roles of the librarians must change and be proactive.

## **The Modern Library**

Modern libraries, in addition to providing patrons with access to books and other materials, often publish lists of accessions and may maintain a readers' advisory service. Interlibrary loan services, lecture series, public book reviews, and the maintenance of special juvenile collections are other important recent developments. Three systems of book classification are widely used to facilitate access to library collections: the Dewey decimal system of Melvil Dewey, the system of Charles Ammi Cutter, and the Library of Congress system. Since the 1930s public library systems have had several technological tools at their disposal, including microphotographic techniques for copying, computer data banks enabling the storage of far more information and the search of indexes and catalogs far more quickly than ever before, and computer networks that provide instant access to materials in libraries throughout the world and to the Internet and its increasingly rich resources.

Major university libraries in the United States must work to meet an enormous demand for research materials and spend nearly \$5 million a year for books and related supplies such as binding materials. Preservation of pulp-based paper, which becomes brittle after a few decades, has become a major drain on library resources; many libraries will no longer acquire books that are not printed on acid-free paper. Such libraries typically have private endowments as well as receive federal and state support. Other libraries throughout the world operate on far smaller budgets, frequently with severe financial handicaps.

The architectural design of modern public libraries in the United States has placed the highest priority on functionalism. Outstanding examples of library construction include the central housing for collections in New York City (1911), Los Angeles (1926; major renovation 1993), Baltimore (1932), and San Francisco (1996) and university buildings at Columbia (1896; no longer a library) and Harvard (1915). Modern buildings tend toward modular construction and smaller, separate housing for special collections.

## **Evolution**

The earliest known library was a collection of clay tablets in Babylonia in the 21st cent. B.C. Ancient Egyptian temple libraries are known through the Greek writers. Diodorus Siculus describes the library of Ramses III, c.1200 B.C. The extensively catalogued library of Assurbanipal (d. 626? B.C.) in Nineveh was the most noted before that at Alexandria. The temple at Jerusalem contained a sacred library. The first public library in Greece was established in 330 B.C., in order to preserve accurate examples of the

work of the great dramatists. The most famous libraries of antiquity were those of Alexandria, founded by Ptolemy I, which contained some 700,000 Greek scrolls. The library at Pergamum, founded or expanded by Eumenes II, rivaled those at Alexandria.

The first Roman libraries were brought from Greece, Asia Minor, and Syria as a result of conquests in the 1st and 2d cent. B.C. Caius Asinius Pollio established (c.40 B.C.) the first public library in Rome, but the great public libraries of the Roman Empire were the Octavian (destroyed A.D. 80) and the Palatine (destroyed c.A.D. 190) and the more important Ulpian library, founded during the reign of Trajan. In addition to these public collections, there were many fine private libraries by the time the Roman Republic was ended in 27 B.C. Of these there remain only fragments of one at Herculaneum.

The early Christian libraries were in monasteries; the Benedictines amassed a fine collection at Monte Cassino. The Romans had brought book collections to the British Isles, but important early monastic libraries were founded in York, Wearmouth, Canterbury, and elsewhere in England and Ireland by Anglo-Saxon monks. Some of the finest manuscript illumination was produced in these libraries. On the Continent, St. Columban and other missionaries founded monastic libraries in the 6th cent. Most of the ancient Greek and Latin texts that have survived until modern times were preserved in medieval European monastery libraries.

The Arabs in the 9th to 15th cent. collected and preserved many libraries, and the Jews and the Byzantines also developed fine libraries during the medieval period. In the 14th and 15th cent. Charles V of France, Lorenzo de' Medici, and Frederick, duke of Urbino, all formed fine libraries; part of the Urbino library is now in the Vatican Library. In the 15th cent. the Vatican Library, the oldest public library in Europe, was formed. In 1475, Platina, as its first librarian, made a catalogue that included 2,527 volumes. In 1257 the Sorbonne library at Paris was founded, and in 1525 the erection of the Laurentian Library in Florence, designed by Michelangelo, was begun. Many of the great university libraries (*e.g.*, Bologna, Prague, Oxford, and Heidelberg) were opened in the 14th cent.

In the United States a circulating library, the Library Company of Philadelphia, was chartered in 1732 on the initiative of Benjamin Franklin. A public library had, however, been opened in Boston as early as 1653. Other early subscription libraries included the Boston Athenaeum, the New York Society Library, and the Charleston (S.C.) Library Society. In 1833 the first tax-supported library in the country opened at Peterborough, N.H. The American Library Association was formed in 1876, and this organization spurred improvements in library methods and in the training

of librarians. Libraries in the United States and Great Britain benefited greatly from the philanthropy of Andrew Carnegie, who gave more than \$65 million for public library buildings in the United States alone and strengthened local interest by making the grants contingent upon public support. Among the innovations of the late 19th cent. were free public access to books (involving elaborate classification schemes) and branch libraries or deposit stations for books in many parts of cities; in the early 20th cent. travelling libraries, or "bookmobiles," began to take books to readers in rural or outlying areas.

### **Notable Libraries**

Among the chief modern public and university libraries are the Bibliothèque nationale and the Mazarine, Paris; the British Museum, London; the Bodleian Library, Oxford; the Vatican Library, Rome; the Ambrosian Library, Milan; the Laurentian Library, Florence; the Russian State Library, Moscow; the Huntington Library, San Marino, Calif. the Library of Congress, Washington, D.C.; the New York Public Library; the libraries of Chicago, Columbia, Harvard, Princeton, Yale, and other major American universities; and the Newbery and John Crerar libraries in Chicago.

There are several sorts of libraries in the United States and elsewhere that exist apart from the public and university systems. Three major categories of these are private libraries, usually housing special collections, *e.g.*, the Pierpont Morgan Library in New York City of rare books in the humanities and the Folger Shakespeare Library in Washington, D.C. presidential libraries, which contain the papers of past presidents not held in the Library of Congress, *e.g.*, the Jimmy Carter Library, Atlanta, Ga., the Dwight D. Eisenhower Library, Abilene, Kans., the Gerald R. Ford Library, Ann Arbor, Mich., the Rutherford B. Hayes Library, Fremont, Ohio, the Herbert Hoover Library, West Branch, Iowa, the Lyndon Baines Johnson Library at the Univ. of Texas, Austin, the John Fitzgerald Kennedy Library, Boston, the Franklin D. Roosevelt Library, Hyde Park, N.Y., and the Harry S. Truman Library, Independence, Mo.; and industrial libraries formed by many corporations to house research works relevant to their business.

### **Automated Digital Libraries**

#### ***The Cost of Access to Research Information***

Libraries are expensive and research libraries are particularly expensive. Even in the United States, few people can afford good access to primary scientific, medical, legal and scholarly information. Members

of major universities have excellent library services. So do people who work in teaching hospitals, or for drug companies or rich law firms. Others have access to information only through the tedious, inefficient system of interlibrary lending. In less affluent countries the situation is worse; even the best universities cannot afford good libraries. Must access to scientific and professional information always be expensive, or is it possible that digital libraries might change this sad situation?

The costs of a conventional research library fall into three main categories: facilities (which include buildings), library materials and staff. In digital libraries, the facilities costs are small, since digital libraries avoid the need for expensive buildings. Digital libraries require computers and networks, but these are relatively inexpensive, and the costs to users are shared with other services, such as electronic mail and word processing. To build digital libraries that are inexpensive for users requires dramatic reductions in the costs of materials and of staff. Progress is being made in reducing material costs. Open access materials on the Internet are making many primary materials available at no cost. Some open access materials are identical to those that are available commercially. Others provide an acceptable substitute, such as Amazon.com as an alternative to *Books in Print*. For several disciplines, the open access materials are already good enough to support research. In an earlier paper, I discussed the economic forms that are supporting these open access publications and the strong economic reasons to believe that the volume of open access materials will increase.

Hence, the key to inexpensive access to information lies in lower staff costs, which is the subject of this article. Big libraries are labour-intensive. Although salaries are low, staff costs are the largest item in most budgets, typically about half. The libraries at Harvard employ a thousand people and the Library of Congress more than four thousand. If professional and research information is to be available more widely, either users must bypass libraries, or libraries will have to employ fewer people. Over the past thirty-five years, libraries have automated routine clerical tasks, such as circulation or filing catalogue cards. Is it possible that, at some future date, computers might assume the skilled tasks that now require professional librarians?

The term “automated digital library” can be used to describe a digital library where all tasks are carried out automatically. Computer programmes substitute for the intellectually demanding tasks that are traditionally carried out by skilled professionals. These tasks include selection, cataloguing and indexing, seeking for information, reference services, and so on. The common theme is that these activities require considerable



mental activity, the type of activity that people are skilled at and computers find difficult. Automated digital libraries should not be confused with library automation, which uses computing to reduce routine tasks in conventional libraries.

### **Equivalent Library Services**

The remainder of this paper discusses the question of whether automated digital libraries can give good service to users. The short answer is that many aspects of automated libraries are a mirage—always just over the horizon—but some are surprisingly close or actually with us today. The underlying question is not whether automated digital libraries can rival conventional digital libraries today. They clearly cannot. The question is whether we can conceive of a time (perhaps twenty years from now) when they will provide an acceptable substitute.

Quality of service in automated digital libraries will not come from replicating the procedures of classical librarianship. More likely, automated libraries will provide users with equivalent services that are fundamentally different in the way that they are delivered. For example, within the foreseeable future, computer programmes are unlikely to be much good at applying the Anglo American Cataloguing Rules to monographs. But cataloguing rules are a means to an end, not the end itself. They exist to provide services to users, notably information discovery. Automatic methods for information discovery may not need traditional cataloguing rules. The criterion for evaluating the new methods is whether the users find what the information that they require.

Consider the contrast between web search engines and conventional abstracting and indexing services or library catalogs. Almost everything that is best about a library catalogue is done badly by a web search service. The selection of which materials to index by a web search engine relies on arbitrary considerations, the indexing records are crude at best, authority control is non-existent, and the elimination of duplicates leaves much to be desired. On the other hand, web search services are strong in ways that catalogs are weak. While cataloguing is expensive, indexing the web is cheap. The leading web search engines index several hundred million web pages every month, more than the total number of MARC records that have ever been created. It is wrong to claim that conventional catalogs or indexes are superior because of their quality control, and it is equally wrong to claim that the web search services are superior because of their coverage and currency. The value to users depends on what the user wants to achieve.

For medical research, no web search engine can approach the National Library of Medicine's Medline service. Medline has over 11 million references



and abstracts. It is built by a team of indexers who have knowledge of bio-medical research, using indexing rules and MeSH subject headings that have been developed laboriously over decades. In contrast, web search services such as Google are entirely automated. The indexes are built by a team of computers with no knowledge of what they are indexing. Google has the advantage over Medline of indexing hundreds of millions of web pages, and doing so repeatedly every month. It is quite useful for finding general information on medical topics, but it does not index the major scientific journals, its indexing records are crude, it has no understanding of medical terminology, and makes no attempt to separate sound medicine from quackery. It is a long way from being a substitute for Medline.

On the other hand, consider the trade-off between Google and Inspec, which is the leading abstracting and indexing service for computing. I used to be a regular user of Inspec, but have largely abandoned it in favour of Google. In many areas of computing, Google's restriction to open access web materials is relatively unimportant, since almost every significant result first appears on a web site and only later reaches the printed journals, if ever. Google is more up to date than Inspec, its coverage is broader and its indexing records are good enough for me to find what I am looking for. But its greatest strength is that everything in its indexes is available online with open access. In computing, substantially the same information is often available from several sources. Google provides a direct link to an open access version. Inspec references a formally published version, which is usually printed or online with restricted access. For my purposes, Google's broad coverage and convenient links more than compensate for its weaknesses.

This discussion highlights important differences between disciplines. For example, a scientist judges a library catalogue simply as a tool for information discovery, while, for a humanist, the catalogue may be a bibliographic source in its own right. Any predictions of the future value of web search engines compared with conventional abstracting and indexing services depend heavily on the publication and reading habits of people in different disciplines. However, as we look ahead twenty years, the most difficult part of the comparison is to guess how the automated tools will develop. We know that they will improve dramatically and we can anticipate that research habits will accommodate themselves to the new tools, but only a fool would attempt to forecast the precise changes that will occur.

### ***Brute Force Computing***

The first serious study of what is here called automated digital libraries was at MIT in the 1960s, under the leadership of J. C. R. Licklider, and discussed in his 1965 book "Libraries of the Future". This remarkable book

described the design of what he called “procognitive systems” for the year 2000. It envisaged digital libraries based around “information-processing schemata” that would be free from the physical constraints of books and library shelves. He listed twenty-five desiderata listed for procognitive systems. Many of these are definitely in the realm of artificial intelligence. For example, one of his desiderata was, “Converse or negotiate with the user while he formulates his requests and while responding to them.”

At the time that Licklider was writing, early experiments in artificial intelligence showed great promise in imitating human processes with simple algorithms. (For a contemporary view of this work, see Feigenbaum and Feldman, “Computers and Thought”.) Therefore, Licklider was optimistic that, within thirty years, advanced algorithms in fields such as natural language understanding would enable intellectual processes to be carried out automatically.

Thirty-five years later, we can see that many of the results that he predicted have come to fruition, but not all and not in the manner that he expected. The development of sophisticated natural language processing has been slower than hoped, with general-purpose software still on the distant horizon. However, while Licklider and his contemporaries were over-optimistic about the development of sophisticated methods of artificial intelligence, they underestimated how much could be achieved by brute force computing, in which vast amounts of computer power are used with simple algorithms. The rate of progress in computing power is described by Moore’s Law, that the number of transistors on a semiconductor doubles every eighteen months. This is roughly equivalent to saying that computing power increases 100-fold in 10 years or 10,000-fold in 20 years. Few people can appreciate the implications of such dramatic change, but the future of automated digital libraries is likely to depend more on brute force computing than on sophisticated algorithms.

Many of the most successful methods of artificial intelligence apply simple methods to huge volumes of data. An interesting example comes from the computer programmes that play chess. The IBM system that is now equal to the world’s greatest grandmasters is descended from Deep Thought, a student project at Carnegie Mellon University. The members of the Deep Thought team were not chess experts. Their breakthrough came from expertise in developing exceptionally fast hardware, which could analyze immense numbers of chess variations. The potential for automated digital libraries lies in the simple observation that:

*Simple algorithms plus immense computing power often outperform human intelligence.*

Moore’s Law tells us that the computing power will be available.

### **The State-of-the-art in Automated Digital Libraries**

The introduction of automated digital libraries is a continual process, much of it happening outside conventional libraries. Here are some current examples.

**Information Discovery:** Information discovery illustrates the complementary skills of computers and people. Humans are skilled at reading a few thousand words and extracting complex concepts. Faced with a billion pages (roughly the size of the web), they are helpless. Computers can index every word in a billion pages and search the indexes for simple patterns almost instantaneously.

The web search services represent the state-of-the-art in automated information discovery. Within each service lie a number of separate processes, each of which is carried out automatically, and each of which is constrained by the current state of computing. To build the indexes, a web crawler must decide which pages to index, eliminate duplicates, create a short index record for each page and add the terms found on the page to its inverted files. To search the index, the search engine must convert the user's query to a search command, match it against the inverted files, rank the results and return them to the user.

To anticipate the potential of automatic systems to rival the functionality of Medline in all disciplines, we need to examine the components of a system like Google and see how they could be improved. Moore's law predicts that computers will be 10,000 times more powerful in twenty years. With such computer power available, we know that the automatic search systems will be extremely good, even if no new algorithms are invented. For example, to decide how closely a document matches a query would seem to require human judgment, yet standard methods of information retrieval do remarkably well. They use the power of computers to match simple patterns as a surrogate for the human ability to relate concepts. As humans, we use our understanding of language to observe that two texts are on similar topics, or to rank how closely documents match a query. Computers can estimate closeness of match by comparing word frequencies. One basic concept, developed by Gerald Salton at Cornell University about 1970, represents each document as a multi-dimensional vector and uses the angle between their vectors as a measure of the similarity of two documents.

Evaluating the importance of documents would appear to be another task that requires human understanding, but Google's ranking algorithm does remarkably well entirely automatically. The idea behind this algorithm is simple. Google ranks web pages by how many other pages link to them. It gives greater weight to links from higher-ranking pages. Calculating the

ranks requires the algorithm to iterate through a matrix that has as many rows and columns as there are pages on the web, yet with modern computing and considerable ingenuity, Google performs this calculation routinely. As a result, Google is remarkably successful in presenting a user with the most important page on a topic or a well-respected overview. This algorithm was developed as part of the NSF-funded Digital Library Initiative.

**Archiving and Preservation:** The Internet Archive, directed by Brewster Kahle, provides a topical example of the economic advantages of automated digital libraries. The Internet is an extremely important part of modern culture and contains many materials that should be preserved for future generations. Each month, a web crawler gathers every open access web page with associated images. The Internet Archive preserves these files for the future and mounts them on computers available for scholarly research today. The Internet Archive is not perfect. Only HTML pages and images are collected, no Java applets or style sheets; the materials are dumped into a computer system with no organization or indexing; broken links are left broken; and access for scholars is rudimentary. Yet the simple fact is that without the automated approach of the Internet Archive, these materials would already have been lost. Attempts to catalogue and collect web materials using skilled librarians and archivists have floundered on the scale of effort needed to do even a rudimentary job.

**Citations, Hyperlinks and Reference Linking:** Citation analysis is a long-standing success story of applying computers to library information. Inspired by the efforts of Eugene Garfield, the founder of Science Citation Index, there is a long tradition of using citations as bibliographic measures. Hyperlinks are the web's equivalent to citations. Since they are already in machine-readable form, they are amenable to algorithmic analysis. Google's ranking algorithm can be seen as applying the concepts of citation analysis to the web.

Hyperlinks refer to items or copies of a work, but citations normally refer to the work itself or a specific manifestation. Automatic systems are becoming capable of extracting a reference from a document and linking it to the digital object that it references. Currently, the most fully automated system for reference linking is the SFX system, created by Hebert Van de Sompel and colleagues at the University of Ghent. Reference linking is one of the building blocks that are being used to build large-scale automated digital libraries. ResearchIndex is a digital library of computer science materials, created entirely automatically by Steve Lawrence and colleagues at NEC. It makes extensive use of citation analysis and reference linking. It downloads papers from the web. If they are in PostScript or PDF, it converts them to text. It parses the papers to extract citations and the context for the citation. It provides users with services such as searching

the entire text or the citations, listing the references within a paper, following the citation links, or displaying the context in which references appear. An interesting aspect of ResearchIndex is that it provides a way for users to submit corrections, automatically of course.

***Beyond Text:*** Metadata is one of the foundations of librarianship. There are a number of projects that extract metadata from digital objects automatically. Perhaps the most remarkable is the Informedia project, led by Howard Wactlar at Carnegie Mellon University. Informedia has the extremely ambitious goal of providing access to segments of video, such as television news, entirely automatically. Thus it includes algorithms for dividing raw video into discrete items, for generating short summaries (called “skims”), for indexing the sound track using speech recognition, for recognizing faces and for searching using methods of natural language processing. Each of these methods is a tough research topic and, not surprisingly, Informedia provides only a rough-and-ready service, but overall it is surprisingly effective. Moreover, many of the weaknesses of Informedia could be overcome by applying huge amounts of computing power. Informedia was another project of the Digital Library Initiative.

### **Reference Librarianship**

The job of a reference librarian ranges from helping users with the mechanics of using a library to tasks that require deep intellectual understanding. The ugly term “disintermediation” is used when users perform for themselves tasks that used to be carried out with the help of a librarian. Could we conceive of an automated digital library that disintermediates all the services that reference librarians now provide?

Information retrieval provides a good test case. The mechanics of searching have been almost completely assumed by computing. The current generation of scholars never experienced the tedium of reading through long lists of abstracts, searching huge card catalogs and following citations laboriously from journal to journal. Searching a card catalogue required skill. Because of the labour in creating and filing cards, only a small number of entries were provided for each work. Since few users ever mastered the complex rules for the main and supplementary headings, or the intricate filing conventions, serious users turned to reference librarians for help.

Automated digital libraries can clearly help with the mechanics of searching, but information seeking is more complex. Some years ago, I wanted to find data to support Moore’s Law. Specifically I wanted to compare the rate of progress in semiconductors, magnetic media and telecommunications. After searching for half an hour using the standard



online tools, I gave up and asked a reference librarian. Half an hour later she provided me with the data that I wanted. There was nothing magical about the methods that she used. She simply had more expertise in the idiosyncrasies of the information available and how to navigate through it. Automated libraries are a very long way from providing such insights. In disciplines with complex organization of information, searching for information remains a skilled task. Often, knowledge of the subject matter is paramount and the experts develop their own skills. For example, carrying out legal research online is a basic skill that every law student learns. Historically, most doctors needed the help of a medical librarian to carry out an in-depth search. Now, even in medicine, the tools available to the user are sufficiently good that most searches can now be carried out directly by the user. It seems that automatic tools are steadily reducing the need for reference librarians in these fields.

However, consider a problem once set to a student by Marvin Minsky of MIT. How would we create a computer system to answer questions such as, "Why was the space station a bad idea?". For many years, we have had computer systems that can search enormous collections of text for the phrase "space station", or simple variations. For this purpose, computers clearly out-perform human searching for both speed and accuracy. But consider the concept "a bad idea". What is the possibility of computers being able to examine any arbitrary text and look for such abstract concepts within it? The recognition that no existing computer could address such questions stimulated the student (Danny Hillis) to design new computer architectures and to found the company Thinking Machines, but even with the most advanced parallel computers, nothing on the horizon approaches human judgment in understanding such subtleties.

### **Cost**

This article ends as it began, with cost. Undoubtedly the greatest advantage of automated digital libraries is cost. Computing power is much cheaper than human expertise, more so every year. When money and time are available in abundance, skilled professionals have no equal. But they are always in short supply. In the United States, the National Library of Medicine is funded by the government and provides open access to Medline, but only rich lawyers can afford to use the legal services provided by Westlaw and Lexis. Because of the cost, traditional library systems are selective. Indexing and abstracting services restrict their coverage to a carefully selected set of publications. Catalogs do not include potentially useful information from monographs, such as individual items in anthologies, subheading, captions, and so on. There are essentially no attempts to catalogue the content of web sites, below the level of the whole

site. Even so, these services are very expensive. Automatic systems have no trouble with being inclusive; they have problems when they attempt to be selective. Their weakness is lack of precision. They exhibit what, in a human, would be called very poor judgment. Both ISI's Web of Science® and ResearchIndex provide users with interlinked scientific documents. Web of Science is a splendid service, but its production is not fully automatic, since ISI relies on skilled personnel for election and for key parts of the input process. Because the ResearchIndex methods are automatic and are applied to raw data, ResearchIndex inevitably has errors, while the skilled staff at ISI eliminate almost all errors, but at a cost. A library subscription to the Web of Science costs \$100,000 per year. ResearchIndex is free.

To conclude, automated digital libraries combined with open access information on the Internet offer to provide the Model T Ford of information. Nobody would claim that the Model T Ford was a peer to the handcrafted cars of its generation, and automated digital libraries cannot approach the personal service available to the faculty of a well-endowed university. But few people could afford a hand-built car, and few people have easy access to a major research library. The low cost of automated digital libraries is already bringing scientific, scholarly, medical and legal information to new audiences.





## Manual of Digital Libraries

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### What is a Digital Library?

A digital library is a collection of digital objects. A collection of research papers is a typical example. When this collection gets sufficiently large, users of the digital library cannot examine each paper individually to find if its subject interests them. To address this problem, digital librarians create an interface to stand between the content of the collection and the user. In a traditional library, an example of this would be a card catalogue—a collection of small cards that represent the larger objects contained in the collection. These cards are more manageable than the books that they represent. In a digital library, there are a number of ways that we can present the digital collection to the user. The first thing that we need to do is to describe each object in a manageable way. This description is called metadata—data (the description) about data (the digital object). This metadata is more manageable than the digital objects that it represents. Metadata is written in a standard format. This allows the metadata to be manipulated using automated tools.

In the past, the problem has been that digital libraries have been very expensive to develop. This is because people were programming them all from scratch. Lots of people and organizations have digital collections. Why should each digital library be a reinvention of the wheel? Another problem is interoperability. When many organizations have collections, users must search each one until they find what they need. What if the users could go to one place and look through lots of collections at once? For this to happen, the programmers that developed one digital library would have to talk to the programmers of the other library to get the collections to talk together. Then two digital libraries could interoperate, but what about all of the others?

This is where the idea of Open Archives comes in. The Open Archives Initiative created a standard protocol, a way that collections provide descriptions about their contents. This is the basis for the creation of interoperable digital libraries. By standardizing the interface to the metadata, tools to work with this data can be created only once. Organizations that can't afford programmers can now have digital libraries, using these standard tools.

This is the purpose of Digital Library in a Box. DLBox is the collection of standard tools using a standard interface and underlying protocol needed to create a digital library that is interoperable with other digital libraries.

DLBox uses a "component model." Each major feature of a digital library is broken into functional building blocks (or components). These building blocks can be reassembled by the digital librarian to provide the features that are needed. This allows organizations that want simple libraries to invest a minimal amount of effort and quickly get up and running. Organizations that want a full-featured library can get there with less effort. Either organization can add features, like a search engine, incrementally by adding more components.

So, if you already have a digital collection, you can use components to make it interoperable with other collections. If you are thinking about building a digital library, you can use DLBox tools to construct it from the ground up.

Digital Libraries (DLs) have traditionally been positioned at the intersection of library science, computer science, and networked information systems. The different underlying philosophies of these three fields has had an unsettling influence on the development of DLs. While library science is fairly mature, networked information systems are constantly evolving to keep pace with Internet innovation. DLs are thus expected to demonstrate the careful management of libraries while supporting standards that evolve at an astonishing pace.

This architectural moving target is a predicament that all DLs face sooner or later in their lifecycle, and one that few manage to deal with effectively. To exacerbate this problem, there has been a general desire for systems to be interoperable at the levels of data exchange and service collaboration. Such interoperability requirements necessitated the development of standards such as the Dublin Core Metadata Element Set and the Open Archives Initiative's Protocol for Metadata Harvesting (OAI-PMH).

These standards have achieved a degree of success in the DL community largely because of their generality and simplicity. Informed by those lessons, this project is an attempt to consistently extend known interoperability

standards to form the basis of a framework of components for building extensible DLs.

### **Preamble**

“Open” is a word that conjures up many different connotations depending on the context in which it is used. In this case its use is deemed appropriate since Open Digital Libraries (ODLs) build directly upon the concepts and philosophies of the Open Archives Initiative [OAI, 2001]. Just as Open Archives are data repositories that allow remote access using a simple and well-defined publicly available protocol, so too will ODLs accomplish the same in the context of service components.

Extension of standards, such as the OAI-PMH [Lagoze and Van de Sompel, 2001], is another contentious issue since it invariably adds undesirable complexity. This work is based on the premise that if a new standard is needed, it is better derived from an existing and accepted one as long as the two are completely separable.

Digital libraries are far from well-defined [Borgman, 1999] Definitional agreement may only extend to notions of accessible collections of information. Because of this, it is hardly surprising to note that the field does not easily converge on standards and technology. Most of the existing systems that are classified as DLs have resulted from custom-built software development projects—each the product of intensive design, implementation and testing cycles. There are many reasons why this effort is repeated for each project:

- Many DLs are built in isolation as a response to the needs of a particular community, in most cases not involving personnel with prior experience.
- Most modern DLs have WWW interfaces—thus the user interfaces and process flows are fashioned to resemble the way people use the WWW, which itself changes with time.
- Each DL is aimed at meeting the needs of a particular community—so the underlying programme logic varies vastly among systems.
- Most DLs are intended to be quick solutions to urgent community needs—so not much thought goes into planning for future redeployment of the systems.
- DLs, by the very nature of being responses to user needs, can be arbitrarily complex, so new projects sometimes choose to develop from scratch because it is cheaper than adapting what already exists to a different set of scenarios.
- As DL systems get more complex, extensibility becomes more difficult and, as a result, maintainability is compromised. As testimony to

this, at the turn of the millenium, Dijkstra wrote that computing's central challenge of "how not to make a mess of it" had not been met [Dijkstra, 2001].

- There are very few software toolkits available to build DLs.

A natural solution would be to create software toolkits. A few institutions have investigated this approach. Dienst [Lagoze and Davis, 1995] is a DL system developed at Cornell University with tasks clearly divided and specified by a protocol based on HTTP and eventually using XML. It was developed to support distributed operation of the NCSTRL project and, while technically sound, required an investment in software, methodology, and support that some prospective users were not willing to make. The Repository-in-a-Box [NHSE, 2001] software from the University of Tennessee is an alternative, as is the E-Prints software from Southampton University [OpCit, 2001]. Both these toolkits avoid many problems related to complexity of DLs by defining workflows that are not easy to change. All of these and other systems have had varying degrees of success among archivists looking for drop-in solutions but they generally suffer from two basic problems:

- The range of possible workflows is restricted by the design of the system.
- The software is either built as a monolithic system or as components that communicate using non-standard protocols—in both cases making understanding and modification a complex process.

Because it is widely accepted as good software engineering practice, most modern programming environments adopt some form of component model. Even in the DL community, as far back as 1994, early discussions on the future of DLs [Gladney, et al., 1994 2001] concluded that components were an integral part of the solution. The University of Michigan Digital Library Project investigated using autonomous agents as the basic components of a DL [Birmingham, 1995]. Stanford's InfoBus project defined a set of services to support distributed digital libraries, each wrapped in an object, communicating through a remote method invocation interface [Baldonado, et al., 1997; Roscheisen, et al., 1998]. Other scientific communities embraced component technology as an aid to rapidly and correctly solving problems—for example, the Sieve framework at Virginia Tech [Sieve, 2001] encapsulates scientific functionality into software components. However, in spite of the widespread use of such technology, for the reasons outlined above, the DL community did not in general adopt a single component framework.

In October of 1999 the Open Archives Initiative (OAI) [Van de Sompel and Lagoze, 2000] was launched in an attempt to address interoperability

issues among the many existing and independent DLs. The focus was on high-level communication among systems and simplicity of protocols. The OAI has since received much media attention in the DL community and, primarily because of the simplicity of its standards, has attracted many early adopters.

The OAI Protocol for Metadata Harvesting [Lagoze and Van de Sompel, 2001] in essence supports a system of interconnected components, where each component is a DL. Also, since the protocol is simple and is becoming widely accepted, it is far from being a custom solution of a single project. The OAI protocol can be thought of as the glue that binds together components of a larger DL. However, since DLs are themselves defined only loosely, this collaborative system could be composed of individual component DLs, each with different functionality. In the extreme case, each component DL could supply the functionality of exactly one (part of a) service expected by a user. This is the approach taken in this work, where *Digital Libraries are modelled as networks of extended Open Archives, with each extended Open Archive being a source of data and/or a provider of services.*

This approach to DL architecture is further motivated by the following factors:

- Componentization and standardization are built into the system by design if every service is delivered by an extended Open Archive. This inherently supports reuse and allows for interoperability at the level of individual services within the DL.
- The ODL approach closely resembles the way that physical libraries work. In a physical library the individual systems interoperate within their own communities. For example, the purchasing department interoperates with the booksellers and the inter-library loan department interoperates with peer departments at other libraries. A retiring head of the acquisitions department can be replaced by a peer at another institution because he or she understands a common protocol for all libraries. Interoperability is achieved at the level of individual services rather than at the level of organizations.
- There is currently a significant difference in technology between a research DL and a production DL. The former focuses on experimental concepts and technology while the latter deals with the real issues of meeting the needs of users. Connecting the two is not usually a simple task, but if both systems subscribe to a common protocol, that would greatly simplify matters—OAI can be the basis for that protocol.

- The Internet is without a doubt the single most effective information dissemination tool of current times. This was primarily possible because of the simplicity of the protocols it relies on and the hierarchical manner in which protocols such as HTTP [Fielding, et al., 1999] build on more fundamental protocols such as IP and TCP. The OAI provides us with a simple protocol to transfer metadata; building simple layered extensions to this protocol would closely follow the proven methodology of the networking community [ISO, 1994].
- While complex system interactions might support complex operations, they also raise the bar on adoption of new technology. A good example would be the hypertext community where the WWW has succeeded well beyond other projects simply because its model was always a simple one [Berners-Lee and Fischetti, 1999]. Modelling DL services as Open Archives would enforce such a degree of simplicity.
- Scholarly communication is a rapidly changing field and many people are slow in making the transition to new forms of communication in spite of a growing number of advocates [Harnad, 1999]. The success of new DL systems in this arena relies on keeping pace with current thinking on how publications are created, processed, and distributed. A simple component model will greatly simplify changes in the workflow of the DL to support the gradual shift to new and improved processes.
- User interface design and workflow management are complex tasks. But common base-level services—mediators for connecting resources or middleware in three-tier client-server development [Umar, 1997]—have emerged in practice, for example, supporting searching and browsing. If an arbitrarily complex user interface could access DL components in a standard manner, it would be easier to interchange components and add new services—the OAI protocol could be the basis of that standard protocol for components.
- Norman advocates that designs should be visible, understandable and natural in their mappings [Norman, 1990]. The OAI protocol is already establishing itself in those areas so it makes an ideal foundation upon which to build.

### **Open Digital Library Design**

ODLs are guided by a set of design principles and operationalized with the aid of a set of OAI-PMH extensions. By analyzing some of the emerging aspects of Internet development, a set of basic design principles have been extracted to guide the construction of new protocols so that they are



consistent with proven techniques in networked information systems. The observed factors that influence these include: simplicity of protocols, openness of standards, layering of semantics, independence of components, loose coupling of systems, purposeful orthogonality, and reuse wherever possible. Based on these ideas, a generalization of the OAI protocol is possible so that it may be used for purposes that go beyond its original intention, namely to provide higher-level DL services. Formally, these principles are stated as follows:

1. All DL services should be encapsulated within components that are extensions of Open Archives.
2. All access to the DL services should be through their extended OAI interfaces.
3. The semantics of the OAI protocol should be extended or overloaded as allowed by the OAI protocol, but without contradicting the essential meaning.
4. All DL services should get access to other data sources using the extended OAI protocol.
5. Digital Libraries should be constructed as networks of extended Open Archives.

Each DL service is then designed as a self-contained component that communicates with other services using a protocol that is an extension of the OAI-PMH. A typical example of how this works in practice is illustrated, which shows a search engine's relationships to its data source and the interface that uses it as a service component.

In this case, the OAI Harvester is used to obtain a stream of data which in turn is used to create indices for searching. Queries are then submitted through the OAI Data Provider interface. These queries overload the semantics of the OAI-PMH, by using the OAI notion of sets to correspond to the dynamically generated result sets of a search engine. Analogously, when such a request is submitted, the query is mapped to the name of a set. Thus, without making any changes, the OAI-PMH can be used to serve as the interface to a search engine. With a few minor additions to the OAI-PMH, information such as cardinality of result sets also can be returned.

An example of such an OAI request, with overloaded semantics for a search component is:

```
verb=List I dentifiers & set = odl search 1/computer % 20  
science/1/10
```

This query specifies that the response should contain the identifiers of the first 10 most relevant documents with respect to the query "computer



science". The response generated by the component is in the standard format returned by OAI-compliant archives.

To use this component in a typical ODL network, it must be connected to a source of metadata and a user interface, much in the same manner as UNIX pipes and filters are used to connect cooperating processes together.

### **Implementation and Analysis**

To test the feasibility of ODL design, a suite of components was specified, implemented, integrated into a network, and assessed for their ability to replace existing systems. These components and their functionality are specified.

*Component*

*Function*

*ODL-Union*

*Combine metadata from multiple sources*

*ODL-Filter*

*Reformat metadata from (non-OAI-Conforming) data sources*

*ODL-Search*

*Provide search engine functionality*

*ODL-Browse*

*Provide category-driven browsing functionality*

*ODL-Recent*

*Provide a sample of recently-added items.*

### **Components Used in Prototype Systems**

The components were implemented individually, tested using the Repository Explorer [Suleman, 2001], and combined into an ODL network to provide DL services over the union archive of metadata maintained by the Networked Digital Library of Theses and Dissertations (NDLTD) [Suleman, et al., 2001]. Then, to illustrate reusability, some components were integrated into the production server for the Computer Science Teaching Centre [CSTC, 2001]. A system architecture for the former of these systems is depicted.

There were seven source archives from which data was harvested through OAI-PMH interfaces, one of which required a filter because of minor differences in implementation from the others. The data was aggregated into a central archive for use by local services. Three high-level services were provided using this data: Search, Browse, and Recent. Search

indexed the data and exposed an OAI-like interface for specifying keyword queries. Browse sorted the data and exposed a slightly different OAI-like interface for accessing items by controlled vocabulary elements. Recent stored recent items and upon request returned a random sample of those.

The user interfaces were created using minimal scripts to translate HTML form elements into ODL requests and then convert the XML responses into human-readable displays using XSL stylesheets.

The design and implementation of the NDLTD ODL system conformed to the design principles stated earlier and thus provide an extensible framework for future expansion. Initial reactions to the design have been positive, with simplicity cited by some users as a motivation for using such a system.

Equivalence of the ODL network to a monolithic system is an important criterion for acceptance. Work has already been done on techniques to improve speed and reduce redundancy in storage. Substantial speed improvements were realized by using caching and persistent CGI script facilities provided by Fast CGI and Speedy CGI. Storage requirements were reduced by obtaining records on demand from co-located metadata archives. Network performance was tuned through some initial studies of the complexity of the OAI approach to harvesting. The net result of designing by principle and implementing for real-world scenarios is that the resulting system provides the expected level of service while still abiding by the principles of software engineering as applied to networked information systems, and the design and development of Digital Libraries in particular.

### **Future Work**

It is hoped that the results of this ongoing work will change the way people build Digital Libraries. The evaluations and feedback received from users and colleagues strengthen the case for building on the OAI protocol to support high-level services, and composition of those services into complete Digital Library systems.

Building upon a foundation of extensibility, it then will be possible to work on providing more interesting services to users, thus bridging the wide gap between current research and production systems, and ultimately making information more accessible to more people.

### **Distributed Interoperable Metadata Registry**

Providing distributed, flexible search and retrieval of their collections was one of the promises of digital libraries. Although—with various degrees of success—many digital libraries have been developed, their ability to interoperate has always been limited. The main difficulty in interacting

with digital libraries is not in the standardizing of network access across systems but lies in the inability to consistently determine the nature of the information they contain. This problem arises largely because of the lack of agreed metadata standards. Metadata commonality is necessary for clients and systems to search for, access, and exchange distributed information.

Metadata, at an abstract level, describes intrinsic and extrinsic data attributes according to an arbitrary, specific, and potentially unique conceptual space. Simply restated, this means that different types of metadata describe data from different, possibly unique perspectives. Two sets of metadata are considered compatible if their conceptual spaces overlap. Metadata interoperability can therefore be described as a measure of the compatibility of two metadata sets. In practical terms, metadata interoperability represents the ability of a system to cross-walk from the conceptual space of one metadata set to the other.

Types of metadata used today often lack some of the basic requirements that enable compatibility, such as standard definitions and unique identification, without which it is difficult to determine the metadata intents, what it describes, or how to process it. To make matters worse, there are nearly as many types of metadata as there are digital collections.

There are two main approaches with which researchers have experimented to achieve metadata interoperability across digital library systems: the first approach is to define a common metadata standard, and the second consists of building metadata gateways to convert specific metadata corpora into another base standard for performing uniform queries.

We believe it is neither realistic nor practical to seek metadata interoperability through the adoption of a single metadata standard. We are also of the opinion that incompatible metadata is unavoidable and will persist. Therefore, we believe that any solution to the problem of metadata interoperability will have to accommodate the multiplicity of incompatible metadata.

### ***A State of Perpetual Metadata Heterogeneity***

Metadata corpora have been non-interoperable primarily because of the wide range of data genres they describe and because the metadata is created in diverse environments. Metadata must provide accurate, specific, and contextually relevant information about the data it describes. Thus new, data-specific, metadata descriptions are continuously being developed, resulting in a multiplicity of concepts and namespaces that greatly complicate metadata interoperability.

Adopting one recognized metadata standard such as the Dublin Core [DC] or MARC [MARC] would result in better all around metadata interoperability, but for practical, technical, and political reasons, this approach is neither realistic nor necessarily desirable. Indeed, if a single standard were adopted, the resulting metadata would not be appropriate for describing all types of data and in effect, would not be interoperable. A one-size-fits-all standard would either not provide enough information about the described data or the metadata would be overwhelmingly difficult to generate, resulting in imprecise descriptions.

Even if partial success is achieved, as is the case with Dublin Core, experience shows that its limited number of metadata elements, key to insuring interoperability, also restricts the more sophisticated metadata user. To address this issue, metadata qualifiers have been added to the Dublin Core to gain additional power of specification and substructure [BM99]. This adaptation allows for more complex metadata uses, but at the same time threatens the original goal of interoperability.

### **Dealing with Incompatible Metadata**

When used on its own, the term “metadata” references the general notion of data about data. However, this simple description is too broad. In order to avoid generating further metadata terminology confusion, below we define four additional metadata terms we will use throughout this article:

- *Metadata Element*: Represents an abstract yet specific conceptual notion to characterize data. An example is the Dublin Core’s “Creator” metadata element, which defines the concept of an entity primarily responsible for creation of the content of a resource [DC].
- *Metadata Element Instance*: Describes a specific set of data according to a metadata element’s conceptual notion. For example, the metadata element instance of “Creator” for this article is Christophe Blanchi and Jason Petrone.
- *Metadata Schema*: Represents an arbitrary but specific set of unique data elements. An example of metadata schema is the Dublin Core, which is named after its set of fifteen unique metadata elements.
- *Metadata Schema Instance*: Describes a specific set of data according to that metadata schema’s set of metadata elements respective conceptual notions. For example, all the metadata about this article is described using instances of the Dublin Core metadata elements.

We believe that one of the most basic requirements needed to achieve broad metadata interoperability lies in the ability to describe and identify metadata schemas and their respective metadata elements.

Without description, a metadata schema is an arbitrary set of terms whose purposes cannot be independently determined. Without metadata schema identification, there exists no mechanism to deduce the nature of that metadata schema or how to use it.

### **Metadata Schema Description**

To describe each metadata schema we adopted Part 3 of the ISO11179 standard. Part 3 of the standard organizes metadata elements into five general categories: identifying, definitional, relational, representational, and administrative. The specific set of attributes expressed in each of these categories provides a precise, unambiguous, description of the nature, context, and conditions of use of each metadata element within a metadata schema. The complete set of metadata element descriptions for a given metadata schema represents that schema's definition.

This description enables independent parties to acquire the same understanding of the nature, context, and condition of use of each field of the metadata schema. It is important to note at this point that although we use the ISO11179 standard to describe our metadata schemas, the framework's mechanisms are not dependent on the standard to function. Indeed, another method for describing the metadata schemas could be used instead of, or in conjunction with, the standard as long as the resulting descriptions precisely and completely describe each metadata schema.

To facilitate generation of metadata schema descriptions, we created a Document Type Definition (DTD) that specifies the various attributes for describing a metadata element and that encapsulates some of the rules described in Part 3 of the ISO11179 standard. Using Extensible Markup Language (XML) simplifies the metadata schema description encoding process and provides an additional level of integrity checking. The use of XML enables the independent generation of accurately encoded metadata schema definitions.

### **Metadata Schema Identification**

In our approach, we uniquely identify each metadata schema and its metadata elements using the CNRI Handle System™. The Handle System is a comprehensive system for assigning, managing, and resolving persistent identifiers, known as "handles," for digital objects and other resources on the Internet.

An added benefit of using a handle as a metadata identifier is that it provides a simple mechanism to associate each metadata schema identifier with a specific set of resource pointers. These pointers can be used to locate a particular metadata schema's description and services. Since the metadata

schema handle can be used as an identifier, description, or service pointer, we assert that the handle represents the *type* of a metadata schema.

### **Digital Metadata Objects**

Recognizing the impracticality of finding a single metadata standard, we seek to achieve metadata interoperability by dynamically converting metadata based on the evolving needs of clients or systems. Our approach to metadata interoperability focuses on developing a framework geared toward making metadata instances, schema, and services into first class network objects. This involves typing, identifying, and defining metadata, and requires a framework for associating metadata with distributed services.

A digital metadata object is a distributed first class object. It can describe itself, its metadata, and its metadata schema. It provides a set of services for converting its metadata into one or more different metadata schemas and can generate different representations and encoding of its metadata. Our framework allows for new metadata and metadata schema to be dynamically added and to be immediately accessible as distributed first class objects. Our framework does not provide any new methods for converting, identifying, and describing metadata and, in many respects, uses the same solutions found in currently existing middleware.

Nor are we proposing any overall conceptual approach for the creation and mapping of metadata schemas, as the indecs project does for the intellectual property community. We are proposing a network architecture that is decentralized and distributes metadata and services to facilitate flexibility and extensibility.

### **Digital Object Architecture**

The interoperable metadata framework uses CNRI's Digital Object Architecture to provide decentralized conversions of metadata as well as administration functionality. The following section provides an overview of this architecture and introduces the minimum necessary concepts required to understand the interoperable metadata framework [PB99].

The Digital Object Architecture has been an ongoing area of research at CNRI. The origins of the architecture work can be traced to R. Kahn and R. Wilensky's paper "A Framework for Distributed Digital Object Services"[KW].

Digital objects can be thought of as general purpose, uniquely identified networked information entities that protect the integrity and access rights of their respective contents. Digital objects are accessed and managed exclusively through the Repository Access Protocol (RAP). The Digital Object Architecture defines a set of services for identification, access, and



management of digital objects. These services operate in a dynamic and extensible manner while respecting access policies of individual digital objects.

### **Digital Objects**

A digital object is the primary form of information representation within the architecture. At an abstract level, digital objects are uniquely identified network entities that can encapsulate, describe, and provide value-added access to heterogeneous typed content. Digital objects are created, managed, and accessed using the operations defined in the RAP protocol. Clients interacting with digital objects typically do not retrieve the entire digital object all at once; but only retrieve the views of the object that they have permission to request. The sets of information returned from these views are called disseminations.

Digital objects achieve all their functionality through the use of two internal data structures: the data elements and the disseminators. An illustration of the structures of a digital object can be found.

Data elements are stored or referenced as sets of sequences of bytes within a digital object. Each digital object can have any number of uniquely identified data elements. Each data element has its own set of key metadata consisting of its data type, size, date created, and date last modified.

A disseminator is a structure within a digital object used to associate a uniquely specified class of operations, also known as a Content Type, with a set of data elements from that same digital object. A digital object can have any number of uniquely identified disseminators. Zero or more data elements are associated with a disseminator's content type using a disseminator structure known as the attachments. Digital object creators use the attachments to specify which and how data elements are associated with a disseminator's content type.

A digital object repository implements the RAP interface to allow for the creation, modification, deletion and access of digital objects, as well as assumes the digital object storage responsibilities. Repositories enforce the access rights policies pertaining to each digital object and provide safe environments for the generation of digital object disseminations.

### **Content Types**

Content types provide a high level typing mechanism for describing the contents of digital objects. They are sometimes referred to as intents of use types since they can describe how a digital object creator intended for its object to be used. A content type is associated with the contents of a digital object using a disseminator described in the previous section.



A content type characterizes all or part of the content of a digital object by describing a set of specific operations that can be performed on it.

Each operation within a content type has a semantically relevant name, as well as a human readable description of its purpose and usage recommendations. As with any operation request, content type operations accept input parameters that are each described using a semantically meaningful name and a human readable description of their relations to the behaviour of the operation.

When a client issues a digital object dissemination request, the targeted content type operation receives inputs from two sources: the input parameters supplied by the requestor, and zero or more digital object data elements as specified by that disseminator's attachments. The content type operations are then run against the set of attached data elements and input parameters, and return the content type dissemination to the requestor.

Although the mechanisms that enable content types to operate are completely abstracted from the client, it is important to mention that content types consist of two separate entities. The first entity, a content type signature, describes the set of operations a content type provides by defining the semantics, parameters and general expected return types for each operation. The second entity, the servlet or content type implementation, implements all the operations defined by a specific content type signature. The separation of the content type interface definition from its respective implementation allows for multiple implementations of the same content type.

Content types represent a powerful and flexible mechanism for identifying, describing and referencing implementations of operations. Content types enable expression of complex types in a distributed and extensible fashion by allowing anyone with the proper authority to create new content types to express the specific functionality of their class of data.

This technique of high-level data typing bears some resemblance to MIME [FB96], a standard designed to facilitate interoperability in Internet email attachments. However, there are a number of differences between MIME types and digital object content types. MIME types are concerned with expressing the particular structure within a set of bytes, while content types denote the manner in which the data is to be used. For example, an SGML file containing the script for the play *Hamlet* would have a MIME type of `text/sgml`. Since SGML is a generic file format, and requires a separate document type definition (DTD) file for interpretation, the MIME type in of itself does not provide any context for interpreting the contents of the file. A *content type* for this same script could be "Script"

or could even be as specific as “ShakespereanDrama”. These content types could define operations for accessing the content by retrieving a single act, or providing a version of the play typeset in a manner consistent with the play’s genre. The MIME type does not provide any aid in understanding how to make advanced usage of the play, and it would require a knowledgeable person to acquire the appropriate tools.

While both MIME types and content types are registered with unique identifiers, the process of registration for each differs greatly. MIME registration requires submitting for peer review a proposal to the Internet Engineering Steering Group (IESG) [FKP96] and is contingent upon IESG approval. To prevent the MIME type registry from becoming overburdened, few MIME types are adopted as standards.

Unlike MIME type registration, content type registration is dynamic. Content types are registered using the Handle System so that the registry may be distributed. This allows for registration of many content types without the scalability problems of a centralized index. Using the Handle System allows content type providers to independently administer their own registries, enabling individual organizations to globally register content types with autonomy.

### ***Dynamic, Extensible, and Interoperable Metadata Registry***

Our interoperable metadata registry design is based on the notion that making metadata and metadata schema into first class network objects will provide a more powerful method for manipulating metadata. The following section describes how we applied the digital object architecture to implement our dynamic, extensible and interoperable metadata registry design.

#### ***Basic Design Rationale***

The interoperable metadata registry implementation is based on the existing functionality of our previously implemented digital object architecture. The digital object architecture was specifically well suited for implementation of the metadata registry for the following reasons:

- The digital object architecture provides a simple mechanism for binding resource(s) to a unique identifier by encapsulating them in a uniquely identified digital object. In our registry, this functionality allows, for example, binding a metadata schema description to its respective schema identifier.
- The digital object architecture provides a framework for binding distributed services to distributed resources by simply associating a service’s identifier to the resources in a digital object. In the registry, this allows for binding standard metadata services to

metadata, or in another example, binding metadata registry services to a metadata schema.

- The digital object architecture is extensible and allows new services to be added in a dynamic and decentralized fashion. This feature gives the metadata registry the ability to absorb new metadata and metadata schema as they are introduced.
- The digital object architecture provides content types that expose a standard interface for operating on conceptually similar but otherwise different content.

### **Defining a Metadata Schema Digital Object**

Encapsulating a metadata schema description and services in a digital object enables the metadata schema to become a first class network object. The resulting metadata schema digital object provides standardized access to its metadata schema definition by abstracting its specific formatting and encoding.

If the metadata schema was appropriately expressed according to the approach described in section two of this document, a new metadata schema digital object can be created using the following set of operations:

- Create a new digital object using the metadata schema's identifier as the object's identifier.
- Deposit the encoded metadata schema description in a data element within the newly created object.
- Register the metadata schema's identifier/digital object identifier with the Handle System and initialize its value to point to the metadata registry containing the object. The handle can then be used by anyone to identify and locate the metadata schema's description and associated resources.
- Add the *Metadata-Schema* content type to the digital object and bind it to the description of the metadata schema. This *Metadata-Schema* content type defines a specific set of dissemination requests that provide access to the metadata schema descriptions and services. This content type abstracts the specific encoding of the metadata schema description by providing access through a method-based interface.

The *Metadata-Schema* content type is to be used with all metadata schema digital objects within our interoperable metadata framework. It is designed to provide two different levels of functionality:

- *Generic Metadata Schema Description*: Provides the necessary functionality to access all of the metadata schema descriptions

while abstracting the specific manner in which they were described and encoded. Examples of methods are `ListMetadataElements()`, which returns the list of all metadata elements in the metadata schema, and `GetElementDefinition (Element Name)`, which returns the description of a particular metadata element.

- *Specific Metadata Conversion*: Provides metadata schema conversions from one specific schema to another. The rationale for having the *Metadata-Schema* content type be responsible for converting metadata is that the responsible organizations overseeing the description of the metadata schema are in the best position to generate conversions of their own metadata schema. An example of a method from this content type is `ListConversion()`, returns the identifiers of the metadata schema into which the content type can convert metadata. Another example is `Convert(TargetSchema, Metadata)`, which converts the provided metadata into the user specified target metadata schema.

### **Creation of Interoperable Metadata**

Encapsulating metadata and its respective services in a digital object enables the metadata to become a first class network object. Operations can be run on a metadata digital object to provide access to its metadata while abstracting the specific schema, format, and encoding of the metadata. An example of a metadata digital object is illustrated.

As previously mentioned, the inherent problem with metadata is that there are many different kinds, all serving different purposes. To describe metadata in an interoperable fashion in a digital object, it was necessary to provide a non-metadata specific interface, while still allowing a client to acquire any part of the metadata. To address this problem, we created the *Interoperable-Metadata* content type. This content type provides non-metadata-specific access to its attached metadata. Its functionality can be broken down into two different categories:

- *Generic Metadata Access*: Provides access to the metadata and metadata schema information in a generic fashion. Some examples of its methods include: `Get Schema Type ()`, which returns the metadata schema of which the metadata is an instance; `List Metadata Fields ()`, which returns all the base metadata fields of the metadata schema; `Get Metadata (Field Name)`, which returns the metadata for a given metadata field name; and `Get Metadata (encoding)`, which returns all metadata fields in the specified encoding. These functions are used to abstract the specifics of the encoding and formatting of the metadata deposited in the digital object.

- *Metadata Conversion*: Defines a set of operations to translate the metadata contained in the digital object into another metadata schema. One such method is List Available Metadata Schema (), which returns a list of metadata schemas into which the content type can convert the metadata. Another is Get Metadata (schema Identifier), which translates the metadata into a different metadata schema.

It is important to add that a given digital object can contain as many instances of *Interoperable-Metadata* content types as it contains metadata sets. Furthermore, each *Interoperable-Metadata* content type implementation has its own specific metadata schema. The *Interoperable-Metadata* content type has CNRI/DLIB.metadata.schema as its metadata schema, and therefore its implementation dictates that it be associated only with DLIB type metadata.

A new metadata digital object is created as follows:

1. Create a new digital object, or acquire an existing one.
2. Deposit the metadata in a data element within the object.
3. Add the *Interoperable-Metadata* content type to the digital object and associate it to the data element containing the metadata. Note: the *Interoperable-Metadata* content type implementation is specific to a particular kind of metadata and encoding. The content type implementation is specific to the DLIB metadata schema.

At this point the metadata creator has deposited an interoperable metadata digital object. The object can now be queried, and metadata conversion can be requested.

### **Dynamic Metadata Conversion**

An intrinsic characteristic of digital objects is that they can request disseminations from each other. In addition to the quick and reliable way with which one digital object can determine its ability to interact with another based on its content types, this feature provides the basic functionality that enables dynamic metadata conversion to operate.

This dynamic metadata conversion requires that both metadata and metadata schema digital objects exist concurrently, as they are both involved in the conversion process. Indeed, whereas the metadata digital object receives the original request for conversion, it delegates the actual metadata conversion to its respective metadata schema digital object. The delegation is set in the implementation of the *Interoperable-Metadata* content type. In the case of the 10.1045/december2001-blanchi digital object, for example, the object's content type is always to be associated with the DLIB type metadata defined by the CNRI/DLIB.Metadata.Schema metadata schema

digital object. Furthermore, the 10.1045/december2001-blanchi object will delegate to CNRI/DLIB.Metadata.Schema all its metadata conversion requests.

In our implementation, we designed the metadata digital object to provide a simple abstraction over the specific nature of the metadata encoding. The metadata schema digital object was given the responsibility for expressing and preserving the intrinsic characteristics of a given metadata schema and converting instances of its own metadata schema into one or more different schema.

The manner in which the interoperable metadata works is illustrated and is described below:

1. A client wishing to interact with the metadata in the 10.1045/december2001-blanchi digital object first must check to see if that digital object contains an *Interoperable-Metadate* content type. The 10.1045/december2001-blanchi digital object does contain such a type, and therefore, the client can proceed with its metadata request.
2. The client wants to acquire the metadata residing in the digital object as an instance of a Dublin Core record. Not knowing whether the digital object can disseminate a Dublin Core metadata record, the client queries the digital object using the *Interoperable-Metadate* ListAvailableMetadataSchema() dissemination request to determine the list of available metadata schema.
3. The *Interoperable-Metadate* content type “knows” that its associated metadata is an instance of the DLIB schema and, therefore, puts the DLIB metadata schema identifier CNRI/DLIB.metadata.schema on the list of available metadata schema.
4. The *Interoperable-Metadate* content type then issues a List Available Conversions() dissemination request to the CNRI/DLIB.metadata.schema digital object *Metadata-Schema* content type.
5. The *Metadata-Schema* content type in the CNRI/DLIB.metadata.schema digital object “knows” all the metadata schema conversions it supports and returns a dissemination containing each conversion object’s identifier. In this example, the Dublin Core conversion is supported.
6. The *Interoperable-Metadate* content type in the 10.1045/december2001-blanchi digital object receives the list of available conversions, adds the available conversions to its list of available metadata schema, and returns it as a dissemination of the client’s ListAvailableMetadataSchema() query.



7. The client receives the dissemination and determines that the metadata object can disseminate a Dublin Core version of its metadata since its metadata schema identifier is on the list of supported types. The client then issues a query to the *Interoperable-Metadata* content type for the dissemination request `GetMetadata(DublinCore)`
8. The *Interoperable-Metadata* content type receives the request. Based on the identifier of the requested metadata schema, the content type delegates the conversion to the `CNRI/DLIB.metadata.schema` object by issuing the `ConvertTo(DublinCore,metadata)` dissemination request to the *Metadata-Schema* content type.
9. The `CNRI/DLIB.metadata.schema` digital object converts the DLIB metadata into DublinCore and returns it to the *Interoperable-Metadata* content type, which passes it on to the client.

### Implementation

In our prototype implementation we demonstrated how such a system facilitates the navigation of metadata registries.

Building a user interface for search and query of metadata is fairly straightforward in a controlled environment where metadata schemas are relatively consistent and few in number. But in settings such as digital library federations and multi-organization archives, new schemas may be introduced regularly and will often differ in content and encoding. Our metadata registry allows distributed management of resources; when one organization adds new metadata or schemas, the changes are automatically reflected throughout the system.

Users may interact with the system through a WWW gateway. The HTML representation of a metadata instance is generated by the digital object that contains the metadata instance. This shifts the responsibility of presentation to the creator of the metadata schema, and away from the metadata creator or WWW gateway. Of course, if desired, the WWW gateway creator may implement a different presentation style, and the metadata creator may choose a custom implementation of the schema object in order to provide a different presentation.

The registry maintains an inverted index of the contents of all metadata objects in a search digital object. New metadata objects are registered with the search object by invoking its `AddMetadata()` method with the metadata object's handle as an argument.

The search object will then index the metadata object. Keyword queries performed on the search object return a list of handles of metadata objects containing the keyword. When a user selects one of the listed metadata



objects from a WWW browser, the gateway retrieves the metadata object's HTML rendering and returns the HTML to the user. Adding metadata based on new schemas requires no effort on the part of the WWW gateway administrators.

Since the registry keeps track of metadata schemas, it is also able to provide cross-indexing between metadata instances and their schema. So when a user views a metadata instance, the user can follow links to its schema in order to learn more about the meaning and context of individual metadata fields.

At the time of this writing, our implementation has registered metadata schemas for *D-Lib Magazine* and the University of Illinois Digital Library Initiative.

The digital object metadata registry was successfully implemented and demonstrated the feasibility and flexibility of our approach. Although the metadata schemas and metadata collections we experimented with were small, the current implementation of the system should scale reasonably well, both in its ability to handle new metadata and metadata schemas. As new metadata conversions are needed, new metadata schema conversion modules can be dynamically added to the infrastructure without requiring updates to any of the digital objects containing metadata. This framework could provide an attractive solution to collections in need of metadata migration.

At the moment, creating metadata schema content type implementations requires development of software modules. Although this approach works well, efforts should be made to provide a non-programmatic solution for expressing conversions across metadata schema. Indeed, simple mappings across metadata schema could be expressed using simple equivalencies or mappings expressed in XML. This approach would make the task of adding new conversions as easy as attaching a single XML document to a general metadata schema conversion content type.

Given the wide range of metadata schema that could reside within the metadata registry, it is very likely that, in many cases, the conversion from one metadata schema to another will not be supported. Experiments with dynamic graph searches through the set of metadata schema conversions could be used to dynamically determine a path of conversion sequences to produce the desired metadata conversion. The graph search would be easy to build, given that the source-target metadata schema conversion is easily expressible using a source and target metadata schema ID. The ability to create new metadata conversions using a sequence of pre-existing metadata conversions will accentuate the need for metadata conversion accuracy metrics. Finally, the use of dynamic interoperability

determination using digital object content type identifiers, as well as the chaining of digital objects, provides a flexible framework that could be useful in other aspects of information integration.

## **How do Physicists Use an E-Print Archive?**

### ***Implications for Institutional E-Print Services***

It has been suggested that institutional e-print services will become an important way of achieving the wide availability of e-prints across a broad range of subject disciplines. However, as yet there are few exemplars of this sort of service. This paper describes how physicists make use of an established centralized subject-based e-prints service, arXiv (formerly known as the Los Alamos XXX service), and discusses the possible implications of this use for institutional multidisciplinary e-print archives. A number of key points are identified, including technical issues (such as file formats and user interface design), management issues (such as submission procedures and administrative staff support), economic issues (such as installation and support costs), quality issues (such as peer review and quality control criteria), policy issues (such as digital preservation and collection development standards), academic issues (such as scholarly communication cultures and publishing trends), and legal issues (such as copyright and intellectual property rights).

These are discussed with reference to the project to set up a pilot institutional e-print service at the University of Nottingham, UK. This project is being used as a pragmatic way of investigating the issues surrounding institutional e-print services, particularly in seeing how flexible the e-prints model actually is and how easily it can adapt itself to disciplines other than physics.

At the University of Nottingham, we are in the process of setting up an experimental institutional e-print archive. The technical side of this has been reasonably straightforward. We are using the software produced by e-prints.org, and have customized the interface to give it a Nottingham 'look and feel'. However, the managerial and cultural aspects of 'self-archiving' have proved to be rather more complex. How can researchers be encouraged to contribute to the e-print archive? What is in it for them? How can procedures be managed to make it simple for them to archive their material?

To help us address these questions, we decided we needed to know more about how a successful e-print archive is actually being used by researchers. To do this, we chose to look at use of the arXiv service (formerly known as the Los Alamos XXX service). We consulted (face-to-face or by email) a number of researchers who are making use of arXiv.

At the same time, we looked at the service itself to see if what we were being told seemed to reflect the wider experience.

We were interested in finding out more about how arXiv is used so that we could then consider whether any of its features would read across into other e-print services. To what extent is arXiv based on the unique working practices of physicists or is it an exemplar for other potential services? Would a centralized subject-based service such as arXiv have anything to tell us about how researchers might use an institutional multidisciplinary service? If institutional services are to be, as some have suggested, an important way of achieving the wide availability of e-prints across different subject disciplines, then it is crucial these questions are investigated.

### **Pre-print Culture**

The historical background of the Los Alamos service has been described in detail elsewhere. What needs to be said here is that the archive was originally designed as a way of automating a paper-based process already in existence. This process was the circulation of 'pre-prints'. Pre-prints are pre-refereed, pre-publication papers which report on new research. They were circulated by physicists for two main reasons. Firstly, pre-prints were a good way of establishing priority. In a fast moving field as soon as research results are available, it is important to get the work into the public domain with a researcher's name attached to it. Publication in journals was usually too slow. Pre-prints on the other hand could be produced quickly and circulated immediately by mail to other research centres in order to establish priority.

Once papers were circulated, the second reason for the existence of pre-prints came into play. Pre-prints were a way of soliciting comments on the research so that the paper could be refined for 'formal publication'. A kind of informal peer review. On receipt of comments, a paper would then be redrafted for submission to a journal. For the discipline as a whole, pre-prints were a way of reducing the likelihood of unnecessary parallel research by allowing correlations to be quickly identified.

However, paper pre-prints were not entirely satisfactory. For a start, they did not halt all disputes over priority. Another key problem had to do with distribution. Distribution was inevitably limited. Only certain institutions received pre-prints; others (including most institutions in less developed countries) were effectively out of the loop. Researchers in these places were at a distinct disadvantage.

The Los Alamos e-print archive was designed to solve these problems. It clearly establishes priority by date stamping contributions. The e-print

archive also widens access. Anyone with access to a networked computer can now look at the pre-print literature. Some have seen the e-print archive as 'democratizing' the scholarly communication process. The Los Alamos archive was designed for High Energy Physics. Other areas of Physics, Mathematics, Non-linear Sciences and Computer Sciences have since come on board. But these are not the only disciplines to have pre-print traditions.

For example, in the completely different fields of Management, Business and Finance, 'working papers' are circulated in a similar way to Physics pre-prints. It is interesting that although the RePEC (Research Papers in Economics) service partly covers these subjects, no real equivalent of arXiv has been set up. Why? This question requires further investigation, but part of the answer in this particular field may relate to the fact that in Management, Business and Finance, Business schools have been keen to issue working papers in school series rather than relying on individual writers, and some institutions have actually developed a practice of charging for their working papers. This may have held back resource sharing through self-archiving on the arXiv model.

### **The Process of Using arXiv**

Bearing in mind the pre-print culture, the current pattern of usage of arXiv seems to look something like this:

1. A researcher prepares a paper in one of a number of formats accepted on arXiv. The accepted formats are listed on the arXiv Help pages as: TeX/LaTeX/AMSTeX/AMSLaTeX; HTML plus PNG/GIF; PDF; PostScript; or Mathematica Notebook.
2. The author self-archives the paper on arXiv. This can be done by email (following a pre-determined data structure so that the content can be machine-parsed), FTP or by the using the submission procedure on the web.
3. Other researchers are then able to read the paper. They may find out about the paper by using the arXiv web interface, or they may be informed of its existence by email if they have subscribed to the email alerting service.
4. Having read it, other researchers may then comment on the paper by email.
5. The author may then revise the paper in response to comments and replace the original paper on arXiv with the revised one. The paper may go through a number of iterations in this way.
6. The revised paper may next be submitted to a journal as well as placed on arXiv. Some journal publishers now even allow submission

in the form of an arXiv document number. The referees can go to the paper on arXiv in order to read it.

7. Following referee's comments the paper is either accepted or rejected by the journal.
8. If rejected, the paper may be submitted to another journal after any necessary revisions. Revised versions may be included on arXiv.
9. If accepted, revisions are normally made in response to referee comments and a final revised version of the paper submitted to the journal. It is common practice for this final revised version to also be placed on arXiv.

This account is inevitably based on anecdotal evidence but seems to be representative. Empirical evidence on the usage of the archive is emerging which complements and helps to flesh out this basic outline.

### **Discussion**

There are a number of important issues here. Many of them lead to interesting questions about institutional archives and how they might be used. Some of the issues are discussed in what follows.

The format of papers (stage 1 above) is the first issue. The arXiv service will accept a variety of formats, including proprietary ones (PDFs), though not word-processed documents. This was fine for the physicists we talked to. Many of them do not use popular word processing software—they were working on UNIX boxes not PCs or Macs. But this is not the case for all potential contributors to a multidisciplinary institutional e-print service. Many authors in other subject areas would have difficulty producing text in any of the formats specified by arXiv, even HTML. It is clear that institutional archive administrators have to give careful consideration to what formats they will accept from authors, what formats they will allow on the e-print server and whether they can, if necessary, convert from one format to another. This is not, of course, a question just for the here and now. Long term preservation considerations are important as well. All archives need to address questions of the long-term viability of formats and how digital preservation measures can be put in place. In the short term, in order to attract authors from all disciplines, we believe at Nottingham we may have to do some 'hand holding' in this area, at least in the early stages of an institutional archive.

The same might be said of the submission process (stage 2). The arXiv service relies on self-submission. All of the options for self-submission assume a basic level of IT literacy (a reasonable assumption perhaps for most physicists). However, once again administrators of a multidisciplinary institutional archive may not be able to make such an assumption about

their users. In any institution there is an enormous range of IT literacy both between and within departments. The self-submission process on the e-prints.org software involves five or six major stages. Some potential contributors may not have the know-how or the patience to submit their documents themselves, especially as they would only be doing it irregularly.

It has been suggested that, in the initial stages of the implementation of institutional archive, it may be best to smooth the path of submission by having the archive administrator deposit papers on behalf of users. This would also allow institutional archive administrators to enhance user-created metadata. Text conversion and mediated submission may then be necessary but of course come at a price (staff, administrative and equipment costs). It has been argued that institutions are in a good position to subsidize a new service during start up and provide the organizational framework for its continuation. At Nottingham, Library Services is absorbing the e-print facility into its remit.

Users of arXiv can find out about papers (stage 3) in two ways: first by browsing or searching the web interface, secondly through the email alerting service. The web interface of arXiv is famously unspectacular. Apart from the one “gratuitous icon”, the interface makes no concessions to aesthetics. Compare it with a commercial provider’s site, such as Science Direct, or even non-commercial sites like *D-Lib Magazine*, and the difference is striking.

It will be interesting to see how institutional archives begin to appear. Institutional design policies (which often promote the use of graphics and Java-script) are likely to have an influence on institutional e-print server presentation and lead to a departure from the arXiv ethos. Many institutional designers will also be concerned with *attracting* authors and users to their services and giving the site a feeling of authority in the design itself. But this is not just a matter of aesthetics.

The low-tech nature of arXiv means that it has a fast download time, especially using a modem. This is something all designers should consider. Then there is the issue of functionality. The arXiv service includes most of the functionality that users might expect but it is rather unforgiving, especially for beginners. And yet it is particularly beginners that institutional e-print managers will be trying to attract. Institutional designers will perhaps be more concerned with helping all users (including beginners) easily get the most out of the service.

The second way of finding out about papers, the email alerting service, was more important to the researchers we spoke to than we had expected. Researchers can sign up to receive email notification of new additions to sections of the archive. It seems that many would prefer to use this alerting



service, since it pushes relevant information to them rather than requiring them to search for it.

It is difficult to know how this sort of service might translate to a situation where there are numerous multidisciplinary servers. It would be inconvenient to have to register with large numbers of servers for email alerts. There has been much discussion in the literature on how the metadata from distributed OAI (Open Archives Initiative) registered archives may be *searched* across the board, perhaps more ought to be said about how alerts could be *pushed* to users.

Authors valued the informal peer review process associated with arXiv (stage 4). Often comments referred to other papers not cited by the author and this could be helpful. The arXiv system has the advantage of subjecting the paper to widespread scrutiny. Other disciplines, however, may do this more informally. Papers may be distributed to colleagues by email for comment. The full-scale pre-print culture may not be something that could easily translate to other disciplines. Some may not want to expose their pre-refereed work in this way. It is common, for example, for faculty to express concern about quality control on e-print servers.

They may even see the distribution of pre-prints (or the self-archiving of pre-refereed e-prints) as vanity publishing. Many would prefer only post-refereed material be available. Some professionals in the medical community have gone so far as to say that pre-refereed material may be dangerous in their field if it is used as a basis for clinical practice. However, e-print archives do not *have* to include pre-prints, at least not for all disciplines. In Physics, pre-prints are an accepted part of scholarly communication, in other disciplines they are not. An e-print archive should include material that is most useful for its users.

There are important questions for *multidisciplinary* services here. Should a multidisciplinary institutional e-print service accept pre-prints? If so, from all disciplines or just some? Should any attempt be made to monitor quality? After all, an institution has an interest in ensuring that only high quality research output is available from its 'branded' archive. If quality *is* monitored, what criteria are to be used? Will users see this as unnecessary 'control'? These questions should be addressed in an archive collection development policy.

At Nottingham, we feel it is too early to try devising a rigid collection development policy (which should also include file format standards and digital preservation issues mentioned earlier). Rather, we are using the development of a pilot service as a way of working through the issues. At present, we are looking at various forms of research output: pre-prints, book chapters, conference papers, university theses, as well as refereed



journal articles. On the specific problem of the need to accept different material types for different subjects, one possible solution might be to set up several archive installations which could then have different collection policies (although they would, of course, remain cross-searchable). This is the approach Caltech seems to be have adopted

Perhaps the most important single issue associated with the current debate on scholarly communication is the relationship between journal publishers and e-print archives. The arXiv service has some interesting features to consider in this area. It is clear that many Physics publishers seem to have accommodated arXiv in their processes. The fact that some allow submission of an arXiv document number demonstrates this acceptance. This shows a high degree of realism on their part and a willingness to work with the subject community. This will no doubt take time to develop in other subject areas. Institutional archives will not be able to offer such value-added features in the short term.

The attitude of publishers is particularly interesting in relation to the final post-refereed version of a paper. It seems that it is common practice to deposit a copy of the final version on arXiv even when it is published in a journal. What about copyright? In some cases, publishers have adapted their copyright agreements to allow self-archiving. For example, the Institute of Physics requires authors to sign over copyright but grants a “personal licence” to authors “to post and update the Work on non-Publisher servers (including e-print servers) as long as access to such servers is not for commercial use and does not depend on payment for access, subscription, or membership fees”.

This has “effect from the date when the Work is accepted for publication”. Other publishers have similar regulations. Some make a distinction in their copyright regulations between the content itself and the publisher-produced files. Typically, authors are permitted to submit the final version of their paper to arXiv but not the PDF (or other format) produced for the journal. Simeon Warner of arXiv tells me that they reject the publisher-produced PDFs in order to avoid problems. There is evidence though that authors may not always adhere to the precise terms of ‘liberal’ copyright agreements. For example, the IoP copyright agreement requires authors to give a full citation to the journal article (which normally is done) but also to reproduce certain clauses of the agreement with their paper and to link to the IoP web site (which is not).

Not all publishers are so accommodating. Some copyright agreements (often from large commercial publishers) do not allow self-archiving of the post-refereed version of the paper. But there is evidence to suggest that attempts to restrict publication of the final version of the paper to the

journal are being undermined by authors. Many authors deposit a copy of the final version in arXiv anyway. We identified a number of journals in the field with copyright agreements that do not permit final versions of papers to be made available in e-print servers, or in any other form outside of the journal.

We then took a random sample of 10 papers in arXiv each of which gave a 'published in' reference to one of these journals and compared the e-print on arXiv with the corresponding article in the journal. In every case, we could not identify any differences between the two versions, except for layout. It seems that many authors are either negotiating exceptions to the copyright restrictions or are simply ignoring them and posting final versions of articles on arXiv regardless.

It is interesting to consider what the policies of institutional archives might be on this issue. It seems unlikely that an institution would want to encourage authors to ignore copyright agreements. Alternatively, they might encourage their members to alter agreements to claim the right to deposit content on e-print servers or to invoke the 'Harnad-Oppenheim strategy' (where the pre-print plus corrigenda are archived). The latter does not yet seem to have been widely used and will always be second best, but in the short term the Harnad-Oppenheim strategy may be an effective way of getting content into archives. Whether it is acceptable to researchers as a way of presenting their results in the longer term remains to be seen. An alternative institutional strategy might be to claim some sort of copyright on the publications on behalf of the university. The institution could then archive research output as a matter of policy. Such an approach may, however, be difficult to steer through institutional policy-making bodies (even if a case could be made for it in law) and is certainly not a necessary precursor to self-archiving.

One thing is clear. Researchers who contribute to arXiv now consider it to have a central place in their work. They use it to disseminate both pre-prints and post-refereed articles. Interestingly, they still wish to have their work accepted by journals, and endorsed by the formal peer review process, but do not see journals as the only means of *distributing* their work. In other words, self-archiving is not seen as a substitute for publishing in peer-reviewed journals, but rather a useful supplement to the journal publishing process that makes research output widely available. Whilst this way of working has not permeated into many other fields, it is easy to see its potential, even bearing in mind different communication conventions between disciplines.

In view of arXiv's success, there is clearly a need to discuss the issues more widely in institutions across different academic fields. The potential

benefits have been discussed at length elsewhere, but until recently this discussion has been confined to a select band of people. It is important that archive developers not concentrate only on practical implementation issues (some of which have been touched on here) but also retain a clear view of the big picture and of the need to consult researchers. The big picture is the aim of freeing-up research output and thereby improving research communication. This is certainly worth pursuing.

There is also potential for the development of historical archives. Whilst we often think of the *raison d'être* of e-print archives being the dissemination of the latest research results, they could also become major historical archives. Interestingly, there is evidence that arXiv itself is already being used in this way. Many authors have deposited papers published before the Los Alamos service was set up as a way of improving the availability of their earlier output. It is not unusual to find papers from the 1970s or 1980s on arXiv.

### **The Nottingham Implementation**

Studying arXiv usage has helped us at Nottingham focus on these important issues. The Nottingham e-print archive pilot project has two strands, both of which have been informed by our investigation. The first strand is service implementation; the second strand is advocacy. The service is currently being implemented using version 1.1.1 of the OAI-compliant eprints.org software. The pilot Nottingham e-print archive has been set up and tailored to give it a local look and feel. For demonstration purposes, the archive is currently being populated with existing material by Nottingham researchers.

At the same time, we are trying to raise the profile of the issues associated with e-prints in the institution. Researchers in most disciplines still need persuading that e-print archives may be the right way forward in their field. This persuasion may take various forms. For example, it may take the form of explanation. One of the physicists we spoke to said that if people from other disciplines really understood the potential of archiving their e-prints, they would start doing it. This optimistic view may apply to some researchers but not all. Others may be encouraged by institutional policies.

It is important to win the support of senior members of the University who can encourage participation. In addition, it may be possible to attract users by offering them 'value added services'. These might include reports of hit counts on papers, citation analyses, and the ability to generate lists of publications for personal and departmental web sites, as well as the assistance with formatting and depositing already suggested. We are currently considering all of these at Nottingham as ways of helping us

address the most important issue of getting a critical mass of content in place.

In many respects the pilot project is a pragmatic way of helping us work through some of the key issues identified in this paper. Identifying these issues in the first place has itself been important. We have had a number of key issues highlighted for us, including technical issues (such as file formats and user interface design), management issues (such as submission procedures and administrative staff support), economic issues (such as installation and support costs), quality issues (such as peer review and quality control criteria), policy issues (such as digital preservation and collection development standards), academic issues (such as scholarly communication cultures and publishing trends), and legal issues (such as copyright and intellectual property rights). All have been flagged as being important for both subject-specific and multidisciplinary institutional e-print services. Combining the implementation of a pilot server with the promotion of wide discussion of the issues is a good way of testing how flexible the e-prints model actually is and how easily it can adapt itself to other disciplines.

Looking at how arXiv is used on the ground was very useful for us. It has helped us identify some of the things that are most important to researchers and to consider how these might be of practical significance in running an multidisciplinary institutional service. There are, of course, differences in how a subject-based service and an institutional service may work, just as there are differences in the way different disciplines themselves work.

The arXiv service was designed by Physicists for Physicists, but at least some of the principles upon which it is based have the potential to be transferable. Many of the practical managerial considerations of running an e-print service should be the same across e-print archives for different disciplines. However, the arXiv service has been ten years in the making. For this reason, perhaps we should not expect instant results from our new services. Rather, we need to continue working through the issues discussed in this article and see how other services might develop in practice. Many people in institutions (researchers, librarians and managers) are beginning to see the potential of e-print archives and to think about the issues involved. Perhaps the best thing to do now is to give it a try.

## **Implementing Digital Sanborn Maps for Ohio**

### ***Ohio LINK and OPLIN Collaborative Project***

The Ohio Library and Information Network (OhioLINK) and the Ohio Public Library Network (OPLIN) have collaborated to provide the state

of Ohio with digital versions of Sanborn Fire Insurance maps covering the state. This is the first such collaboration between the two consortia, which serve distinctly different communities—academic libraries and public libraries. To our knowledge, Ohio is the first state to offer digital Sanborn Maps to all its citizens.

The collaboration between the two consortia has not been a luxury but a requirement. Despite strong interest, neither partner would have undertaken this project alone. This article describes: 1) the nature of Sanborn Fire Insurance Maps in their paper, microfilm, and digital formats, 2) how the maps are loaded locally at OhioLINK and delivered over the Web to Ohioans, and 3) the two consortia and the nature of their collaboration.

### **Sanborn Fire Insurance Maps**

**Original, Paper Versions:** Sanborn Maps are large-scale street plans produced by the Sanborn Fire Insurance Company from 1867 to 1970. Sanborn Maps show the outlines of buildings, including the location of windows and doors, street names, street and sidewalk widths, property boundaries, building use, and house and block numbers. These maps are used heavily in both public and academic libraries by a wide range of researchers. The users include local historians who use them to locate and identify buildings and neighbourhoods; urban historians studying the growth of towns and cities; and environmentalists concerned about the impact of new developments.

In Ohio, both the Cleveland Public Library Map Room and the Map Library of Kent State University own original printed Sanborn Maps. In addition, other public and academic libraries have subsets of the Ohio maps in their collections.

### **Microfilm Versions**

Microfilm versions of Sanborn Maps are also available. Many academic and public libraries (in Ohio and elsewhere) own microfilm versions of Sanborn Maps, particularly of their own communities. Though the colour information of the paper map is unavailable in black and white microfilm format, the convenience of microfilm helped justify the acquisition of the maps in that format for a large number of libraries, and most research purposes are still served even without the colour provided by the paper maps.

### **Digital Versions**

Sanborn Maps were digitized by Bell & Howell Information and Learning from its microfilm collection. Approximately 40,000 digitized

maps were supplied to OhioLINK as black and white, Group IV compressed, Tagged Image File Format (TIFF) images. These images are generally about 4,000 to 5,000 pixels in width and height.

Bell & Howell supplied an XML file with information about each map. This map information includes the date, city, and county of the mapped community. The indexes appearing on certain maps were transcribed and supplied, as well. The XML for an 'index map' includes a street index of major street names, as well as the address range contained in that map. The text also may provide an index of 'Specials' such as schools, manufacturing plants, churches, and other facilities.

### **Implementation of the Digital Sanborn Maps System in Ohio**

At the inception of the Sanborn Maps for Ohio project, the publisher of the Digital Sanborn Maps did not offer the online access mechanism that it provides today. Customers who bought maps were required to develop systems on their own—as OhioLINK has done. The following sections describe this delivery system.

### **Interface for Searching, Browsing and Viewing**

Images and text information are served to the Web from OhioLINK servers. Users are able to search by keyword (*i.e.*, any word or phrase associated with a map) or by field, *e.g.*, city (though there aren't many fields in the map record). Users can browse by city name, as well as by date. Once a particular map is identified, users can open the map within a browser and 'zoom' to several levels of detail.

The map system functionality on the Web required both image and text processing. The TIFF images were converted into MrSID format. Combined with scripts on the web server, this format can serve portions of a full image in JPEG format so: a) the user can download sections of the entire image; and b) the user does not require a special viewer or plug-in to view the map image.

The XML map information was converted into a relational database format.

### **Rights and Authorized Uses**

The maps are restricted to users within the state of Ohio for educational use. The terms of use are defined in a license agreement between OPLIN and Bell & Howell Information and Learning. The terms of this agreement are consistent with those of other licenses involving electronic resources for academic and public libraries. Generally, commercial uses are prohibited, but educational and personal uses such as viewing, downloading, and printing are allowed.



## **Users and User Authentication**

The license stipulates that the maps will be made available only to Ohioans via the Internet. Specifically, users authorized to have access to the maps include: K-12 students and teachers; public library users; and students, faculty, and staff of higher education institutions. Higher education users are authenticated through OhioLINK's existing authentication mechanism. The authentication involves validating users by IP address. If IP authentication fails, users are prompted for their username and ID or barcode number that are then verified against their institution's OPAC. Public library users are authenticated similarly through the library's own established authentication systems and then users are redirected to OhioLINK's web server. The K-12 community, represented by a similar organization known as INFOhio, is authenticated in the same way as public library users.

## **Usage**

Between the system's inception in May 2001 and November 2001, approximately 45,000 map downloads have occurred. A 'map download' occurs when a map is opened in the map viewer window—subsequent navigational activity within the opened map is not counted. Slightly less than 20% of use has come from the higher education community with the remaining uses identified as coming from the public library and K-12 access points.

The number of downloads of Sanborn Maps, if annualized, would be equivalent to the number of downloads of the most popular electronic journal titles as measured from OhioLINK's Electronic Journal Centre.

## **Future Developments**

Because the Sanborn Maps are loaded locally on OhioLINK servers, functional enhancements must be developed with local resources. Several enhancements are likely over the next year.

Sanborn Maps are currently a stand-alone resource. However, OhioLINK is helping develop other locally stored image and other media collections of historic, Ohio-related content. Where it is possible to integrate such collections with the Sanborn Maps, users will be able to geographically locate many of the historic items they find via Sanborn Maps. As an example, parts of the Wright Brothers Archives at Wright State University are now available from OhioLINK. Researchers will benefit from being able to view Sanborn Maps of the Dayton area from within the same interface that offers them photos of Orville and Wilbur Wright's studio. Other enhancements to the interface are under consideration. The zoom and navigation within the map viewer will likely be improved. Browsing

will be refined so that users can drill-down more narrowly. Users will be able to select and save maps in their own online accounts.

### **OPLIN and OhioLINK Collaboration**

In this collaboration to bring Ohio Sanborn Maps to the state:

- OPLIN executed the contract and funded the perpetual license for the maps.
- OhioLINK implemented and will continue to manage the storage and delivery of the maps.

### **Ohio Public Library Information Network (OPLIN)**

OPLIN is a publicly funded facility that delivers information to every resident of Ohio through the state's 250 independent public library systems. OPLIN is a consumer information network, and its mission is *to ensure that all citizens have equal access to information regardless of location or format and regardless of the location of the user*. OPLIN believes equity is particularly important in areas such as education, health, career, business development and access to state electronic services.

To carry out its mission, OPLIN provides tele-communications to public libraries by funding one T-1 line per library system and providing a wide area network for intra-state network traffic and library services.

Equally important is the provision and delivery of content not otherwise freely available on the Web. On behalf of Ohio residents, OPLIN manages three kinds of content:

- OPLIN-funded content, which was developed by partners in Ohio and which is freely provided via the World Wide Web.
- OPLIN-owned content that is unique to OPLIN, and for which it owns the copyright. Such material is also routinely made freely available on the World Wide Web.
- OPLIN-licensed content, which takes a variety of forms.

OPLIN is state-funded. Until July 2001 (State Fiscal Year 2002), OPLIN was funded from general revenue. In fiscal years 2002 and 2003, OPLIN will be funded from the Library Local Government Support Fund (LLGSF), which is also the source of public library funding. Seventy-six percent of Ohio's public libraries get 100% of their support from the LLGSF.

### **OPLIN Licensed Content**

Most OPLIN licenses are temporary and renewable annually. Where possible, perpetual licenses are acquired, though they are less common

than renewable licenses. The license to Digital Sanborn Maps is a perpetual license. In cases in which OPLIN owns perpetual rights to licensed material, and that material remains vendor-hosted, the licenses provide for eventual migration to OPLIN should that become necessary.

### **Ohio Library and Information Network (OhioLINK)**

The OhioLINK programme is a consortium of Ohio's college and university libraries and the State Library of Ohio. Its mission is to leverage technology to increase the quantity and quality of resources available to the state's higher-education community. Serving more than 600,000 students, faculty, and staff at 79 institutions, OhioLINK's membership includes 17 public universities, 23 community/technical colleges, 38 private colleges and the State Library of Ohio. OhioLINK is a state funded programme within the Ohio Board of Regents budget. A 13-member Governing Board approves strategic directions and financial decisions.

The OhioLINK programme was formed in order to implement a shared electronic catalogue system of library materials of the state's 6 major public universities. This central catalogue now offers access to more than 31 million library items from its 79 institutions in all subjects. Users can request items electronically while searching the OhioLINK central catalogue. A delivery service among member institutions speeds the exchange of library items. In addition to the central catalogue, users can access electronic research databases, including a variety of full-text resources. These databases cover a variety of disciplines. Many of the databases are citation indexes, though electronic full-text resources include online encyclopedias, dictionaries, literature, and journal articles. More than half of these resources are stored and delivered from OhioLINK servers via custom interfaces.

Through its Electronic Journal Centre, OhioLINK offers access to more than 2.5 million research articles in a growing collection. Over 2,500,000 research articles are downloaded each year.

### **OhioLINK Digital Media Centre**

OhioLINK launched its Digital Media Centre (DMC) three years ago. The DMC serves as an archive and distribution platform for a variety of non-text media such as images, audio, and video. Content is acquired from contributions made by affiliated OhioLINK institutions, partnerships with other institutions, and commercial sources.

Content is grouped by subject. The Art & Architecture database, for example, contains images from commercial sources such as AMICO and Saskia, as well as 'local' contributions from partnerships with the University of Cincinnati and the Akron Art Museum. Users can search through the

entire collection or search within a specific collection. Other databases include Historic and Archival Collections and a database of LandSat 7 Satellite data. More information about DMC resources is available on the DMC web site. The DMC is an industrial strength architecture built for the long term. It offers virtually unlimited storage space on its servers; a multi-terabyte disk array is in use that has the capacity for expansion as needed. OhioLINK has a partnership with the Ohio Supercomputer Centre (OSC) to use its IMB Tape system to provide near-line backup of its media data and hierarchical storage management capabilities.

The OhioLINK DMC is the infrastructure used to support the Sanborn Maps. Sanborn Maps are one collection within the History & Archival Collections database.

### **Benefits of the Collaboration**

The nature of the license agreement for the digital Sanborn Maps encouraged OPLIN to collaborate with others. Because the license allowed for access to Ohioans without regard to access mechanisms, OPLIN was free to pursue partners that could provide new access points within the state. At the time, a vendor-hosted map delivery system was not available by subscription; therefore, OPLIN needed to find a partner to host the content.

OPLIN and OhioLINK sought collaborations and partnerships before the digital Sanborn Map project. Among the most important of these partnerships has been Libraries Connect of Ohio (LCO), which includes—in addition to OPLIN and OhioLINK—the Information Network for Ohio Schools (INFOhio), a resource sharing organization that serves the K-12 community. In the fall of 1997, LCO began informally to explore ways the three networks could work together for the benefit of their memberships.

INFOhio, though not a contributor of money or resources, is nonetheless an important third organization in this project. Because the license allows the distribution of digital Sanborn Maps through any secure channels to Ohio citizens, OPLIN and OhioLINK chose to leverage INFOhio's existing authentication mechanisms. Through INFOhio, K-12 users at school may access digital Sanborn Maps directly on menu driven systems with which they are familiar. INFOhio benefits from the convenient availability of the resource, while OPLIN is able to extend the visibility of the resource and enhance access.

Because OPLIN's server capacity is limited, OPLIN is not able to host commercial content itself and thus sought out OhioLINK to serve as data and application provider for the maps. OPLIN benefits because OhioLINK provides the service at no charge, and because OPLIN is able to influence

interface and other decisions since the organizations are located across the street from one another.

OhioLINK benefits because it has access to content at no charge, and because OhioLINK can serve the maps within an integrated system that includes other historic, Ohio-related material.

A final benefit of this type of collaboration is the benefit to the lifelong learner living in Ohio. From elementary school to university to work, a consistent reliable resource will have been available.

### **Barriers to the Collaboration**

Though—as organizations steered by librarians—OPLIN and OhioLINK have shared values, several differences between them make collaboration challenging. These differences include the audiences served, administrative positions in state government, and inequality of funding. The audiences are different: the teaching and research community in the higher education community has different needs than those of public library patrons. For example, the health information needed by high-school students and consumers is not generally the same information used by medical or nursing school students.

Because OPLIN, OhioLINK and INFOhio receive their funding for mandated purposes, none is empowered to spend on behalf of the other. Collaboration must occur as a result of each organization meeting its own needs and finding that a resource can be extended without loss to the core constituency. The Sanborn Maps are one example.

Because the organizations were created at different times and for different reasons, they reside, fiscally, in different parts of state government. This means their processes for contracting and invoicing vary considerably. These bureaucratic differences make partnering non-trivial.

Generally speaking, inequality of funding is often the greatest barrier to collaboration. For online, vendor-hosted databases, it is particularly challenging to create joint license agreements in which all groups can participate. This project did not require outright financial contributions from all partners and was therefore less problematic.

Since April 2001, Ohioans have had access to digital Sanborn Maps of their state from home, school, work—or anywhere a World Wide Web connection is available. Acquisition of the digital Sanborn Map content was funded by OPLIN, and it is hosted on OhioLINK's Digital Media Centre. With limited data at hand, we can assert it is a popular resource—*anecdotal evidence and common sense tells us that it is far superior to its microfilm alternative.*

The Sanborn Map project has demonstrated that public and academic library communities can maximize limited public funding through collaboration. Neither OhioLINK nor OPLIN had the combination of financial resources and technical infrastructure to implement this resource independently. Based on the success of this project, the two consortia will continue to seek partnerships of many types where appropriate and feasible.

### **Transfer from Analog to Digital : Selecting a System**

Let me start by saying that for a place like the National Library of Australia the major shift from analogue to digital is probably in managing digital information, rather than reformatting our existing collections into digital form. Unless we manage the digital information that is being created we will lose a lot of it. So when I am talking about digitising collections, I recognise that it isn't the Library's only focus.

I approach this subject from a preservation background, but one that has been looking for some time at preserving information from a range of collection formats, using a range of reformatting and preservation management techniques. For the moment I want to bypass the question of whether digitisation is a useful preservation process-although ultimately I won't be able to avoid it.

What my experience leads me to are some principles that I believe should guide us. I then want to talk about a few specific projects and how we have tried to apply principles like these. I won't be presenting any technical information or comparing actual systems-it seemed too ambitious to take on what I want to talk about as well as the mass of available technologies in a relatively short paper.

What I have to say seems pretty obvious, but I hope it is still worth saying. It is very easy to believe there is one process called digitisation; very easy to assume that convergence means everything can be treated in the same way, as if there were a truck called "digitisation" on which we can throw all of our dead and dying technologies to be carted away and turned into something new and useful. It is easy to believe we can choose one of many desirable outcomes and ignore the processes we have to go through to reach it. One very desirable outcome is the ability to make information from all of our collections available to anyone anywhere, with rapid and thorough retrievability, and with seamless access so that data from all over the place can be put together in ways that are simply not possible with different analogue formats.

Although parts of that vision are achievable right now, as a whole it is a long way off, and there are many issues to resolve, many dilemmas along the way. (I keep thinking of a drawing by Lord Baden-Powell, of a



boy scout paddling a small canoe between rocks towards a beautiful sunrise emblazoned with the word “happiness”.)

This paper talks about some of the issues and dilemmas, and some of the approaches we are taking at the NLA.

### **Some Guiding Principles**

So, let’s start with some principles. Most of them should be familiar to anyone involved in preservation management, or library management, or public administration, just about anywhere.

- We must be accountable—we are going to be spending lots of someone else’s money, so we had better be sure that we can justify it, both in terms of what we digitise and how we do it (we also remain accountable for our existing collections and for what is going into them, so we have to do a good job of managing competing demands for our attention and resources).
- There are a lot of things we don’t know, so we had better remain flexible. It is hard to predict costs, technologies, storage capacities, bandwidths, what people will want to look at in a digital form, how they will want to use it, what the community will be willing to pay, what users will be willing to pay. (Already some of these look complicated. I hope I can convince you, if you need convincing, that we need to be mindful of all of these, but not debilitated by them.)
- We need to be both cautious and decisive. We need to step forward, and there is generally no point waiting until everything is perfect. While it is tempting—and foolish—to rush in, it is also tempting to wait, discuss, agonise, until everything is stable and understood.
- There are different ways of doing things, so we have to choose between alternatives. How do we choose? If I put accountability and flexibility together, I come up with pragmatism—by which I mean a commitment to solutions that work, and realism about what is likely to be possible, and about what may get in the way. Like other speakers, I am struck by the similarities and the differences between the old and the new. There is/was? an idea that everything would be different—everything had to be done differently because everything has changed. A truly pragmatic approach says: “we will apply what still seems applicable from the past—we will not assume that it must be wrong because we have done it that way before. If a model is useful, we will use it.” It also says, “if it isn’t useful, we won’t use it, we will do it differently.”
- Reflecting that pragmatism, I would say that we need to be experimental. We need to give ourselves room to undertake some

cautious projects that bring expertise together, and address some clearly defined objectives. We should seek to discover information that we need on specific issues.

These are general principles that apply to digitisation projects as well as elsewhere. There are a couple of other principles of particular relevance to digitising collections of the National Library:

- There is no one “system” applicable to all of our collections—at the most we may find a system that works well for a particular part of the collection. Even when different kinds of collection material have been digitised, there are likely to be differences in the way groups of primary users want to use them, and certainly differences in the storage capacity and network bandwidth needed. These are likely to be significant enough to keep them apart in the near future, even though highly selected bits will be brought together when someone wants to produce a multimedia package.
- We also believe we need to be systematic, rather than digitising bits and pieces, and to be comprehensive rather than selective. (By “systematic” I don’t mean we start at item one and work our way through to item 23 million, and by “comprehensive” I don’t mean that we will digitise everything.) The Library serves a number of roles. It is an educator, and a creator of what I might call recreational or entertainment products. In those roles it has an interest in packaging information. But it also has fundamental roles as a very significant research resource—we would say a pre-eminent resource—and as a major archive of documentary heritage. Digitisation must support our business, and we think it can do that best if we digitise systematically rather than *ad hoc*.
- And as a final starting principle, it’s worth saying that digitising always costs more than you think, and raises more issues that you thought of (and in this it is very much like microfilming only more so!)

### **Applying the Principles—Some NLA Projects**

How have we have tried to apply these principles? I will talk about a few projects selected to suit my purpose of trying to draw out some of the learning that has gone into and come out of those projects.

The ones I want to talk about are:

- a project to digitise the Oral History collections;
- a project to make digital copies of some of the original portraits in the Library’s Pictorial collections;

- the Australian Cooperative Digitisation Project that Ross Coleman [Collection Management Librarian, University of Sydney Library] has spoken about [in his paper *The Ferguson, 1840-45, collection proposal: adopting the hybrid approach* at the same conference]; and
- the digitisation of current Australian serials.

This does not account for a number of important proposals regarding maps, manuscripts and microfilm. It doesn't even mention our publications, education and exhibitions programmes. And it doesn't pretend to articulate the Library's main digitisation strategy, which is currently being finalised. There are significant larger issues associated with that digitisation strategy that are beyond the scope of this paper. Here I mainly want to use projects for the way they illuminate certain principles, not as case studies, and certainly not as a definitive statement of what the Library will seek to achieve in digitisation. What do these projects illustrate? The first principle I mentioned was accountability. Trying to be accountable we recognised a kind of chain of understandings:

- i. we can't digitise everything, at least not all at once, and maybe never. This is partly a matter of resources, but also a matter of priorities.
- ii. we have to start somewhere.
- iii. we need to base our priorities-our starting points-on two related things:
  - areas of the collection where there is a demonstrated imperative to digitise or we will lose access; and
  - things that clearly address the Library's strategic directions.

The first of these-demonstrated need-led us to the Oral History collections. Being a tape-based collection, we are dependent on supplies of professional quality analogue tape. When we became aware that suppliers were planning to stop making it in the next few years, we realised we had to look at a digital system or else lose our ability to preserve and give access to our collection. Having made a decision about priorities, we have looked at what benefits we could get from the project, what we can integrate into it. I will discuss the project in more detail a little later. For now I would ask you to note this theme in our priority setting-working out what needs to be done for a primary purpose, then looking for opportunities to get the maximum benefits out of it.

The other projects I mentioned are not being driven by the same operational necessity, although they are based on some strategic necessities. The portraits exercise came out of a concern that we had a major

documentary resource that is not as widely known as it should be, partly because it is difficult to provide safe and easy access to a collection of oil paintings, watercolours, prints, photographs and 3-D objects. The Library's support for and involvement in the National Portrait Gallery has led to increased collecting and increased demand for access to our portraits.

There were other advantages to this project. It addressed an identifiable component of the collections that are stored in one place, are already under consistent and good intellectual control, and where much of it is not encumbered with copyright restrictions. It was also a small enough project to be achievable in a short time frame, large enough to be significant, and it matched the available funds quite well.

Of course, there were also problems-quite a lot of the material is still covered by copyright; we had concerns about the technical and preservation difficulties in scanning original works of art; and we had been told that scanning technology for handling large colour images was still at a fairly immature stage of development.

We have sought to take advantage of these problems. We want to know about the copyright challenges-how artists will respond to requests to copy and give networked access to their works; what measures we can put in place to protect their intellectual property rights while providing the level of access we want; even just the administrative logistics. We intend to learn by dealing with these problems.

Likewise, we decided to take advantage of the fact that about half of the items were already photographed onto professional quality colour transparencies-so we decided to photograph the rest. This allows us to scan the trannies rather than the originals directly, adding a preservation-enhancing step to the process. We are interested in exploring the preservation implications of digitisation, but at the same time we are cautious about relying on it.

We are aware that responding to preservation concerns in this way adds considerably to the short term financial cost. This project will give us very useful benchmarking information on the image quality we can expect from this kind of pictorial material; it will also give us experience with one approach that uses an analogue technology as a preservation backup to a digital database.

Ross Coleman has already spoken at length about the Australian Cooperative Digitisation Project and the thought processes behind it. From the National Library's point of view, it is a project worth being part of for a number of reasons. It responds to a formally articulated demand from a primary user group; it lets us build on the experience we have in cooperative microfilming, testing and developing our collaborative

procedures to make them applicable to digital reformatting. We will learn about the similarities and the differences, the costs and the surprises. We will also learn a lot about options for archiving large amounts of data, for providing networked access, and about some legal issues associated with ongoing ownership and responsibilities.

The project is also attractive because it involves historical print materials—a good contrast with our portraits project.

The project to scan articles from current Australian serials indexed under APAIS (the Australian Public Affairs Information Service) takes a very different approach. Whereas our retrospective digitisation efforts involve struggles with priorities, finding best copies, preparing material that is sometimes in poor condition, and so on, the APAIS scanning project is based on a much simpler concept of building a digital collection as we go. If we can digitise before the material is put on a shelf we can avoid many of the costs associated with retrospective projects.

From a preservation point of view this is going to be fascinating: unlike our other projects there will be no preservation intermediate copy—we will be relying on our ability and will to migrate the data we create, without recourse to microfilm or transparencies should our migration paths fail. This experience will help educate us as we address one of the major issues—can we rely on digital imaging for preservation? Of course, the project has not been set up to answer that question—in fact, its focus is access, access, and more access, but having created this growing database, we will be faced with preservation questions to which we have to find answers.

In all of these projects, and at each stage of them, we have tried to get the right balance between making a responsible and accountable decision based on thorough consideration of all the factors, on the one hand, and experiment, on the other. Learning is not an adequate justification for any of these projects, but we expect it to be a major outcome of all of them.

What is important to understand from this is that these projects were not chosen at random: they came from ordinary priority-setting processes—operating in slightly extraordinary circumstances—to pursue outcomes in line with the Library's strategic objectives. It is important to put the main point of this paper in this context. When we talk about choosing a system we must go back to our priorities, and ask ourselves why we are doing this—what do we hope to get out of it? It is the answer to this question that we need to carry with us as we look at options, talk to systems designers, and put ourselves at the mercy of sales reps.

**Some Issues to Consider**

What are some of the issues to consider when we look at systems for digitising collections that we have identified as worth doing? how are we going to choose the best solution? I will try to mention a few issues that I think are worth pursuing.

I could sum it all up by talking about a cost/benefit analysis. This doesn't seem like a paradigm shift—we basically want to know whether the benefits are worth the costs, and to be able to compare the benefits and the costs we will wear with different systems. I think that process can be as formal and rigorous, or as informal and intuitive, as we need to be, but it should go beyond the obvious.

There are some obvious costs—what we pay to a scanning service provider, what we pay to buy or hire equipment and staff to do it ourselves, the cost of staff identifying and preparing the material. Then there are costs that don't get factored in if we are just thinking about the cost of scanning—things like building the access interface, storage and maintenance of the digital data we will create, the infra-structure that may be needed to make the data available. And there are obscure costs in managing the project, developing specifications, tendering, monitoring performance. It is easy for a few cents per page for scanning to turn into many dollars. And there is the cost of other activities foregone—what we could have done with the money, time, energy, and creativity that will go into the project. (As I have already said, this doesn't necessarily have to be done with rigour, but at least we need to get some gut-feeling for it.)

All of these costs are sounding like they add up to too much, so it is worth looking at the benefits. Hopefully they will be high. The benefits are usually not quantifiable in the way costs are, but we should be able to compare the benefits between systems. Because, like the costs, they will vary between systems. Again, we need to look at them seriously.

As well as the obvious benefits, such as improved access, we should try to make a realistic estimate of the preservation potential, the learning potential, what I might call the synergy potential. Just as some systems have hidden costs, there can also be hidden benefits that maybe should influence our choice of one system over another. But benefits also have a way of looking more promising than they are. It's worth asking whether we are really going to get them, and whether they are really what we want?

Often we are making a huge investment when we digitise, not just in making the information available for remote and multiple users, but also by improving access within an item or collection. It represents a major investment in improved accessibility, in many ways doing the work the



reader or a librarian or an archivist was once expected to do. This sort of investment should be made consciously, based on how the information will be used.

In choosing a system, there is a decision to be made about convergence. I have already said that I don't expect all digital data to be handled in the same way. At the same time, my digital Baden-Powell in his little canoe was paddling towards a glorious sunrise of happiness and integrated information access. Choosing a system involves making decisions about what can be converged, how easily, and when. Perhaps I have already answered my own question by talking about integrated information access.

We probably aren't going to use the same system for capturing and digitising information from all of our collection areas, but we almost certainly will want to be able to make all of it available to a user, using the one access tool, without having to move from place to place. So we have to make some sophisticated judgments about exactly where we seek convergence, choosing the point that gives us the maximum benefits and the minimum pain.

In many cases deciding on a system also means deciding whether it will be a system or a collection of components. It is easy enough to walk through the door marked "do we have a system for you!"-easy to walk in and say "yes, I'll have one of those please". I find it encouraging that fewer people are doing that. When we open the door marked "components we can put together to meet your needs", we find we are blessed with the range of possibilities before us, though cursed with the responsibility of wider choice.

In most cases, what we need are systems-even if we are building from components we still need to be integrating them into a system that works as a whole. Systems like this need design, they need a unifying understanding of what has to be done. Probably like most institutions, we have to decide at how many levels we can make this system design work. We know we want a digital set up in our sound preservation area that works beautifully as a system; we have to decide on how far we need to design that into a grand concept of a Library-wide system. I am fairly sure these are questions of "when" rather than "if".

One thing we are blessed with is the growing ability and readiness of the market place to build things that talk to each other, that can be put together to make what we are calling a system. This is an encouraging sign!

I should like to think that this came about through preservation awareness, but it really has to do with winners and losers. Because we have a small number of very big winners the market has tended to be

pulled into line with them. There is a big lesson in this for us when we are choosing digitising systems. In a very fluid market place we are trying to pick winners: the people whose technology will be so widespread that it will be superseded in ten years rather than two; the people who will stay in business and be able to offer us support for our system. There are many good reasons for choosing something that isn't likely to become an unserviceable white elephant, that was once a great innovative idea.

A question that worries me sometimes: should we digitise once for all? We have tended to assume that we should only digitise once; that we want a system that gives us the resolution-if I can use that term very broadly-to meet all of our anticipated needs. That approach surely makes sense, as it does with microfilming. But of course it comes with a cost-the more the resolution, the bigger the digital file, the more it costs to store, the longer it takes to copy, and all the rest. There is understandable pressure to set some sensible limits on resolution-let's limit it to the resolution of viewing equipment, or what people can see and hear, or what publishers need to make art print quality reproductions? "No, no," we say, "you don't understand: the time will come when we can view at much higher resolutions, when we can send massive uncompressed pictorial and sound files through networks with no delays; where will we be then, unless we have very high resolution images? And what about preservation-surely we must be capturing enough data to reproduce all of the original?" "Ah," the answer comes back, "I thought you weren't relying on this for preservation; I thought this was why we had to have microfilm as well. And, when the day comes when we can store and transmit very large files at such a low cost, will we not also be able to digitise at a much lower cost? Why not do it now for the purposes we have now, and accept that we will be able to do it again later for tomorrow's purposes?"

This is almost an open and shut case, but perhaps it is not completely shut. I know what my current approach would be, but maybe there is an interesting debate in some cases.

Now this debate hardly applies at all to the Oral History digitisation project. We don't think we will have the option of re-digitising from "the originals" in 50 years' time. We think this really is a "once and for all" job. (It also means that we haven't had to pay attention to the otherwise critical question of whether we can digitise without causing damage to the originals.)

### ***Criteria for a Digital Sound Preservation System***

I want to finish by showing you the detailed criteria we have been using to look at options for this project. As I do so, it may well look like an impossibly complex task. There are so many factors, some of which need

more weight than others, so many spaces where it is hard-even impossible to fill in the gaps. It is complex!

I can only say that we have found room to be more rigorous with some of these and more intuitive with others, but that we are trying to take all of them into account.

For every factor we ask ourselves these questions:

- is it part of the system?
- how is it going to be done?
- what are the costs?
- how easy will it be?
- what flexibility does it give us?

And these are the factors we have been looking at:

- equipment, software, accessories
- installation, maintenance
- expertise required, training provided
- infra-structure needed
- opportunities to make use of existing infra-structure, facilities, expertise (Any system is going to have much more chance of success if we can operate it without having to take on a team of technological whizkids to nurse it through)
- transfer rates (how quickly and easily) for analogue to digital, and for digital to digital (we recognise that the conversion to digital is the start of a cycle of copying)
- how much digital storage capacity the data takes up
- what kind of storage media are required (or possible)
- any special storage requirements for media
- life of the media
- reliability of the media-how much trouble it will cause us?
- error detection and correction-one of the great advantages of digital systems is the ability to build in programmes to deal with data degradation. We want to know how effective it is, how much it costs.
- other maintenance procedures needed for the media. (Exercising tapes every couple of years might or might not be more than we could manage)
- the expected life of the format and the technology. (We are assuming that there is no archival medium, only archival procedures. We

want to work out where we are in the life cycle of the technologies we are looking at, and of course, when the technology does change, we want to be confident that we can migrate the data forwards. (Choosing a ubiquitous technology probably increases our chances)

- reliability, consistency, standards-are we entering an operating environment with established standards, or one where we take our chances and keep our fingers crossed?
- security of data, copyright, access restrictions-how well will the system protect the data we are storing from unauthorised access, unapproved copying, and corruption?
- ability to operate as a network-because we are a reasonably large operation with a number of studios and control rooms, we want to know about internal networking
- ability to index data and ability to link information-we want to be able to do our indexing and intellectual control processes as efficiently as possible
- support prognosis-we don't want to be left stranded on a system that does a good job most of the time, but that leaves us waiting for weeks before someone can fix up any problems. And we expect to need that support for quite a few years, not just for the first 12 months
- ability to deliver to external networks-although we are being driven by a preservation necessity, this is where we start looking at how we go beyond our internal system. We are interested in the capability and costs of connecting to and delivering data through networks, how we will provide access, how easily we can give copies to users, how well our system can be part of a larger system within the Library and beyond.
- convergence potential-how compatible we will be with other parts of the Library
- compressibility?-the question of data compression comes up quite often. This affects storage capacities and how well we can give networked access-and the likely impact of our data on the other systems around the place. So far we don't believe we can use any compression algorithms for sound recordings that we are preserving.

## Computer Library Management

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### The Workings of Library

In a parliamentary democratic system, as in India, the representatives of the people need objective, factual and timely information with a view to ensuring executive accountability to the legislature. That being the case, it is imperative that a Parliament should have its own information reservoir and information management system, away from the control of the Executive Branch. In the Indian Parliament, the multifarious information needs of members are met by Parliament's Library and Reference, Research, Documentation and Information Service, more popularly known by its acronym 'LARRDIS'.

The Parliamentary Library was established in 1921, long before India's independence, when representative government was then under the control of the administration of Britain. The Library grew in size and stature only after the achievement of national freedom in 1947. The demands of the parliamentary system contributed to the growth of the Library and in 1974 a total transformation was effected in its organizational set up when it acquired a larger role and the present name, the LARRDIS.

Ever since its inception, LARRDIS has endeavoured to live up to its role as an information provider and also as an information manufacturer. The Parliamentary Library is a key component in the LARRIDS system, with a collection of about one million volumes. The Library collections include books, debates of Indian Parliament, State Legislatures and some foreign Parliaments, reports of Central and State Governments and United Nations and its Agencies, Gazettes of Central and State Governments and other documents, including periodicals and publications brought out by the Secretariats of the two Houses of the Parliament. The collections of the Library are primarily in English. India being a nation of diverse

languages, the Parliamentary Library has of course a sizeable number of books and other publications in Hindi and a large number of other national languages. Collections in foreign languages are not maintained in any significant numbers.

The traditional approach of collecting books, issuing them out to those who ask for them and answering simple queries of the customers was all that was expected of the Libraries till very recently. But the phenomenal growth in the range and dimensions of the sphere of the government has made it impossible for the modern legislator to be self-reliant in the field of information that he needs in the discharge of his duties as an effective representative of the people. The situation has necessitated the establishment of not only a well-stocked Library but also an efficient research and reference service to which Members of Parliament can always turn for help and assistance.

Remarkable developments in the field of science and technology in recent years have revolutionised all aspects of human endeavour—especially in the context of information management. People today live in an information society and without a doubt an informed electorate and Legislature are valuable assets to a successful democracy.

The advent of new technologies has not gone unnoticed or unutilized in the Parliamentary Library in India also. We have been making a modest but sustained attempt to harness the advantages of modernizing our Library so that we can serve the Members of our Parliament better.

It was in the mid-eighties that the Parliamentary Library of India initiated measures to keep pace with the technological advancements in information management. Thus, in December 1985, we made a modest beginning towards automation. A Computer Centre was set up for managing the Parliamentary Library Information System (PARLIS) with the help of the Government run National Informatics Centre (NIC). There has not been any looking back since then. In fact, within a decade and a half, we have succeeded in automating almost the entire Lok Sabha Secretariat, besides LARRDIS. The software required for different services of the Secretariat are developed in-house in collaboration with the NIC and another Government-owned firm, the Computer Maintenance Corporation (CMC) Ltd.

It may be worth mentioning that the modernization of the Lok Sabha Secretariat has indeed been a welcome development in further facilitating the varied roles of a Member of Parliament. Inevitably, the informational needs of members have also been greatly addressed with the computerisation of the Secretariat and its Branches dealing with Questions, Committees, Reporting, Members' Services, General Administration, Budget and



Payment, Recruitment, Pay and Accounts, etc., and LARRDIS. Two separate but inter-linked Computer Centres are now functional-one in Parliament House and another in the Parliament House Annexe.

### Databases

The Parliamentary Library has put special emphasis on developing its own database, since the need for objective and non-partisan information for a member is vitally important. As of now, the following are available by on-line information retrieval:

- Business of the House
  - o *Parliamentary proceedings* (Indexes of relevant parliamentary proceedings from 1985 to 1993; retrievable by the Member's name and keyword, with a facility for year-wise filtering)
  - o *Select Parliament Questions* (since 1985; lists may be generated by giving the Member's name or subject or date)
  - o *Text of the Constitution and the Constituent Assembly Debates* (List of Members and full text of proceedings)
  - o *Bills* (Index of Bills-Government & Private Members-retrievable by name of Member, subject, Bill number, amendment number, etc., available from 1985 onwards)
  - o *Practices and Procedures* [Rules of procedure and conduct of business in the Houses, Decisions/Observations/Directions by the Chair (Indexes available, besides text of Directions from 1952; retrievable through the serial number of the Direction and subject)]
- Ministers and Members
  - o *Council of Ministers* (names and portfolios of the Union Council of Ministers since 1947)
  - o *Consolidated Index of Members* (names and membership from the time of the Constituent Assembly onwards)
  - o *Bio-data of Members* (of Ninth to Thirteenth Lok Sabha and of Rajya Sabha from 1986 onwards; statistical data relating to age, sex, education, profession, party, previous political experience and socioeconomic background of members of Lok Sabha from 1952)
- Obituary References (made in the Houses since 1921)
- Elections
  - o *Presidential and Vice-Presidential Elections* (details of all elections since 1952)

- o *By-elections to the Lok Sabha* (since 1952)
- President's rule in States/Union Territories (since 1957)
- LARRDIS
  - o *Library Catalogue* (books/reports added since 1992; search by author, title, classification number, subject, keywords in title, keywords in context) [A programme to include all data pertaining to book acquisitions prior to 1992 is in the planning stages and we hope to have this completed soon].
  - o *Serials Control* (journals/periodicals added since 1989; title, subject, keyword searches possible); Parliamentary Documentation (this Current Awareness Service provides indexes to select books, reports and articles from 1989, retrievable under parameters like period, subject and country).
  - o *Press Clippings* (about 600 new press clippings on a wide variety of subjects available daily for on-line scanning; search is also possible through various parameters)
  - o *Library management functions* like acquisition, processing and issue and return of books have been computerized by using the software package LIBSYS. Members can access the catalogue of the Parliamentary Library through the terminals installed at the Library counters. Indexes of important articles published in newspapers and journals and publications of national and international organizations are also available through the terminals. Subject bibliographies and select lists of publications on various subjects are provided to members on request. Further expansion of the computerization efforts is envisaged to cover some other areas, including parliamentary activities like Papers tabled in the House; Pay Rolls of Members of Parliament; rare collections of Parliamentary Museum and Archives; and telecasting of parliamentary proceedings.

### **Supply of Computers to Members**

Keeping in view the immediate and succinct information requirements of Parliamentarians, a need was felt to provide computer facilities to them at their residences/work places. Accordingly, each Member is being provided with a computer (lap top/desk-top, as per his choice) along with all accessories like printer, data/fax modem card, etc. Free Internet and e-mail connections have also been given to each Member. A user friendly menu-driven software under the Windows environment has been developed by the NIC and the CMC which would assist the Members of Parliament in the following areas:

- Constituency functions management system: census statistics; and election statistics
- Personal information system: correspondence and grievance module; local area development system; and lists of service beneficiaries
- Office automation activities: multilingual word processing facility; e-mail facility for sending mail to fellow MPs, Parliamentary Secretariats, Ministers and their offices, etc., fax facility, voice mail, telephone diary; greetings preparation, Directory of Who's Who; appointment planning; etc.
- Parliamentary Library Information System (PARLIS).

In order to provide on-line services such as e-mail facility and access to the parliamentary databases, other Government databases and databases of foreign Legislatures to the Members, a central computing facility has been set up in Parliament House and connected to the NIC's satellite based network, NICNET, through a Micro Earth Station (VSAT) and leased lines. Presently, Members of Parliament can have access to computerized information/databases available in the Computer Centre (in the Parliament Library) from their residences/work places through their personal computers.

### **Linkage**

As mentioned earlier, PARLIS is connected to the NIC's satellite-based network called NICNET, which in turn is linked to the capitals of all the 32 States and Union Territories and the 600 odd District Headquarters of the country. The linkages help in the quick search for information as needed by Members.

The Library is also working on a comprehensive scheme for developing a national on-line network for inter linkage of databases of PARLIS with databases of State Legislatures under a National Legislatures Information System.

### **Parliament of India Home Page**

The Indian Parliament's Home Page, which became operational in March 1996, was accessible at the Internet site <http://alfa.nic.in>. The site has now been changed to <http://parliamentofindia.nic.in> to facilitate the search. A large volume of information is available on the Home Page. The information includes the texts of the Constitution, Constituent Assembly Debates, Select Addresses by the President of India, Rules of Procedure, Directions and Decisions from the Speaker, Bills and National Policies, bio-data of Members, current Debates of the Houses, indexes of Debates, etc. (part of the information is available from specific years only).

**Microfilming**

For the optimum utilization of space and better preservation of documents, the Parliamentary Library set up a Microfilming Unit in 1987. Substantial work has since been accomplished. Documents now available for computer assisted retrieval include Debates of the Legislative Council and the Central Legislative Council (representative institutions which existed during the pre-independence period), Debates in the Constituent Assembly and Lok Sabha and Rajya Sabha and the Indexes thereof, Reports of various Parliamentary Committees and the Indian Parliamentary Group, Papers tabled in the House, rare books, Government Bills, Constitution of India, Journal of Parliamentary Information, etc.

**Reference Service**

Within the LARRDIS is a Reference Service which is devoted exclusively to attend to the requests for information from Members. The various tools of information technology now available in the Library have helped in ensuring a speedier and better response to the queries from Members, especially on matters coming up for discussion in Parliament.

**Conclusion**

The new advances in the field of information technology, as we have seen, have enabled the expansion of the services that are made available to the Members of Parliament. Apart from this, a noteworthy yet often ignored achievement has been the speeding up of the already existing practices and procedures in the service of Members. These include the faster supply of more comprehensive information on demand, preparation of briefs and notes in anticipation of needs, etc. Application of IT has thus resulted in an overall improvement in the quality and content of the services rendered by the Library in the areas of reference and research support for Members of our Parliament.

**Integrating Knowledge Management Technologies in Organizational Business Processes**

Technologists never evangelize without a disclaimer: "Technology is just an enabler." True enough-and the disclaimer discloses part of the problem: enabling what? One flaw in knowledge management is that it often neglects to ask what knowledge to manage and toward what end.

Knowledge management activities are all over the map: building databases, measuring intellectual capital, establishing corporate libraries, building intranets, sharing best practices, installing groupware, leading training programmes, leading cultural change, fostering collaboration, creating virtual organizations-all of these are knowledge management,

and every functional and staff leader can lay claim to it. But no one claims the big question: why? (Tom Stewart in *The Case Against Knowledge Management, Business 2.0*, February 2002).

The recent summit on knowledge management (KM) at the pre-eminent ASIST conference opened on a rather upbeat note. The preface noted that KM has evolved into a mature reality from what was merely a blip on the “good idea” radar only a few years ago. Growing pervasiveness of KM in worldwide industries, organizations, and institutions marks a watershed event for what was called a fad just a few years ago. KM has become embedded in the policy, strategy, and implementation processes of worldwide corporations, governments, and institutions.

Doubling in size from 2001, the global KM market has been projected to reach US\$8.8 billion during this year. Likewise, the market for KM business application capabilities such as CRM (Malhotra, 2004a) is expected to grow to \$148 billion by the next year.

KM is also expected to help save \$31 billion in annual re-invention costs at *Fortune* 500 companies. The broader application context of KM, which includes learning, education, and training industries, offers similarly sanguine forecasts. Annual public K-12 education is estimated at \$373 billion dollars in US alone, with higher education accounting for \$247 billion dollars. In addition, the annual corporate and government training expenditures in the US alone are projected at over \$70 billion dollars.

One can see the impact of knowledge management everywhere but in the KM technology-performance statistics (Malhotra, 2003). This seems like a contradiction of sorts given the pervasive role of information and communication technologies in most KM applications.

Some industry estimates have pegged the failure rate of technology implementations for business process reengineering efforts at 70 percent. Recent industry data suggest a similar failure rate of KM related technology implementations and related applications (Darrell *et al.*, 2002). Significant failure rates persist despite tremendous improvements in sophistication of technologies and major gains in related price-performance ratios.

At the time of writing, technology executives are facing a renewed credibility crisis resulting from cost overruns and performance problems for major implementations (Anthes and Hoffman, 2003). In a recent survey by Hackett Group, 45 percent CIOs attribute these problems to technology implementations being too slow and too expensive. Interestingly, just a few months ago, some research studies had found negative correlation between tech investments and business performance (Alinean, 2002; Hoffman, 2002). Financial performance analysis of 7,500 companies relative

to their IT spending and individual surveys of more than 200 companies had revealed that:

- Companies with best-performing IT investments are often most frugal IT spenders;
- Top 25 performers invested 0.8 percent of their revenues on IT in contrast to overall average of 3.7 percent; and
- Highest IT spenders typically under-performed by up to 50 percent compared with best-in-class peers.

Based upon multi-year macroeconomic analysis of hundreds of corporations, Strassmann (1997) had emphasized that it is not computers but what people do with them that matters. He had further emphasized the role of users' motivation and commitment in IT performance. Relatively recent research on implementation of enterprise level KMS (Malhotra, 1998a; Malhotra and Galletta, 1999; Malhotra and Galletta, 2003; Malhotra and Galletta, n.d. a; Malhotra and Galletta, n.d. b) has found empirical support for such socio-psychological factors in determining IT and KMS performance.

An earlier study by Forrester Research had similarly determined that the top-performing companies in terms of revenue, return on assets, and cash-flow growth spend less on IT on average than other companies. Surprisingly, some of these high performance "benchmark" companies have the lowest tech investments and are recognized laggards in adoption of leading-edge technologies. Research on best performing US companies over the last 30 years (Collins, 2001) has discovered similar "findings". The above findings may seem contrarian given persistent and long-term depiction of technology as enabler of business productivity (cf. Brynjolfsson, 1993; Brynjolfsson and Hitt, 1996; Brynjolfsson and Hitt, 1998; Kraemer, 2001).

Despite increasing sophistication of KM technologies, we are observing increasing failures of KM technology implementations (Malhotra, 2004b). The following sections discuss how such failures result from the knowledge gaps between technology inputs, knowledge processes, and business performance. Drawing upon theory, prior research, and industry case studies, we also explain why some companies that spend less on technology and are not leaders in adoption of most hyped RTE technologies succeed where others fail.

The specific focus of our analyses is on the application of KM technologies in organizational business processes for enabling real time enterprise business models. The RTE enterprise is considered the epitome of the agile adaptive and responsive enterprise capable of anticipating



surprise; hence our attempt to reconcile its sense making and information processing capabilities is all the more interesting. However, our theoretical generalizations and their practical implications are relevant to IT and KM systems in most enterprises traversing through changing business environments.

### **Disconnects between Disruptive Information Technologies and Relevant Knowledge**

Organizations have managed knowledge for centuries. However, the popular interest in digitizing business enterprises and knowledge embedded in business processes dates back to 1993. Around this time, the *Business Week* cover story on virtual corporations (Byrne, 1993) heralded the emergence of the new model of the business enterprise. The new enterprise business model was expected to make it possible to deliver anything, anytime, and, anywhere to potential customers. It would be realized by digitally connecting distributed capabilities across organizational and geographical boundaries. Subsequently, the vision of the virtual, distributed, and digitized business enterprise became a pragmatic reality with the mainstream adoption of the internet and web.

Incidentally, the distribution and digitization of enterprise business processes was expedited by the evolution of technology architectures beyond mainframe to client-server to the internet and the web and more recently to web services. Simultaneously, the software and hardware paradigms have evolved to integrated hosted services and more recently to utility computing and on demand computing (Greenemeier, 2003a, b; Hapgood, 2003; Sawhney, 2003; Thickins, 2003) models. Organizations with legacy enterprise business applications trying to catch up with the business technology shifts have ended up with disparate islands of diverse technologies.

### **Decreasing Utility of the Technology-push Model**

Management and coordination of diverse technology architectures, data architectures, and system architectures poses obvious knowledge management challenges (Malhotra, 1996; Malhotra, 2001a; Malhotra, 2004b). Such challenges result from the need for integrating diverse technologies, computer programmes, and data sources across internal business processes. These challenges are compounded manifold by the concurrent need for simultaneously adapting enterprise architectures to keep up with changes in the external business environment. Often such adaptation requires upgrades and changes in existing technologies or their replacement with newer technologies.

Going business enterprises often have too much (unprocessed) data and (processed) information and too many technologies. However, for most high-risk and high-return strategic decisions, timely information is often unavailable as more and more of such information is external in nature (Drucker, 1994; Malhotra, 1993; Terreberry, 1968; Emery and Trist, 1965). Also, internal information may often be hopelessly out of date with respect to evolving strategic needs. Cycles of re-structuring and downsizing often leave little time or attention to ensure that the dominant business logic is kept in tune with changing competitive and strategic needs.

As a result, most organizations of any size and scope are caught in a double whammy of sorts. They do not know what they know. In simple terms, they have incomplete knowledge of explicit and tacit data, information, and decision models available within the enterprise. Also, their very survival may sometimes hinge on obsolescing what they know.

In other words, often they may not know if the available data, information, and decision models are indeed up to speed with the radical discontinuous changes in the business environment (Arthur, 1996; Malhotra, 2000a; Nadler and Shaw, 1995). In this model, incomplete and often outdated data, information, and decision models drive the realization of the strategic execution, but with diminishing effectiveness. The model may include reactive and corrective feedback loops.

The logic for processing specific information and respective responses are all preprogrammed, pre-configured, and predetermined. The mechanistic information-processing orientation of the model generally does not encourage diverse interpretations of information or possibility of multiple responses to same information. This model of KM is often driven by technological systems that are out-of-alignment with strategic execution and may be characterized as the technology-push model. This model has served the needs of business performance given more manageable volumes of information and lesser variety of systems within relatively certain business environment. However, with recent unprecedented growth in volumes of data and information, the continuously evolving variety of technology architectures, and the radically changing business environment, this model has outlasted its utility. The limitations of the technology-push model are evident in the following depiction of IT architectures as described in *Information Week* by LeClaire and Cooper (2000):

The infrastructure issue is affecting all businesses... E-business is forcing companies to rearchitect all or part of their IT infrastructures-and to do it quickly. For better or worse, the classic timeline of total business-process reengineering-where consultants are brought in, models are drawn up, and plans are implemented gradually over months or years-just isn't

fast enough to give companies the e-commerce-ready IT infrastructures they need... Many companies can't afford to go back to the drawing board and completely rearchitect critical systems such as order fulfilment and product databases from the bottom up because they greatly depend on existing infrastructure.

More often, business-process reengineering is done reactively. Beyond its disruptive effect on business operations, most IT managers and executives don't feel there's enough time to take a holistic approach to the problem, so they attack tactical issues one-by-one. Many companies tackle a specific problem with a definitive solution rather than completely overhaul the workflow that spans from a customer query to online catalogues to order processing.

### **Strategic Execution: The Real Driver of Business Performance**

The gap between IT and business performance has grown with the shifting focus of business technology strategists and executives. Over the past two decades, their emphasis has shifted from IT to information to knowledge as the lever of competitive advantage. At the time of the writing, technology sales forecasts are gloomy because of the distrust of business executives who were previously oversold on the capabilities of technologies to address real business threats and opportunities.

This follows on the heels of the on-and-off love-hate relationship of the old economy enterprises and media analysts with the new economy business models over the past decade. We first saw unwarranted wholesale adulation and subsequently wholesale decimation of technology stocks. All the while, many industry executives and most analysts have incorrectly presumed or pitched technology as the primary enabler of business performance. The findings from the research (Collins, 2001) on best performing companies over the last three decades are summarized in Table I. These findings are presented in terms of the inputs-processing-outcomes framework used for contrasting the technology-push model with the strategy-pull model of KM implementation.

Subsequent discussion will further explain the relative advantages of the latter in terms of strategic execution and business performance. Given latest advances in web services, the strategic framework of KM discussed here presents a viable alternative for delivering business performance as well as enterprise agility and adaptability (Strassmann, 2003).

### **Will the Real Knowledge Management Please Stand-up?**

The technology evangelists, criticized by Stewart (2000), have endowed the KM technologies with intrinsic and infallible capability of getting the

right information to the right person at the right time. Similar critiques (cf. Malhotra, 2000a; Hildebrand, 1999) have further unraveled and explained the “myths” associated such proclamations made by the technology evangelists. Specifically, it has been underscored that in wicked business environments (Churchman, 1971; Malhotra, 1997) characterized by radical discontinuous change (Malhotra, 2000a; Malhotra, 2002b), the deterministic and reductionist logic (Odom and Starns, 2003) of the evangelists does not hold. Incidentally, most high potential business opportunities and threats are often embedded within such environments.

Such environments are characterized by fundamental and ongoing changes in technologies as well as the strategic composition of market forces. Increasing failures rates of KM technologies often result from their rapid obsolescence given changing business needs and technology architectures.

Popular re-labeling by vendors of many information technologies as KM technologies has not helped the situation. Skeptics of technology have observed that real knowledge is created and applied in the processes of socialization, externalization, combination, and internalization (Nonaka and Takeuchi, 1995) and outside the realm of KM technologies.

Practitioners’ inability to harness relevant knowledge despite KM technologies and offices of the CKOs caused the backlash and KM was temporarily branded as a fad. Scholarly research on latest information systems and technologies, or lack thereof, has further contributed to the confusion between data management, information management, and knowledge management.

Recent reviews of theory and research on information systems and KM (Alavi and Leidner, 2001; Schultze and Leidner, 2002) seem to confirm Stewart’s (2000) observation about the key flaw of knowledge management:

***Knowledge Management Activities are all over the Map... But no One Claims the Big Question: Why?***

Hence, it is critical that a robust distinction between technology management and knowledge management should be based on theoretical arguments that have been tested empirically in the “real world messes” (Ackoff, 1979) and the “world of re-everything” (Arthur, 1996). We are observing diminishing credibility of information technologists (Anthes and Hoffman, 2003; Hoffman, 2003; Carr, 2003).

A key reason for this is an urgent need for understanding how technologies, people, and processes together influence business performance (Murphy, 2003). Explicit focus on strategic execution as the driver of technology configurations in the strategy-pull KM framework reconciles

many of the above problems. The evolving paradigm of technology architectures to on demand plug-and-play inter-enterprise business process networks (Levitt, 2001) is expected to facilitate future realization of KM value networks. Growing popularity of the web services architecture (based upon XML, UDDI, SOAP, WSDL) is expected to support the realization of real-time deployment of business performance driven systems based upon the proposed model (Kirkpatrick, 2003; Zetie, 2003; Murphy, 2003).

The technology-push model is attributable for the inputs-and processing-driven KM implementations with emphasis on pushing data, information, and decisions. In contrast, the strategy-pull model recognizes that getting preprogrammed information to predetermined persons at the pre-specified time may not by itself ensure business performance.

Even if preprogrammed information does not become outdated, the recipient's attention and engagement with that information is at least equally important. Equally important is the reflective capability of the recipient to determine if novel interpretation of the information is necessary or if consideration of novel responses is in order given external changes in the business environment.

The technology-push model relies upon single-loop automated and unquestioned automatic and preprogrammed response to received stimulus. In contrast, the strategy-pull model has built in double-loop process that can enable a true sense-and-respond paradigm of KM. The focus of the technology-push model is on mechanistic information processing while the strategy-pull model facilitates organic sense making (Malhotra, 2001b).

The distinctive models of knowledge management have been embedded in KM implementations of most organizations since KM became fashionable. For instance, the contrast between the models can be illustrated by comparing the fundamental paradigm of KM guiding the two organizations, a US global communications company and a US global pharmaceutical firm. The telecommunications company adopted the mechanistic information-and processing-driven paradigm of KM (Stewart and Kaufman, 1995):

*What's important is to find useful knowledge, bottle it, and pass it around.*

*In contrast, given their emphasis on insights, innovation, and creativity, the pharmaceutical company adopted the organic sense-making model of KM (Dragoon, 1995, p. 52):*

*There's a great big river of data out there. Rather than building dams to try and bottle it all up into discrete little entities, we just give people canoes and compasses.*

The former model enforces top-down compliance and control through delivery of institutionalized information and decision models. In contrast, the latter model encourages discovery and exploration for questioning given assumptions and surfacing new insights (Nonaka and Takeuchi, 1995).

### **Real Time Strategic Execution: The Real Enabler of the RTE**

The issues of technology deployment, technology utilization, and business performance need to be addressed together to ensure that technology can deliver upon the promise of business performance.

Interestingly, most implementations of KM systems motivated by the technology-push model have inadvertently treated business performance as a residual: what remains after issues of technology deployment and utilization are addressed. This perhaps explains the current malaise of IT executives and IT management in not being able to connect with business performance needs (Hoffman, 2003). A sense-and-respond KM system that can respond in real time would need to consider the holistic and collective effect of:

- real-time deployment in terms of tech and human infrastructure (inputs);
- real-time utilization in terms of what is done about or with information (processing); and
- real-time performance in terms of how it delivers business performance (outcomes).

Deployment of intranets, extranets, or, groupware cannot of itself deliver business performance. These technologies would need to be adopted and appropriated by the human users, integrated within their respective work-contexts, and effectively utilized while being driven by the performance outcomes of the enterprise.

To deliver real-time response, business performance would need to drive the information needs and technology deployment needs. This is in congruence with the knowledge management logic of the top performing companies discussed earlier. These enterprises may not have created the buzz about the latest technologies.

However, it is unquestionable that these best performing organizations harnessed organizational and inter-organizational knowledge embedded in business processes most effectively to deliver top-of-the-line results. The old model of technology deployment spanning months or often years often resulted in increasing misalignment with changing business needs. Interestingly, the proposed model turns the technology-push model on its



head. The strategy-pull model illustrated in figure treats business performance not as the residual but as the prime driver of information utilization as well as IT-deployment.

The contrast between the inputs-processing-output paradigms of KM implementations is further explained in the following section to bridge the existing gaps in KM research and practice.

### **Gaps in KM Implementation Research and Practice**

The “knowledge application gap” that is characteristic of the inputs-and processing-driven technology-push model have also been the subject of criticism in scholarly research on KM (Alavi and Leidner, 2001; Zack, 2001).

However, these gaps seem to persist across most of theoretical research and industry practices related to information systems and knowledge management as shown in Table II. As discussed in Malhotra (2000a), such gaps have persisted over the past decade despite advances in understanding of KM and sophistication of technology architectures.

The sample of “definitions” of KM listed in Table II is not exhaustive but illustrative. However, it gets the point across about the missing link between KM and business performance in research and practice literatures.

Despite lack of agreement on what is KM, most such interpretations share common emphasis on the inputs-and processing-driven technology-push model. Review of most such “definitions” also leaves one begging for a response to Stewart’s pointed question to technologists’ evangelism about KM: “why?” In contrast, the strategy-pull model with its outcomes-driven paradigm seems to offer a more meaningful and pragmatic foundation for KM.

At least as far as real world outcomes are concerned, this paradigm measures up to the expectations about KM policy and its implementation in worldwide organizations. Better understanding of the gaps that we are trying to reconcile is possible by appreciating the contrast between the three paradigms of KM implementation that have characterized the technology-push and strategy-pull models of KM depicted in figures. This contrast is explained in terms of their primary and differential focus on the inputs, processing, and outcomes.

The inputs-driven paradigm considers information technology and KM as synonymous. The inputs-driven paradigm with its primary focuses on technologies such as digital repositories, databases, intranets, and, groupware systems has been the mainstay of many KM implementation projects. Specific choices of technologies drive the KM equation with primary

emphasis on getting the right information technologies in place. However, the availability of such technologies does not ensure that they positively influence business performance.

For instance, installing a collaborative community platform may neither result in collaboration nor community (Barth, 2000; Charles, 2002; Verton, 2002). The practitioners influenced by this paradigm need to review the “lessons about technology inputs”.

The processing-driven paradigm of KM has its focus on best practices, training and learning programmes, cultural change, collaboration, and virtual organizations. This paradigm considers KM primarily as means of processing information for various business activities. Most proponents of RTE belong to this paradigm given their credo of getting the right information to the right person at the right time. Specific focus is on the activities associated with information processing such as process redesign, workflow optimization, or automation of manual processes.

Emphasis on processes ensures that relevant technologies are adopted and possibly utilized in service of the processes. However, technology is often depicted as an easy solution to achieve some type of information processing with tenuous if any link to strategic execution needed for business performance. Implementation failures and cost-and-time overruns that characterize many large-scale technology projects are directly attributable to this paradigm (Anthes and Hoffman, 2003; Strassmann, 2003). Often the missing link between technologies and business performance is attributable to choice of technologies intended to fix broken processes, business models, or organizational cultures. The practitioners influenced by this paradigm need to review the “lessons about processing”.

The outcomes-driven paradigm of KM has its primary focus on business performance. Key emphasis is on strategic execution for driving selection and adaptation of processes and activities, and carefully selected technologies. For instance, if collaborative community activities do not contribute to the key customer value propositions or business value propositions of the enterprise, such activities are replaced with others that are more directly relevant to business performance (Malhotra, 2002a).

If these activities are indeed relevant to business performance, then appropriate business models, processes, and culture are grown (Brooks, 1987) as a precursor to acceleration of their performance with the aid of KM technologies.

Accordingly, emphasis on business performance outcomes as the key driver ensures that relevant processes and activities, as well as, related technologies are adopted, modified, rejected, replaced, or enhanced in

service of business performance. The practitioners interested in this paradigm need to review the “lessons about outcomes”.

The contrast between the outcomes-driven strategy-pull model and the input-and processing-driven technology-push model is even evident in the latest incarnation of KM under the moniker of RTE. Given the confusion between KM and KM technologies that resulted in the backlash against technology vendors, it is germane to point out a similar future for the proponents of RTE. There is an imperative need for making a clear distinction between the business performance capabilities afforded by the RTE business model and the technologies that are labelled as RTE technologies. As discussed earlier, success in strategic execution of a business process or business model may be accelerated with carefully chosen technologies. However, in absence of good business processes and business model, even the most sophisticated technologies cannot ensure corporate survival.

### **Coming of the Real Time Enterprise: the New Knowledge Management**

The RTE enterprise is based upon the premise of getting the right information to the right people at the right time (Gartner, Inc., 2002) in “real time”, *i.e.* without latency or delay (cf., Lindorff, 2002; Lindquist, 2003; Margulius, 2002; Meyer, 2002; Siegele, 2002; Stewart, 2000). Enabling the RTE should lead to faster and better decisions, and enhanced agility and adaptability. RTE represents the future of knowledge enabled business processes: wherein digitized organizations interact with increasing and relentless speed and any specific “event” results in a real-time “response”.

For instance, businesses such as Gillette and Wal-Mart are trying to minimize the delay between a customer order, its shipment and the restocking of inventory with the help of radio-frequency detection (RFID) tags, also known as smart tags (Cuneo, 2003). The proponents of RTE technologies suggest that these technologies would help companies to learn to adapt, evolve, and survive within increasingly uncertain business environments.

Their rationale still seems to be based on the technology-push model of KM and may perhaps benefit from recognizing the strategy-pull model as a complement. One such perspective of RTE (Khosla and Pal, 2002) that yet does not address Stewart’s (2000) big question: “why?” and may benefit from focus proposed above is listed below:

*Real time enterprises are organizations that enable automation of processes spanning different systems, media,*

*and enterprise boundaries. Real time enterprises provide real time information to employees, customers, suppliers, and partners and implement processes to ensure that all information is current and consistent across all systems, minimizing batch and manual processes related to information. To achieve this, systems for a real time enterprise must be “adaptable” to change and accept “change as the process”.*

The RTE will be able to operate at speeds with split-second reaction times that may far exceed human speeds of gathering and processing of information, analysis, and response (Meyer, 2002). At least, that is what the proponents of “RTE technologies” such as Khosla and Pal (2002) claim. Examples of increase of business process velocity that are often attributed to information technology include the following examples (Gartner, Inc., 2002):

- trading analytics: from 30 minutes to 5 seconds;
- airline operations: from 20 minutes to 30 seconds;
- call centre inquiries: from 8 hours to 10 seconds;
- tracking finances: from 1 day to 5 minutes;
- supply chain updates: from 1 day to 15 minutes;
- phone activation: from 3 days to 1 hour;
- document transfer: from 3 days to 45 seconds;
- trade settlement: from 5 days to 1 day; and
- build-to-order PCs: from 6 weeks to 1 day.

RTE enterprises would harness everything from radio frequency sensors and smart dust to global positioning satellites and worker-monitoring software to monitor and control all processes and activities.

There are obvious benefits of the automated event-driven architectures (Sliwa, 2003) for repetitive, structured, and routine decisions (Malhotra, 2004b). Well-tested business processes may be suitable candidates for acceleration with automation of manual activities and workflows (Malhotra, 2000d). However, the more critical problem can be understood in terms of the contrast between the technology-push model and the strategy-pull model.

The programmed logic of the RTE may yield diminishing returns if environmental change outpaces the assumptions and logic embedded in its computerized networks. Split-second decisions based upon predetermined “rules” are efficient as they follow the single-loop logic and are well suited to repetitive, structured, and routine decisions.

However when such decisions are made regardless of the obsolescing business process or business model, the price is paid in terms of effectiveness (Drucker, 1994; Yuva, 2002). High-risk or high-return situations require reflection, and re-thinking as meaning of information could change and previously non-existent responses become feasible. This is all particularly applicable in contexts within which creativity and innovation facilitate emergence of new meaning, insights, and actions. Such complex meaning making and sense making capabilities for anticipating the unforeseen are yet unavailable in existing technologies (cf., Wolpert, 2001).

### **RTE Business Models: Function should Drive the Choice of Form**

Successful RTE enterprises focus primarily on the function of the business model that guides the choice of the infrastructure form for accelerating strategic execution. Unsuccessful RTE enterprises, in contrast, often meet their fate because of the misplaced belief that form could somehow compensate for the inadequacy of the function.

Successful RTE business models may be apparent in virtual companies such as e-Bay that owe most of their functioning to social capital embedded in their users, buyers, and sellers. Successful RTE business models may also be apparent in companies with brick-and-mortar stores such as Wal-Mart. Regardless of the variations in form, most such companies share a similar but distinctive focus on their higher purpose, which guides their strategy and its execution. This observation perhaps explains how some companies achieved most sustained business performance with lesser investments in related technologies.

Often their success was attributable to a differentiated business model based on strong ties with customers and suppliers rather than most recent investments in CRM and SCM systems. Strategic execution of the business models was accelerated with the help of technologies. However, successful companies had superior business models and a consistent track record of strategic execution as a precursor. Smart and selective investments in technologies afforded them the ability to do more with less by accelerating their business capabilities. Also, strong ties with suppliers and customers enabled them to spread the risk of investing, deploying, and utilizing the technologies with their partners and customers.

### **Enabling the RTE: Ends should Drive the Choice of Means**

The misplaced emphasis of technology-push models arose from their primary focus on the means rather than the ends as explained in this section. Most such KM implementations often happened to be caught in the convoluted complexities of technology deployment and processing

without making a real difference in business performance. Given the state of technology and the long time spans necessary for getting business systems in place, an obvious question is relevant about the superior business performers: how did the top performing companies manage to produce stellar business results despite having to choose same or similar technologies as their competitors?

It may be argued that the top performers always kept their key focus on business performance. They adopted new technologies and adapted old technologies without compromising on that primary focus. Their technologies were used for pushing data, information, and decision models just like their competitors.

However, unlike the competitors they vanquished, their choices of business processes and technologies were still driven by their primary focus on strategic execution. They may not have planned to be laggards in adopting new technologies or in spending less on such tech investments. Rather their slow but steady progress in selecting, eliminating, modifying, adapting, and integrating old and new technologies in service of their business models and business processes seemed to pay off.

As they accelerated their already superior business models and business processes with new technologies, they realized greater returns in business performance. It may also be argued that many of their competitors imitated their choices of specific technologies often based upon “best practice” studies and “benchmarks” (Malhotra, 2002d).

Mistakenly treated as easy and assured solutions for fixing broken business processes and business models, new technologies further escalated the “knowledge application gap”. Some of these comparison companies saw a spate of fickle and frequent technology and tech personnel changes, but their business problems persisted eventually leading to corporate failures or bankruptcies. In contrast, top performing companies have grown their business models around carefully thought out customer value propositions and business value propositions in spite of their adoption, or lack thereof, of latest technologies. Knowledge becomes the accelerator of business performance when identified with execution of business strategy rather than with the choices of tools and technologies that keep changing with time. In the eyes of the wise, knowledge and action are one (Beer, 1994).

### **Why do Some RTE Businesses Succeed (Where Others Fail)?**

The following cases were selected after reviewing the industry case studies of companies that were often described as benchmarks in terms of their RTE business models. Specific companies were chosen based on their visibility in the business technology press and popular media. The



reviews of industry cases studies were guided by our interest in understanding the link between investments in advanced technologies and resulting business performance.

**Wal-Mart: RTE Business Model where Technology Mattersless**

Some IT analysts have attributed Wal-Mart's success to its investment in RTE technologies. However, Wal-Mart has emerged as a company that has set the benchmark of doing more with less. Wal-Mart did not build its competitive advantage by investing heavily or by investing in latest technologies (Schrage, 2002). A McKinsey Global Institute reports:

The technology that went into what Wal-Mart did was not brand new and not especially at the technological frontiers, but when it was combined with the firm's managerial and organizational innovations, the impact was huge.

More recently, Collins (2003) has predicted that Wal-Mart may become the first company to achieve trillion-dollar valuation within next ten years following the performance-driven model delineated in Table I and discussed earlier.

In contrast to its competitors, Wal-Mart systematically and rigorously deployed its technologies with clear focus on its core value proposition of lowest prices for mass consumers. With that singular focus, it went about setting up its supply chains and inventory management systems to accelerate business performance. Long before anyone had heard about the RTE technologies, Wal-Mart was perfecting its logistic prowess based on the hub-and-spoke model of truck routes and warehouses underlying its inventory management systems.

It was much later in the process when for its \$4 billion investment in its supply chain systems its suppliers invested ten times that amount to accelerate its RTE business model underlying its supply chain network (Schrage, 2002).

The business model created the strong linkages with suppliers, which not only heavily subsidized the costs of technology investments but also pre-committed the partners to the success of the shared systems. Simultaneously, given its retail channels, distribution network, and proximity to customers through market scanner data, it has preempted its suppliers from directly competing against it.

**Dell: RTE Business Model that does More with Less**

Dell has developed and perfected its business model by developing strong ties with its customer base over the past 17 years. It perfected its business model over several years before accelerating its business

performance with the aid of carefully selected technologies. It has cultivated outstanding relationships with its virtual supply chain partners including outsourcing providers (such as Solectron) and technology vendors (such as HP, Sony, and EMC). Dell also leverages its customer reach and range and market penetration for deriving commercial benefits from technologies developed by its technology partners.

It has been developing and extending the real time logic over the past several years first for selling and servicing desktop computers, and later to aggregation and distribution of value-added products and services servers, storage, networking, printers, switches, and handheld computers.

According to a survey of 7,500 companies conducted by Alinean (2002), Dell is a thrifty IT spender. Dell is equally frugal in its R&D spending (1.5 percent of revenues), according to a recent *Business Week* report, despite its continuing forays into new products and services.

Through its alliances with partners such as EMC, Dell is able to leverage their research on product innovation while itself concentrating on perfecting the linkages with customers as well as suppliers.

Dell's early innovations in passionate pursuit for being the low cost "build on demand" leader for consumer computing products has yielded it the advantage of real time business performance. More recently, it has been able to accelerate the performance of its business model with the aid of carefully chosen technologies.

### **GE: RTE Automation for Operational Efficiencies**

GE views the real time movement as an extension of GE's renowned emphasis on Six Sigma quality drive. The business model defined for maintaining quality standards has been extended to control costs by minimizing response time to problems affecting products purchased by its customers.

GE's CIO Gary Reiner tracks once every 15 minutes what he considers to be the few most critical variables including sales, daily order rates, inventory levels, and savings from automation across the company's 13 worldwide businesses. He acknowledges that it is neither feasible nor desirable to track all kinds of information in real time even with the aid of digital dashboards. Most operational information is tracked on daily or weekly basis while other kinds of information is tracked on an exception-reporting basis.

The company claims operational savings of 35-60 percent in costs involved in customer response, customer service, and sales. Most of these savings are attributable more to management control rather than to

technologies that are used to enforce pre-negotiated contracts on its buyers who deal with its various suppliers. Operational automation that is executed in terms of command and control logic seeking compliance has not been without its adverse ramifications. GE has encountered labour management disputes resulting from the workers who are not accustomed to minute-by-minute electronic surveillance.

### **Cisco: Real Time Enterprise Technology Troubles**

Cisco has been lauded for its RTE technologies since three years ago when its market cap was 850 percent of its recent market capitalization during this year. The company prided itself about the RTE technologies that offered apparently seamless integration of real time data within and across its supply chain and customer ordering systems. The company had legendary faith in its technologies for predictive modelling and decision-making (Carter, 2001). In a *Harvard Business Review* article, the company's CFO (of that time) claimed that: We can literally close our books within hours... the decision makers who need to achieve sales targets, manage expenses and make daily tactical operating decisions now have real-time access to detailed operating data.

Unfortunately, real-time access to data could not be of much help when, buoyed by its unparalleled growth over several quarters, Cisco made some fundamentally incorrect assumptions about the future. Cisco ignored a key lesson of KM that is often ignored by many others: the past may not be an accurate predictor of the future. While other networking companies with less sophisticated technologies had cut back on production schedules months earlier seeing impending downturn in demand, Cisco stuck to the forecasts of their "virtual close" system that they considered invincible. As Cisco (or, rather, its technology-driven forecasting systems) had never been proven wrong before, their business partners saw little merit in trying to question their proven wisdom.

As a result of misplaced faith in the power of the forecasting systems, Cisco ended up writing off \$2.2 billion in inventories and sacking 8,500 employees. Industry experts and analysts suggest that Cisco's write-off resulted from its blindsided over-reliance on its much vaunted "virtual close" systems. Cisco's case demonstrates that even the best technology offers no protection against bad management decisions, especially when the assumptions embedded in the dominant logic are taken for granted. Some Cisco executives do maintain that in absence of the RTE "virtual close", the outcome could have been worse. Cisco retains its optimism in perfecting its RTE systems hoping they would eventually provide high certitude in the face of increasingly uncertain business environment.

### Enron: Destroyed in Real Time

Given the dominant and intensive role of real-time information, many of the technologies associated with real-time response were initially adopted by financial services firms on the Wall Street. Given Enron Online's primary business of exchanging and trading financial data, the real-time response model seemed like a match made in heaven. Enron planned to leverage its online exchange for facilitating direct real time instantaneous transactions in the online trading of energy market commodities. In its communiqué submitted to the Federal Trade Commission, Enron had emphasized that: Efficiency gains made possible by dynamic pricing and trading are especially well suited to Enron's on-line business because electronic trading can match the speed with which commodity pricing changes. Transactions that used to take up to three minutes to complete over the phone now take just a second or two, including complex processes such as credit checks. The company deployed Tibco's vaunted "RTE platform", sought out new technology wherever possible, and planned to spend hundreds of millions of dollars on technology infrastructure. The management control and oversight vagaries of Enron's management as well its insider-and self-dealings with fictitious entities are well documented in the records of the US Senate hearings as well as the public records of print and broadcast media. *Post-hoc* analysis of Enron's RTE technologies confirms prior observations about the technology-push model (Berinato, 2002):

*If these [accounting irregularities] hadn't come up, the IT inefficiency might well have come up to bite Enron...*

*Enron IT was as cutting edge as it was Byzantine. There were plenty of great tools, but there was precious little planning...*

*The core systems supporting the main revenue-generating activities were very disjointed...*

*There were major disconnects from deal capture to risk management to logistics to accounting. They all worked from different data sources...*

*They had teams and teams of people who had to comb through the data and massage it so that it made sense...*

*There was a lot of magic, transforming apples into oranges and oranges into apples. Preparing annual reports was a joke...*

*The breakneck deployment of state-of-the-art technology was done with little regard for a management plan.*

When the cover about the collusion between Enron insiders and its auditing firm blew open, the RTE system triggered the freefall of Enron as it was also covering the risk exposure related to its instantaneous transactions.

Unfounded and overly optimistic belief in technology as the means for generating profits despite an inadequate business model led to Enron's downfall resulting in one of the largest corporate bankruptcies in US history.

This article opened with the observation that although KM activities are "all over the map" in terms of technology implementations, however, no one has asked the "big question": why? Despite diverse propositions about "getting the right information to the right person at the right time," almost everyone neglects to ask what knowledge to manage and toward what end. A review of the industry case studies of companies characterized in the recent years as RTE business enterprises surfaced some interesting insights. Recent industry analyses that have demonstrated inverse correlations between IT investments and business performance provided some motivation for this analyses.

Additional impetus was provided by the contrast between the hype about "RTE technologies" propagated by some IT analysts and our in-depth analysis of companies that achieved success as RTE benchmarks. To some extent the search for the "next big thing" and the "killer app" is to blame for its narrow focus on IT and innovation as ends rather than means for achieving sustainable business performance (*Business Week*, 2003). The big question "Why?" should drive tactical and operational aspects of technology and process related innovations in an organizational KM implementation. As contrasted with the inputs-and processing-focused technology-push model, explicit and specific performance outcomes oriented focus of the strategy-push model, further emphasized the focus on the "big question."

The contrast between the three archetypes of inputs-, processing-, and outputs-driven paradigms of KM explained in Table I and Table II further aided deconstruction of the existing conceptualizations and practices of KM. One such conceptualization of KM that has been applied in diverse worldwide governmental and corporate practices was then discussed to motivate subsequent discussion on the RTE business models.

The contrast between information-processing capabilities of latest technologies and needed sense-making capabilities was then explained. Additionally, the mechanistic emphasis of technology-based linkages was contrasted with appreciation for organic and socio-psychological relationships needed for nurturing knowledge processes. Two propositions

were offered based on prior discussion-one pertaining to the form and function of the RTE, and the second relevant to the contrast between ends and means of achieving performance outcomes. Based upon original analyses, review of prior research, and review of industry case studies we made specific managerial recommendations about realizing the real time performance of enterprise business models.

Specifically, we recommended that:

- organizational function should drive the choice of organizational form; and
- ends should drive the choice of means.

The above propositions were then illustrated with the aid of RTE industry case studies that have been used by IT analysts to hype the benefits of RTE technologies. Based upon our analyses, we counter-argued that the benefits attributed to the RTE technologies should indeed be attributable to the RTE business model. We further contended that in absence of an effective RTE business model, even the most expensive and sophisticated technology could not ensure corporate survival in the short- or long-term. The RTE case studies lent support to the primary role of strategic execution as the lever for sustained business performance.

As discussed, the successful RTE enterprises achieved their success by staying a step ahead of competition and by offering value propositions that inspired customers' imagination instead of playing the "me too" game in an already crowded market. These companies also selected and integrated ICT capabilities that fit directly with what they were deeply passionate about, what they believed they could be the best at, and what directly drove their steady economic growth. The successful RTE businesses did not adopt new technologies motivated by fear of getting behind. Rather, they thought differently about technology as an accelerator of business momentum and not its creator.

Unlike the successful models of RTE enterprises, the failures were characterized by thoughtless reliance on technology often grasped as an easy solution, without coherent understanding of how it links to strategic execution for business performance.



## **New Technologies in Modern Libraries**

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Libraries developed as a result of the need to preserve valuable records of events. These records might be in the form of written scrolls, papyrus kept in jars, written clay tablets, manuscripts kept in monasteries, and printed materials such books, letters, statutes, and laws. Only a few people, such as kings, nobles, renowned scholars, and ecclesiastical orders had access to these libraries. Modern libraries have taken on additional new roles because of changing demands and new technology. They are currently regarded as agents for educational, social, economic, and political change, and their doors are open to all. The United Nations Educational Scientific and Cultural Organisation (UNESCO 1976) views the library as “an organised collection of published books and periodicals and of other reading and audiovisual materials and the services of staffs able to provide and interpret such materials as are required to meet the information, research, educational or recreational needs of users.” The UNESCO definition touches on every aspect of what a library in the modern sense stands for.

### **Computerization in Nigerian Libraries**

Nigerian libraries, documentation and information centres are yet to fully adopt modern information technology for information handling. Studies have examined the advantages of the use and application of computers to organizational work.

The benefits of computers for library operations cannot be overemphasized. Their value includes speed, storage capacity, links resources, and accuracy of record management. Computer literacy has become part of many public curricula; however, not all people receive their computer training in public schools. In recent years there has been

increasing emphasis on adult computer training, often through community education programmes or in-service training (Rogers, 2005). Other adults receive their initial computer experience as part of their post-secondary education, which in most cases is mandatory. This includes undergraduates in Nigerian Polytechnics, Colleges of Education, and universities. Introductory computer courses are a mandatory part of the General Studies requirements for graduating.

### **Old and New Technologies**

At its inception, new technology seems to pose a threat to the survival of older ones. It is very rare at such points to appreciate the complementary roles and constructive interplay that can result from the co-existence of old and new ways of doing things.

The revolution in Information and Communications Technology is threatening the very existence of a number of highly regarded institutions such as publishing, scientific societies, and academic libraries. In the same vein, print media faces challenges as digital and online services such as the Internet, MP3 players, cell phones, and online versions of newspapers have led news consumers to rely increasingly on information from online and digital sources.

### **Categories of Library Users**

Obanewa et al. (2002) classified library users into four groups: general readers, creative readers, adult students, and readers with specialist interests. General readers are those who read for information and general enlightenment. They consult newspapers, encyclopedias, general works, and related documents. The library offers this group of users excellent opportunity to update themselves and be very current about national and international affairs. The library serves as a powerful means of developing individual readers in their varied interests. Creative readers are read novels, magazines, fiction, and fantasy.

The library resource offers these users materials which are interesting, entertaining, and educative. Adult students' interests centre on information for serious academic pursuits. They consult textbooks and reference works. The last group of library users are people with specialist interests, including scientists, medical doctors, engineers, undergraduate, and postgraduate students.

### **Library Use for Research Purposes**

This last category of library users concentrates on textbooks and journals that are relevant to their profession or calling. They may conduct

research as part of the requirements for completing a degree, for laboratory activities, to report findings, and review existing literature in different subject areas.

It is this category of users that these paper seeks to evaluate on the basis of their perception of the academic library system and the Internet for research purposes.

### **Research Methodology**

Research Questions:

1. What is the level of usage of Internet and formal library facilities for research purposes in Nigeria?
2. Are the facilities complementary?
3. Does the facilities provide equal satisfaction?
4. What are their discrepancies?

### **Hypotheses**

The following null hypotheses were formulated for the purpose of this research;

- There is no significant difference in users' perception of staff efficiency in the use of academic library and online facilities for research purposes in Nigeria.
- There is no significant difference in users' perception of the conduciveness of academic library and online facilities for research purposes in Nigeria.
- There is no significant difference in users' perception of the speed of access to needed materials in the use of academic library and online facilities for research purposes in Nigeria.
- There is no significant difference in users' perception of the availability of current materials in the use of academic library and online facilities for research purposes in Nigeria.
- There is no significant difference in users' perception of the cost of access to materials in the use of academic library and online facilities for research purposes in Nigeria.
- There is no significant difference in users' perception of the ease of use of library facilities in the use of academic library and online facilities for research purposes in Nigeria.
- There is no significant difference in users' perception of the level of distractions experienced in the use of academic library and online facilities for research purposes in Nigeria.

## **Research Design**

The survey method employed in this project is a questionnaire which solicits information from library users actively engaged in research activities.

### **Population**

The population consists of 250 persons stratified into three groups: Lecturers, Undergraduate and Postgraduate students from five institutions in South Western Nigeria. 223 Questionnaires were returned, of which 200 were selected to satisfy the stratification for research purposes.

### **Sampling Technique**

The sampling technique used in this research work is the stratified sampling method in combination with simple random sampling.

### **Research Instruments**

The research instrument titled "Users' Perception of the Use of Academic Libraries and Online Facilities for Research Purposes in Nigeria" uses a three-point Likert Scale, and was administered to evaluate users' views of the use of these two media for research purposes.

### **Administration of Instrument**

The research instrument was partly administered by the researchers and partly distributed to respondents through the Internet.

### **Validation of the Instrument**

The face-validity and content-validity of the instrument were verified by experts in the subject area. The various suggestions made were used to modify the instrument.

### **Findings**

The analysis of the data collected revealed that there is no perceived significant difference in staff efficiency, and ease of use of facilities in academic libraries and online environment. However, there is significant difference in users' perception of speed of access to needed research materials, availability of current and up to date materials, cost of access, and distractions within the facilities.

In major libraries in Nigeria users are left to find their way through library resources usage. The experience is also the same in most cyber cafe. This is closely related to the ease of use of both facilities for research purposes. On the other hand, users feel that library environments are more serene than cafe environments. This is as a result of the fact that people come to cafes in Nigeria for other extraneous and dubious reasons.

It is not uncommon therefore to see cafe environments being rowdy and very noisy. This is not the case in academic libraries where silence is an ethic.

The issue of cost is very obvious as it costs more to access materials on the Internet. Money has to be paid to obtain tickets before access is granted in most cyber cafes. In most libraries registration is all that is required for the use of library facilities. Since online facilities have a pool of resources, it is not surprising that the analysis shows that most users agree that current materials and resources for research are most common on the Internet.

### **Recommendations**

Based on the findings of the study, the following recommendations are made:

- Academic libraries in the country should begin to occupy a pride of place in institutional budgets. The need for full interconnectivity for our libraries can no longer be ignored.
- Provision should be made in providing training programmes for the librarians in order to update their knowledge with new information technology applications and usage.
- The government should as a matter of urgency provide technical and human infrastructures aimed at reducing Internet access costs across the country.
- Computers should be made available at reduced costs so that researchers can have the privilege of accessing the Internet in the comfort of their homes. This will enable them to work at their own pace.
- Our electric power providers and communication networks will have to improve their services, since they remain the backbone for effective use of information technology applications, especially the Internet.
- Academic libraries should be stocked with up-to-date materials in order to encourage researchers to use their facilities.

This study has serious implications for libraries in Nigerian higher education institutions. The line between the use of academic libraries and the use of the Internet for research is still very obvious. In more developed countries these lines are virtually non-existent, because most academic libraries enjoy full Internet connectivity. Manpower training in the use of technology is another issue that is being raised here. Librarians must be trained in the use of current technologies to aid them in the discharge of their duties.

### Information Science' and Research Methods

The nature of 'information science' has been a matter of dispute almost since the term was coined by Chris Hanson of Aslib in 1956. Curiously, the term followed the use of 'information scientist', which was used in the UK in the 1960s to describe scientists who specialised in helping their colleagues to find information. (Bottle, 1997) In other words, the original usage did not imply the existence of an information 'science', but simply a set of information practices aimed at scientists. The difficulties with the term became evident when academic programmes in information science began to emerge and when, consequently, teachers and departments began to seek academic respectability by moving from training people in a vocational practice to searching for underlying principles and theories that would provide that respectability. Numerous writers (*e.g.*, Debons, 1974; Froelich, 1986; McGarry, 1987; Lancaster, 1994) have sought to define the nature of information science and set out curricula that would constitute a sound basis for a unitary discipline. However, these writers, and others disagree on what constitutes information science and, therefore, the curricula, although overlapping, do not fully agree with one another. Some argue for the inclusion of logic, mathematics, and programming; others for the inclusion of linguistics, philosophy, and economics, and so on. We have to ask, therefore, why is there lack of unanimity on what constitutes information science?

### Information and Integrative Levels

Perhaps surprisingly, I do not think that we have to look very far for the answer. Although I have never written on the subject before (because I feel that the answer can be stated very simply and needs, perhaps, a paragraph, rather than a paper), I have long held the view that the answer lies in the concept of integrative levels. The origins of the theory of integrative levels are unclear but the English philosopher Herbert Spencer appears to be the first to set out the general idea of increasing complexity in systems (Spencer, 1862). The term itself was first used by the English biochemist (and scholar of Chinese science) Joseph Needham (1937).

The following quotation from a Web source provides an insight into the fundamentals of the theory: (a) The structure of integrative levels rests on a physical foundation. The lowest level of scientific observation would appear to be the mechanics of particles. (b) Each level organizes the level below it plus one or more emergent qualities (or unpredictable novelties). The levels are therefore cumulative upwards, and the emergence of qualities marks the degree of complexity of the conditions prevailing at a given level, as well as giving to that level its relative autonomy. (c) The mechanism of an organization is found at the level below, its purpose at the level above.



(d) Knowledge of the lower level infers an understanding of matters on the higher level; however, qualities emerging on the higher level have no direct reference to the lower-level organization. (e) The higher the level, the greater its variety of characteristics, but the smaller its population. (f) The higher level cannot be reduced to the lower, since each level has its own characteristic structure and emergent qualities. (g) An organization at any level is a distortion of the level below, the higher-level organization representing the figure which emerges from the previously organized ground. (h) A disturbance introduced into an organization at any one level reverberates at all the levels it covers. The extent and severity of such disturbances are likely to be proportional to the degree of integration of that organization. (i) Every organization, at whatever level it exists, has some sensitivity and responds in kind. ('Levels of...', n.d.)

The idea of integrative levels is widely employed today in comparative psychology, biochemistry, biology, environmental science, and many other areas. It appears to have dropped out of sight in the area of information studies, but was employed by the Classification Research Group in the UK in the 1970s as a basis for ideas on the development of a new classification scheme. (Foskett, 1978; Wilson, 1972) What is the relevance of this for the concept of information? Quite simply, 'information' is a concept that takes different forms at different integrative levels. When the computer scientist thinks of information, he or she is thinking of units of complexity such as bits and bytes (with the byte having a different level of complexity than the bit). The information retrieval specialist, on the other hand, conceives of information in terms of strings of symbols, matching query strings against indexed strings. The librarian sees information in terms of the macro containers, *i.e.*, books, reports, journals and, now, electronic documents of various kinds, and, indeed of a higher level of organization, the library. In other words, information itself is not a unitary concept, but has different levels of organization, around which different theories are built and practices evolved. Consequently, there cannot be a unitary information science, but only different approaches to information from the perspective of the integrative levels involved.

### **Many 'Information Sciences'**

The fact that many different characterisations of information science exist can be seen in the nature of information science curricula, as pointed out above. Which information science curriculum we decide to produce will depend upon the nature of the local market for the product of educational institutions, the market for research in the field, and the competencies of local academic staff. It is entirely reasonable, therefore, to propose a definition of 'information science' that has, at its core, a view of 'information'

as something to be manipulated by computers (in fact, in Australia, departments of computer science were at one time generally known as departments of information science). On the other hand, we can propose a curriculum for information science which is based on the perception of information as a socially-constructed, economic good, which requires the methods and theories of the social sciences for its exploration.

Such a curriculum would include courses on the sociology of information transfer and use, the politics of information in organization, information policy, the economics of information, and so on. From a practical point of view in relation to the market, it would need to include technological aspects of the management of information, but such courses would be informed by the generally social orientation of the programme. Most information management courses in the UK probably have an orientation of this kind and, in general and because of the confusion caused by the word science (at least in English), information management might be a better designation.

### **Research Methods and a Social Information Science**

If we were to try to develop and research methods programme for all possible conceptions of information science we would produce a virtually unmanageable course-or one that skimmed over every possible topic from the development of computer algorithms to survey research. The recognition that there can be many different information sciences enables us to create research methods courses that are more limited in scope and directed specifically to a particular integrative level of information. Consequently, for a social information science, as set out above, a research methods course will be a course on social research methods.

However, even here we are not immune from disputes over the nature of social research and over the correct epistemological position to be taken. The major dispute, over which a great deal of printer's ink is spent, is between those who adopt a positivist view of the nature of social reality, in which social facts can be known with certainty and in which laws of cause and effect can be discovered and applied, and what can be called humanistic approaches (Hughes, 1980) The humanistic approaches generally see social reality as constructed through social action on the part of people who undertake those acts because they have meaning for them. Social construction and meaning therefore become central to most of the humanistic approaches.

Unfortunately, the terms quantitative and qualitative have become associated with the positivist and humanistic approaches, while, in fact, the counting of phenomena is an entirely valid activity in humanistic

social research. This division confuses many people who wonder how, for example, an interview schedule (seen as a positivist, quantitative instrument) can be employed in qualitative research. However, we can overcome this problem, again, very simply.

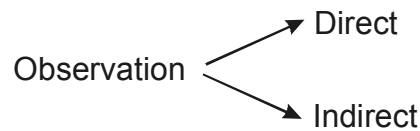
### **An Alternative Typology of Research Methods**

The starting point is that all research methods, in all disciplines are based upon observation: astronomy began by people looking at the stars, then using optical telescopes to do the same thing, then using radio telescopes and other devices to see what the naked eye could not. In physics, what cannot be observed by the eye, is observed by instruments—cloud chambers to show up the collision of particles, for example. In botany, close observation of plants gave Linnaeus his ideas for a classification scheme of plants—now we are using DNA links to do the same thing. And so on—we could go through almost every discipline and find that the original method of data collection on the relevant phenomena was observation; all that has changed, over time, is the sophistication of the instruments used to make observations where the naked eye cannot do so. However, in social research (and, hence, in information research), observation may be direct or indirect. That is, the researcher him-or herself, may watch what is happening, or may rely on the reported observations of others.

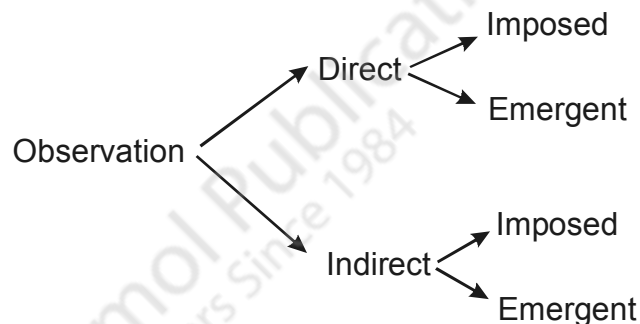
For example, if you are interested in how people use Web search-engines, you could sit beside them during a surfing session and watch what happens, recording the different terms used for the subject and the stages the person went through. You could also log some of this information automatically—that is, the machine makes the observations for you—or you could videotape what was appearing on the screen, while you tape-recorded the person talking aloud about their activity. All of this would be direct observation.

On the other hand, you could conduct interviews with people about how they use search-engines: they would then have to recall what they did and report it to you. This assumes that people have an ability to recall earlier behaviour accurately—which may not always be true. (For example, Brewer, 2000) If you then proceed to ask them about their opinions of, or attitudes towards Web search-engines, you are asking them to observe (probably for the first time) their mental states on these issues: you are asking them to make self-observations.

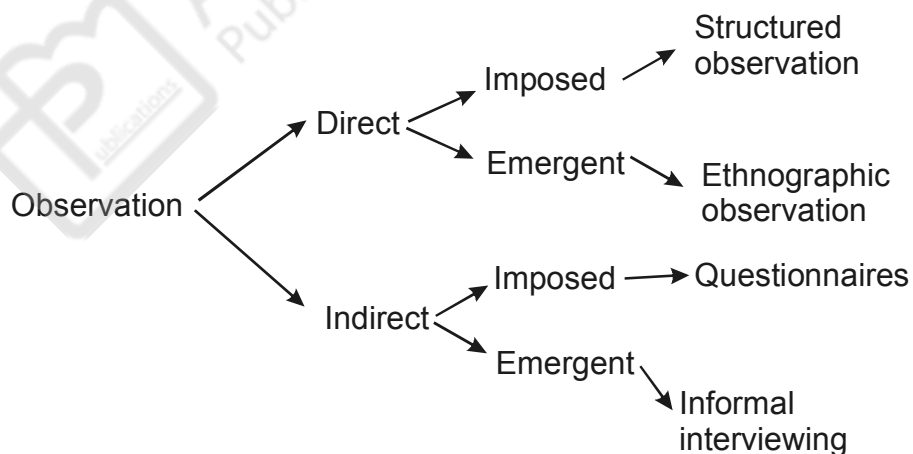
Our typology of research methods, therefore, begins with observation, divided into direct and indirect modes—all social research methods can be shown to relate to this initial classification.



Structure now enters the classification. No data collection process can be totally lacking in structure—we will always have some ideas, derived from prior knowledge of the situation, or from the person we are approaching to interview, or from prior research or theory, or simply from our research objectives. We may wish to put all of that aside in, say, interviewing, but we cannot possibly take it out of mind completely. The key point is whether the structure is imposed in its totality by the researcher, for example, in designing a self-completed questionnaire, or whether the structure emerges from the research process; for example, by analysing interview transcripts and developing a conceptual structure in the process. Applying this idea of structure then gives us four categories of methods—direct observation with either imposed or emergent structure; and indirect observation with either imposed or emergent structure.



Once we have this classification we can assign social research methods in a straightforward way, shown in this third diagram:



The list of methods is limited to fit the frame, but the idea is readily extendable, I think, to include more. For example, we can have: extending the previous diagram, showing that, in addition to informal interviewing, we can allocate at least two other methods to that category—analysis of organizational documentation, and the analysis of almost any other text, including published (or personal) diaries, biographies, and so on.

This typology of methods does not provide the researcher with a ready-made answer to the question, “Which method should I use?” It simply offers a reasonably logical way of viewing the whole range of possible methods and making decisions about which method is appropriate in the circumstances. Those circumstances include the philosophical framework within which you wish to operate (positivist or interpretative), what you know about the research area to begin with, the nature of the research population, and so on.

The question of what we know already is really the main guide, since we can only impose structure when the field is well understood, or when we wish to test a well-developed theoretical framework. Consequently, allowing the structure to emerge through the process of analysis is desirable when the research is exploratory and aimed at theory development. From selection of method, we eventually move to mode of analysis and here again, structure determines both what we have to analyse and what we can use in the analysis.

Imposing structure allows us to collect structured data, which, if not already in numeric form, can be converted to numbers (*e.g.*, by coding Yes/No as 1/0). This allows us to use statistical analysis packages such as SPSS (Statistical Package for the Social Sciences; see for example, Kinnear & Gray, 1999).

Methods that rely upon emergent structure produce mainly text—although they can produce a mixture of text and characteristics that can be numerically coded. Text is more problematical to analyse, since statistical methods cannot be applied and you have to work with the text to identify theoretical concepts. It is then possible to use statistical techniques to determine whether the occurrence of concepts in relation to one another have some probability of being statistically associated, but the initial analysis demands either ‘pencil and paper’ methods of handling the text, or, better, using a qualitative analysis package such as Atlas.ti [A demonstration version of *Atlast.ti* can be found at the Web-site]. To conclude: while a typology of methods may not enable us, on its own, to determine the methods we ought to employ in an investigation, it may help us to determine the approach and to ask ourselves questions about the fundamental research position we are adopting.

**Conclusion**

The link between integrative levels and appropriate research methods in information science has been explored in this paper. We have shown that information is not a unitary concept, but takes different forms at different integrative levels and must be explored by methods appropriate to those levels. It is suggested that a social information science can be created, in which information is conceived as socially constructed and for which social research methods are appropriate. There is, however, confusion over those methods and an attempt has been made to resolve that confusion by proposing a typology based on the fundamental method of observation and the ways in which structure in data may be achieved. It is only by fundamental analysis at these kinds of levels that any firm basis for any model of information science can be evolved.

**Meta-analysis in Library and Information Science**

Every scholarly journal provides highly precise guidelines to its authors regarding the length of articles, the formatting of manuscripts, and the style of citations and footnotes.

While authors may meet these guidelines with varying degrees of success, at least all parties involved in the scientific communication process recognize that a standard has been established. Curiously, few scholarly journals provide any guidelines regarding standards for the reporting of research in terms of the descriptive elements of a dataset that should be shared, the statistics that should be presented for a given method of analysis, and whether or not a copy of the instrument should be included.

One reason for this omission in the field of library and information science (LIS) may be because of the variety of disciplinary and methodological approaches being used by researchers. To impose rules for the reporting of research might curtail the creative freedom of authors in presenting their work. However, this rich variety of quantitative and qualitative methods and different disciplinary orientations argues all the more for such guidelines to be established.

For example, whereas physics or economics may have more rigid rules for publishing research that are well understood by researchers in their respective disciplines, LIS encompasses a much broader array of research methods that is harder to explicitly articulate.

How does a researcher specializing in information retrieval working with a database of 10,000 records and hundreds of queries know how to evaluate a piece of research on information behaviour based on twenty in-depth interviews? How does a researcher studying information services who reviews thousands of virtual reference transactions understand the



validity of a philosophical investigation in classification theory? Such confusion may grow worse when LIS researchers examine the work of their colleagues in computer science, management, law, health informatics, or technical communications whose research questions may be similar to our own.

A guide to the minimum standards for reporting research may serve to help nonspecialists (as well as students) better understand what to expect when reading about a study employing a method with which they are unfamiliar. A second and perhaps more important benefit might be to improve the quality of writing in published research. Does the article provide enough detail so that the study could be replicated? Does the article then provide enough data so that results from a subsequent study could be compared to findings from the original study? Without replication, research in LIS advances haltingly, and validation of findings is difficult to achieve.

The development of commonly accepted definitions and indicators for important concepts proceeds slowly. How do we measure information anxiety, collection strength, or user satisfaction? With the absence of a predominant method of observation, researchers often develop their own operational definitions for each new study. Even when discussing relatively concrete concepts such as number of volumes in the collection, different sources use different measures (compare the Association of Research Libraries [ARL] statistics to guidelines on counting given by various state libraries), and members of the ARL debate what it means to “own” volumes placed in a regional repository (ARL Committee on Statistics, 1997).

Inconsistencies in reporting research findings across studies, failing to provide enough detail on method and instrumentation to facilitate replication, and the multiplicity of different operational definitions or measures for the same concept all pose difficulties to successfully attempting any form of meta-analysis. Meta-analysis is a form of research synthesis, and the terms are used interchangeably in fields that rely heavily on quantitative methods.

Meta-analysis is a body of techniques that enables researchers to draw conclusions based on the findings of previous studies and present them in a useful and compact fashion (Matt & Cook, 1994; Hunter & Schmidt, 1990). The benefit of meta-analysis is that it enables researchers to obtain a greater understanding of the nature of the association between outcome and independent variables by comparing different values of effect size gathered from a large body of research. The ability to summarize findings across multiple situations and discover consistent trends (or in some cases, inconsistent trends) is a critical component of scientific research.

The lack of common definitions and research replication may be explained by two factors. In terms of number of researchers, number of Ph.D. graduates, and amount of available research funding, LIS is clearly a much “smaller” field in comparison to the sciences and other social sciences. Also, the field has a growing number of new scholars as many graduate schools expanded their doctoral programmes from 1995 to 2005 in response to a growing awareness of the looming shortage of new faculty.

Original research and the introduction of new methods enables younger faculty to build a stronger case for tenure (ironically, the author’s own interest in meta-analysis is just such an example of this behaviour). Nonetheless, maturity of a research area cannot be achieved without consensus building among scholars, repetition of studies or experiments to validate findings, and research articles or books that represent what Boyer (1990) defines as the scholarship of synthesis. Meta-analysis is a useful methodology for assessing the level of agreement or disagreement surrounding a given research question, and the growth in the number of meta-analytic studies in the literature is itself an indicator of increasing maturity in a given research area.

This article begins with a brief methodological explanation of meta-analysis and refers the reader to further sources for information on how to perform this type of study. This is followed by a literature review explaining the application of meta-analysis in library and information science or closely related fields. In conclusion, the author presents a set of guidelines for reporting quantitative research that would enable subsequent researchers to perform meta-analysis (and also increase the likelihood of having one’s own research included in such subsequent study).

### ***Meta-analysis: Nuts and Bolts***

Bivariate analysis involves examination of the extent to which one variable may have an influence on another variable, often described as the ability of one variable to predict (but not necessarily cause) the value of the other. Correlation and cross-tabulation are two common forms of bivariate analysis. Effect size is a measure of how much change in the dependent variable can be predicted by the independent variable. A correlation coefficient is a common form of estimating effect size. The overall process is relatively straightforward and easy to understand. In summary, meta-analysis is a method of testing whether findings from multiple studies involving bivariate analysis are homogeneous or heterogeneous, or in other words, do they agree or disagree in terms of the direction of association and effect size?

If the findings are homogeneous, proponents of meta-analysis then argue that it is possible to calculate a truer estimate of the effect size

utilizing the data from two or more studies. The meta-analyst is not averaging the findings but rather treating data from multiple studies as if they were all part of a single study. Given enough descriptive statistics in the published report, such estimates can be calculated without requiring access to the actual dataset.

This last part of the process is where opponents question the validity of the method, suggesting that data can only be properly interpreted within the context of how the observations were initially gathered (Hunter & Schmidt, 1990). However, such arguments provide means of their own refutation by defining the conditions under which meta-analysis can be considered valid.

If subject populations are given the same tests or interventions using identical measures under similar conditions, then one may logically accept that multiple tests will yield a truer representation of a bivariate relationship, just as drawing multiple samples of cards with numbers out of a hat will yield a truer estimate of the mean of all the numbers in the hat. Therefore, the selection of variables and effect size estimates to be considered when planning to conduct meta-analysis is vital in that it will limit the number of possible studies that can be included.

Rosenthal (1991) outlines a large number of effect size estimates that can be used in meta-analysis. Unfortunately, a number of these estimates are dependent on the scale of the variables in question. Even variables originally based on the same operational definition are sometimes rescaled for the purpose of a given study. To overcome this difficulty, G. V. Peckham Glass (as cited by Hedges & Olkin, 1985) proposed using scale-free estimates of effect size. Popular scale-free estimates include Cohen's *d* and Glass's *alpha*, but these measures are specifically designed for use in experimental or comparison studies where at least two groups of subjects are involved. Many studies in LIS are descriptive in nature and do not involve the use of control groups.

Effect size estimates that are not scale-free (for example, correlation coefficients) are susceptible to bias. Small sample sizes will cause wide variability in estimates across studies. Also, range restriction of indicators for the dependent or independent variable may reduce the value of the estimate. For example, a correlation coefficient based on a measure using a seven-point Likert scale is likely to be lower than that obtained from a measure using a four-point scale. The best way to avoid criticism when using such estimates is to only compare variables across studies that have been measured using the same scale.

Such practice may severely limit the number of studies one may include in meta-analysis. For example, Saxton (1997) encountered a number

of problems when looking for repeated measures in evaluation studies of reference service performance.

*Out of fifty-nine studies, forty-two use reference accuracy as an outcome variable, but of those only twenty measure accuracy on the same scale.... Out of those twenty studies, only five reported the correlation coefficients between reference accuracy and a multitude of independent variables... [Of these], three studies sample fewer than twenty subjects. (p. 274)*

The situation did not improve when examining independent variables. Saxton goes on to explain that he identified 38 concepts operationalized in the form of 162 different measures. Of those 162 variables, only 10 were repeated in more than one study. Alternatively, the amount of error resulting from comparing variables of different scales may be small, and each future meta-analyst will have to assess the extent of the possible threat to validity. When introducing a method relatively new to the discipline, future researchers are encouraged to adopt a conservative approach until acceptance is more broadly attained.

Saxton (1997) articulated that the process for comparing and recalculating effect size estimates across studies requires three steps. First, the researcher must test the homogeneity (similarity) of significance levels across studies. If the significance levels for the findings in each respective study are not homogeneous, then the findings from each sample are contradictory. It is then inappropriate to combine the findings since they are not indicating consistent conclusions. Next, the researcher must test for the homogeneity of effect size estimates across studies to determine if it is appropriate to derive a new estimate from them.

For example, if for a given pair of variables one study indicates a strong association and another study indicates a weak association, the researcher cannot simply “split the difference” and declare that the combined findings indicate a moderate association. Neither study suggested that the association was moderate; the samples exhibited conflicting characteristics (Hedges & Olkin, 1985). Finally, once homogeneity has been established, the researcher can calculate a new effect size estimate and associated significance value. Studies that employ larger sample sizes are weighted so as to give them greater emphasis in the actual calculations (Matt & Cook, 1994).

Meta-analytic techniques are controversial because they are susceptible to numerous threats to validity. First, publication bias, as discussed earlier, is one danger encountered by the researcher. Frequently, studies that do not yield significant findings are not reported. Second, range restriction

limits the ability to compare results across studies. Third, failure on the part of investigators to note the number of missing cases for each variable contributes to error in meta-analysis since both significance levels and effect size estimates are strongly influenced by the number of subjects being examined. Fourth, lack of reliability in measurement and coding always threatens to invalidate the conclusions for all analyses. Researchers performing meta-analyses must apply strict quality control by excluding any studies that fail to meet methodological standards or appear to sample imprecisely (Matt & Cook, 1994).

Many different sources provide a wealth of technical detail on how to design a meta-analysis and perform the necessary calculations. Within LIS literature, Ankem (2005) offers perhaps the most sophisticated discussion of meta-analysis. She provides an overview of the three dominant methodological approaches to meta-analysis: the Hedges and Olkin approach that employs scale-free estimates of effect size estimates, the Rosenthal and Rubin approach that recommends transformation of effect size estimates to standard scores, and the Hunter and colleagues approach that attempts to correct for various sources of error in individual studies.

This is followed by an illustrative example of a meta-analytic study of factors affecting information needs of cancer patients. An earlier study by Saxton (1997) provides a narrower, simpler example utilizing the Rosenthal and Rubin approach in a meta-analysis of studies of reference service quality. Both Ankem and Saxton cite Rosenthal's (1991) handbook, *Meta-analytic Procedures for Social Research*, as a useful and relatively accessible technical source for providing guidance on which calculations to use and addressing methodological concerns.

### **Literature Review**

A search in Library and Information Science Abstracts (LISA) reveals that not only is the methodology rarely applied, but that the term itself, meta-analysis, rarely appears. Conducting a search for the terms meta-analysis or metaanalysis in any field yielded references to only 51 journal articles, and a search for the phrase research synthesis yielded only 1 article. Of these 52 articles, only 21 appear in LIS-oriented journals, while the other references are meta-analytic studies in the disciplines of communication, education, or human-computer interaction. While these studies all involve information and technology and may be of interest to LIS researchers, this review will focus on studies that appear in the LIS literature.

Meta-analysis has a long history in medicine, and health science librarians are perhaps the LIS professionals most familiar with the technique. Schell and Rathe (1992) have the earliest, though also brief,



mention of the term meta-analysis in LISA when describing the method as a “quantitative procedure for combining results of clinical trials” (p. 219); they further note the important role that librarians will play in helping researchers conduct extensive literature reviews as this method gains in popularity. Over the past ten years, this theme has been echoed by many others discussing the challenges for medical researchers faced with large retrieval sets, the difficulties encountered in conducting exhaustive searches for the purpose of meta-analysis, and the ability of librarians to assist researchers (McKibbon & Dilks, 1993; Smith, Smith, Stullenbarger, & Foote, 1994; Mead & Richards, 1995; Smith, 1996; Timpka, Westergren, Hallberg, & Forsum, 1997; Johnson, McKinin, Sievert, & Reid, 1997; Yamazaki, 1998; Royle & Waugh, 2004; Demiris et al, 2004).

Interest in the method as a means to investigating research problems in LIS began to grow in the early 1990s. Trahan (1993) discussed the feasibility of meta-analysis in LIS and attempted to inform researchers about the potential of this methodology. Harsanyi (1993) suggested that studies of collaborative authorship would be a good topic for meta-analysis because of the complex relationship between collaboration and productivity.

The first published meta-analysis performed by an LIS researcher appeared in 1996. Salang (1996) used Glass’s techniques in studying the relationship between user needs and options for retrieving information. However, the study was not published in a widely read journal and is not frequently cited.

The following year, Saxton (1997) performed a meta-analysis of reference service evaluation studies. The primary research question was to determine what factors predicted levels of accuracy in answering questions. Out of fifty-nine studies taking place over a thirty-year period from 1965 to 1995, only seven were eligible for inclusion in the meta-analysis because they reported sufficient descriptive data and used the same measures. Findings indicated that factors such as collection growth, library budget, and hours of operation consistently exhibited a positive moderate association with response accuracy. However, the greater value of this study was to provide a step-by-step demonstration of how to conduct a meta-analysis and discussion of methodological concerns such as publication bias, quality standards, requisite sample size of studies, the need for replication of previous studies, and the need for greater uniformity in reporting research.

To model the desirable practice he was advocating, Saxton (1997) provided sufficient statistical data to enable later researchers to include his work in future analysis. This action was clearly validated four years after publication when a doctoral student, Rafael Merens, at the University



of Havana, Cuba, re-analyzed Saxton's work for his dissertation. Merens examined the same seven studies using a different meta-analytic approach to optimize the value of studies with small samples, resulting in alternative estimates of combined effect size (Merens & Morales, 2004).

Hwang and Lin (1999) reported the results of a meta-analysis examining the effect of information load (defined in terms of both information diversity and repetitiveness) on decision quality of managers as reported in bankruptcy prediction experiments. The meta-analysis compared findings from thirty-one experiments reported in eighteen studies but excluded several studies "that did not report requisite data" (p. 215). In conclusion, the researchers noted the success of meta-analysis in clarifying inconsistencies in the research record: "This meta-analysis has found clear evidence of the detrimental effect of information load on decision quality.

Results showed that decision quality suffers with an increase in either the diversity or repetitiveness of an information cue set. The findings help to reconcile the inconsistent evidence reported in the bankruptcy prediction literature" (p. 216). Their article ends with a discussion of the implications for both information suppliers and information retrieval.

Wantland et al. (2004) published a complex, large-scale meta-analysis concerning how the medium of an intervention (Web-based vs. non-Web-based) influences the behaviour change of an individual with a chronic condition. This study may be the first attempt in the medical library literature to apply meta-analysis to an information research problem rather than a clinical research problem. In preparation, the research team conducted an extensive systematic review of the literature. Each study was rigorously reviewed for its suitability for inclusion in the meta-analysis.

*The compliance to standards for the studies is based on five criteria: (1) study design; (2) selection and specification of the study sample; (3) specification of the illness/condition; (4) reproducibility of the study; and (5) outcomes specification and the measurement instruments used/validity and reliability of documentation of instruments. The sum of the variables result in a total score ranging from 0 to 18... Only studies with a quality documentation score of 12 or greater were retained for the meta-analysis. (Wantland et al., 2004, p. 3)*

The study used a scale-free estimate of effect size, Hedges  $d$ , to assess the impact of intervention medium on user behaviour. The findings conclusively demonstrated that Web-based interventions were consistently more effective than other interventions, although the actual effect size varied widely and was not homogeneous across studies.

Ankem (2005) presents a more thorough, detailed discussion of methodology in her meta-analysis of factors affecting information needs among patients. After discussing the merits of three different statistical approaches to meta-analysis, she notes that the procedure is rarely used in LIS: "The reasons for the lack of use of meta-analysis in LIS may be attributed to the difficulty in accumulating results involving variables related to the same research problem across studies and the lack of appropriately measured variables related to the same research problem across studies so that the results can be combined meaningfully" (p. 165).

The results of the meta-analysis based on four studies indicated that the age of individuals has a negative association with their need for information, possibly suggesting that older individuals are more susceptible to information overload, or may intentionally avoid seeking information about their medical condition, than younger individuals. One particular strength of her study is the use of studies conducted in fields other than LIS to investigate questions about information behaviour. This example suggests that meta-analysis may be a useful vehicle to expand disciplinary knowledge in LIS by building on the research enterprise of "larger" fields (those with more researchers and more grant funding).

On occasion, researchers have used the term meta-analysis when only referring to the idea of aggregating findings across studies rather than actually performing the statistical analyses conventionally associated with the term. Haug (1997) reported on a study that utilized what he described as a meta-analytic procedure. The purpose of the study was to examine physician's preferences for using different types of information sources to answer questions in their clinical practice. Unfortunately, he encountered the same difficulties in finding suitable studies to consider.

*Comparative analysis of the twelve selected studies was limited by their dissimilar research questions, research instruments, and reportorial formats... Unfortunately, the published findings of the research described in this paper do not permit rigorous statistical meta-analysis. Conventional meta-analysis marshals evidence for or against relations among variables common to several studies by combining results of significance tests or statistics which measure strength of relationship. The twelve investigations analyzed in this study neither share a common hypothesis nor test for relations among a common set of variables. (p. 225)*

Haug settled for aggregating data on ranking physicians' preferences since he did not find any study that tested bivariate relationships. While Haug was conscientious in his use of the term, others have been less

concerned. Olson and Schlegl (2001) describe their investigation of critiques of subject access standards in the classification literature as a “meta-analysis” although the only quantitative evidence they present are percentages of topics appearing in ninety-three articles.

Despite these individual efforts, meta-analysis has largely been underutilized in LIS. Hjørland (2001) wrote a letter to the *Journal of the American Society for Information Science and Technology* lamenting that meta-analysis was being neglected by information scientists and arguing that meta-analysis was a valuable research method and also “an expansion of the professions [sic] possibility in relation to what should be our core competence: document searching/information retrieval” (p. 1193). However, as has been demonstrated repeatedly in the above review, issues of consistency, replication, and adequate reporting must also be resolved before meta-analysis can be more widely applied.

### **Recommendations for Reporting Research**

The ability to conduct a meta-analysis is dependent upon the consistency with which earlier studies report findings. As discussed at the beginning of this article, it is ironic that stringent rules exist for governing the style of citations and a complex code administers the creation of bibliographic records, yet no commonly recognized standards exist for reporting the results of research in LIS. Saxton (1997) proposed a set of five minimum standards for reporting quantitative research studies that use Pearson’s correlation coefficient for bivariate analysis. In response to Ankem’s (2005) criticism of this narrow approach to meta-analysis, these standards are amended here as follows to accommodate a broader range of statistics:

1. Include the operational definition of every variable mentioned in the article. In some cases, such as survey research, the simplest way to do this may be to include a copy of the instrument (to save space in the journal, some items such as demographic questions may be omitted, and the instrument may be reformatted).
2. For every variable mentioned in the article, list the mean, minimum, maximum, and standard deviation. This data can be easily summarized in a short table in an appendix to the article.
3. List the number of responses for each variable. If the variable has missing cases, list the total number of subjects available for that variable. This data could also be included in the aforementioned table.
4. When describing bivariate relationships, include the precise level of significance (for example,  $p$ ) associated with a given statistic for

effect size (for example, Pearson's  $r$ ) rather than just truncating (for example,  $p < .05$ ). This enables the meta-analyst to calculate more accurately a significance level associated with the newly derived effect size based on multiple studies. Significance is an arbitrary level based on the degree of confidence the researcher is seeking in a given study and may often vary for studies using the same measures and methods.

5. When bivariate relationships are found to be insignificant, list the precise value of  $p$  rather than simply noting that the results were not significant. Significance is closely related to sample size, and meta-analysis utilizes larger samples by interpreting findings from multiple studies.
6. Explicitly describe the population and the unit of analysis for each variable within the population (for example, in a study of reference service, Saxton [2002] gathered observations at the library, librarian, and service transaction level). Findings across studies cannot be compared if they use different units of analysis. To apply group-level observations to individuals is known as the ecological fallacy, and to apply individual-level observations to groups is the reductionist fallacy (Schutt, 2004). Such errors result in intraclass correlation, an error that masks the true effect size between two variables by confounding group-individual relationships.

Of course, the primary objective for researchers is to explain the phenomena they are observing and what it means in terms of expanding disciplinary knowledge and improving teaching and practice. Few researchers set out with the goal of making meta-analysis easier to perform. However, scientific research is a cumulative process where advances are made through multiple investigations over time. Investigators who follow the above guidelines will encourage that process and potentially increase the impact of their own work as exemplified in the relationship between Saxton (1997) and Merens and Morales (2004).

While consistent reporting is the first issue to overcome, the second problem is the lack of consistency in measuring concepts over time. Investigators have not been using the same operational definitions either through oversight (lack of awareness of previous studies) or intention (a belief that previous studies used poor measures). Until some consensus is reached on what definitions and indicators are best to use for the significant concepts in given problem areas, repetition of tests across multiple studies will rarely occur.

In terms of quantitative research, this will retard the maturation of the discipline by preventing the accumulation of large datasets and enabling

new researchers to build upon the foundation laid by experienced researchers. This may also discourage new researchers from pursuing quantitative methods as a possible means of investigation for the questions that interest them.

As a final thought, the Internet has provided a platform to make it easier to perform meta-analysis than at any other time as scholars no longer view the refereed journal article as the sole means for disseminating information about their research.

As journal editors review papers with an eye to cutting out “extraneous” material to conserve pages, the World Wide Web makes it possible to share tables of variables, statistics, copies of instruments, and any other information that would be of use to colleagues investigating the same research questions. In some cases, individual researchers may now provide their actual dataset to others (subject to regulations governing the privacy concerns of human subjects).

However, scholars also have many good reasons to restrict the nature of access to their data, primarily to retain control of how the data is used and how findings are interpreted and presented. Likewise, releasing instruments to the public before conducting any reliability testing or cross-validation of the different variables may only result in the repeated use of poor measures. Reporting research findings according to the recommendations given above provides a “middle road” between providing total access to data or instruments and controlled sharing that enables researchers to receive peer feedback, facilitate meta-analysis, promote research synthesis, and still maintain ownership and control of their creative work.

### **A Survey of Digital Information Literacy**

Society has been transformed by the rapid development and diffusion of information and communication technology (ICT) into fields such as education, business, health, agriculture, and so on. Information users may be bewildered by a variety of digitized information. The process of identifying and selecting information has become complex. It is critical to promote information literacy (IL) in the digital age. Computers have become a necessary part of this digital society, and skills for computer use are a common prerequisite on many job applications. The Department of Education, Training, and Employment (2001a) states:

To live and work in the technology-enabled world of the 21st Century, high-level skills in the use of information and communication technologies (ICT) are essential for all citizens. (DETE, 2001) With those objectives in mind, this survey was undertaken to study digital information literacy

among faculty at Sambalpur University and to set the priorities for promotion of digital information literacy among them.

### **Digital Information Literacy**

Glister (1997, p. 290) defines digital literacy as, “a set of skills to access the Internet; find, manage and edit digital information; join in communications; and other wise engage with an online information and communication network. In simple terms, digital literacy is the ability to properly use and evaluate digital resources, tools and services and apply it to their life long learning process.”

The New Media Consortium (2005, p.2) states that digital literacy, “includes the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively and to easily adopt them to new forms.” The most essential aspect of digital literacy is the ability to make informed judgments about what is found online, for unlike conventional media, much digital information is unfiltered by editors and open to the contribution of all.

Digitally literate people are able to:

- Determine the extent of digital information needed;
- Access the needed digital information effectively and efficiently;
- Evaluate digital information sources and services critically;
- Incorporate selected digital information into one’s knowledge base;
- Use of digital information effectively to accomplish a specific purpose; and
- Understand the economic, legal, and social issues surrounding the use of digital information access and use of this information ethically and legally.

Digital Information Literacy is a major component of information literacy. It helps users cope with information from a variety of electronic formats and provides techniques and methods of collecting digital resources. It creates awareness of issues like copyright, and intellectual property rights in an electronic environment.

### **Methodology**

A structured questionnaire seeking information on computer literacy, digital information competency, training and orientation, the role played by the library, etc., was designed and distributed among the teachers of different postgraduate departments of Sambalpur University. Out of 105 teachers, 70 (66.7%) returned the questionnaire.



**Findings**

- 98.57% of faculty members who responded to the survey expressed their need for electronic information in addition to traditional print sources;
- 58 (82.86%) respondents indicated that they use e-journals. However, e-articles, e-thesis and dissertations and e-databases are used by more than 50% of the faculty. Other forms of e-information such as e-book, subject gateways, e-archives are less popular among the teaching community;
- A majority of faculty use e-information in order to update their knowledge in their respective subject area. More than 60% use e-resources for the purpose of research support, preparation of course materials, and preparation of scholarly articles for publication;
- Time spend browsing and using e-information not significant. Only 20 (28.57%) browse daily but a majority use the Internet for browsing twice a week;
- 58 (82.86%) call themselves computer literate.
- 60% had no formal computer training.
- A majority of the university faculty members have Internet knowledge.
- Search engines are most frequently used for browsing and searching on the web. Other tools such as subject gateways, bibliographic databases, digital libraries, etc., are used much less.
- Authenticity and reliability are the most important parameters for evaluation of online information.
- All respondents expressed the wish that the library would take initiative in promoting information literacy at the university level.

**Recommendations**

- The Post-Graduate departments of the university should teach faculty how to search/browse for e-information, evaluate its validity, and to make judicious use of it;
- The central library of the university should start a digital information literacy programme to educate the faculty members;
- The university administration should develop the necessary infrastructure for the promotion of e-information;
- Faculty should network with those who are already using e-information to make use of their knowledge and skill;

There is an educational imbalance between the rapidly developing technologies and information available to the users. Educating people to use information technologies is becoming an important educational objective for the teaching and research community. Universities should take a lead role in spreading knowledge of digital information resources.

### **Applications in Teaching Bibliometrics**

Librarians do not usually include bibliometrics in their practical work, and still it is very useful for the planning of information provision. There are several reasons for the non-use of bibliometrics. Bibliometric studies are time-consuming and sometimes difficult to perform; another problem is that the results of bibliometric studies give a simplified picture of a complex reality and must take into account many variables to be useful in practice.

The volume of bibliometric studies reported in the literature is big and difficult to put together and compare. There is a need for refining techniques so that the results of one study can be compared more satisfactorily with those of another (Broadus, 1987). Bibliometric methods, however, give opportunities to describe the content, structure and development of research, and bibliometrics is becoming more important as a basis for the collection development in research libraries.

The reason is that scientists today to a large extent organise themselves in networks and the discipline based model of organising knowledge is becoming obsolete. New subject fields emerge and the number of interdisciplinary publications grows exponentially. The classification systems, used for instance by journal services, have a discipline-based structure and do not include new, interdisciplinary subject fields. If they include them, it is often on a very basic level.

Librarians, who develop library collections, databases or information services, will have difficulties in knowing which material should be included, especially in cases where there is little consensus even among the scientists about the definition of the field. In these cases bibliometrics can provide a tool for identifying the core for a local collection in such fields.

### **Application of Bibliometrics**

The huge amount of documents available through networks gives great possibilities to apply bibliometrics within the framework of the librarians daily work. Different bibliographic databases register daily thousands of references to literature in almost any subject field. Bibliometric studies can be based on index terms, words in the titles of documents, authors, sources or geographical or time distributions. The citation indexes

(for example Science Citation Index and Social Science Citation Index) provide a base for analyses based on citations.

Educational institutions have a responsibility to teach students these methods, as well as other research methods in library and information science. A way of teaching bibliometrics is proposed in this paper. It is based on a real library problem, which is to develop local collections in an interdisciplinary field. A course like this can be held in cooperation with the university library. The bibliometric studies could be applied on one of the subject fields covered by the library collections and publications by local scientists in the field the base for the studies.

### **Collection Development Process**

Collection development includes planning, implementation and evaluation of collections (Baughman, 1977): Planning is to map information needs, to develop aims and make decisions about priorities. Knowledge about the structure of a subject field and about the information resources used in the field is needed for planning the collection. Bibliometric methods such as citation analysis, bibliographic coupling, coward analysis and cocitation analysis can be used to map the knowledge structure and the use of literature. Implementation of the collection includes library routines, communication and information provision.

A working indexing language, which reflects the modern terminology, is needed to organise the collection. Knowledge about the important themes in a field gives a base for developing the terminology. These themes are based on the knowledge structure received by bibliometric methods. Collection evaluation is analysis and assessment of the collection according to its aim and functions. Different bibliometric methods such as citation analysis, analysis of the scattering of articles to journals and analysis of the obsolescence of literature are used for this purpose.

### **Bibliometrics as Research Method**

Bibliometrics is the application of mathematical and statistical methods for measuring quantitative and qualitative changes in collections of books and other media. By using quantitative analysis it is, for instance, possible to measure the scattering of articles to different journals or to measure the growth and obsolescence of literature in different subject fields. These analyses show that a small part of the journals in a field stand for a great part of the relevant articles in the field (Bradford's law) and that only a small part of the authors in a field are highly productive (Lotka's law). Bibliometric studies can be used to study the regional pattern of research, the extent of cooperation between research groups and national research profiles. The methods are objective and repeatable, to be of practical value,

however, the results must be applied to a complex reality (Ginman, 1987). The most used bibliometric methods in addition to the above mentioned are cocitation analysis, bibliographic coupling and coward analysis.

### **Cocitation Analysis**

Citations are often used in bibliometric analyses, and they are also the base for cocitation analysis and bibliographic coupling. In cocitation analysis the data compiled are counts of the number of times two documents are jointly cited in later publications.

The fact of having been cited together in the same new paper establishes a quantifiable link between the earlier papers, the strength of the link depending upon the number of times that a pair of documents are cited together. Cocitation analysis can also be based on authors or journals as units of analysis. Journals can thus be used for studying the organisation of a subject literature through cocitation analysis. Cocitation of the published articles link the journals in which they were published and the journal title then represents the subjects of all articles included (McCain, 1991).

### **Bibliographic Coupling**

In bibliographic coupling the hypothesis is that two articles which both cite the same previously published article have something in common. Analysis of the bibliographic coupling results in clusters of citing documents, when the cocitation analysis groups cited documents. In bibliometric terminology the citing articles create a research front, when a cluster of cited documents is called an intellectual base (Persson, 1994).

### **Coward Analysis**

Coward analysis is based upon the analysis of the co-occurrence of the keywords used to index articles and other documents. This method emphasises the existence and evolution of networks of problems (so called problematic networks) (Courtial, 1984). The method is useful for mapping the content of research in a field.

### **Designing a Course in Bibliometrics**

A course in bibliometrics in the library and information science programme can be divided in two parts.

1. Seminars, where the methods and the results of the studies are discussed.
2. Empirical work in the frame of a project, which could be for instance collection development in an interdisciplinary field.

An example of a course in bibliometrics is given in the following:

*The two parts of the course can run parallel. The first part of the course is seminars in groups of at most eight students, where the participants prepare abstracts on literature given by the teacher about the bibliometric methods and discuss them. The empirical part of the course is built on knowledge of online searching in databases, text processing software and software for cocitation analysis and bibliographic coupling. The material used for the analyses is a collection of about 100 references downloaded from the citation indexes Science Citation Index (the database Scisearch) or Social Science Citation Index (SSCI) by known local authors or local organisations in the field with time limitations for restricting the number of references. The format chosen for output is one with tagged fields. Using text processing software (e.g. WordPerfect) the citations of the articles are then analysed in different ways:*

1. The cited sources are sorted and analysed according to type of publication: journal article, book or other. This part of the work includes problems such as identifying journals and different spellings of their names. This has to be done manually, but gives a good training in identifying different types of material and emphasizes the importance of standardization of name abbreviations. The percentage of different types is calculated and gives information about the most important types of literature in the field.
2. In many subject fields journals are the most used type of literature and analysis of them is important. The cited journals are sorted according to frequency of use, and in this way names of the core journals are received.
3. The scattering of articles to different journals according to Bradford's law is analysed on the basis of the frequency list. The cumulated numbers of articles and journals are calculated and plotted on a linear-logarithmic scale, from which the Bradford zones can be calculated. The number of journals needed to cover about one third, two thirds or all the relevant articles in the field are identified.
4. The relations between the journals are studied with a cocitation analysis. A software for the analysis of (small volumes) of references developed at Umea university, BIBMAP, can be used for clustering the cocited journals (Persson, 1994). To visualize the internal relations in the clusters they are further analysed with a software for multidimensional scaling (MDS). MDS describes similarities

between two concepts in a group as distances in a map so that the greater distance between the concepts, the smaller is their similarity. The closer two journals are, the higher is the frequency of cocitations. A journal's placement in the map reflects the congruence between the content of that journal's articles and the research interest of authors publishing in the field represented by the set of journals studied. Journals with high mean cocitation rates may be considered the more significant titles (McCain, 1991).

5. The knowledge structure of the subject field is mapped with bibliographic coupling. This is done by sorting the citations according to the authors and again manually identifying manually different spellings and ways of writing the names. The resulting frequency list of cited documents according to authors is the base for analysing the bibliographic coupling. The same computer programmes can be used for this analysis as for the cocitation analysis. The resulting clusters show documents which are related. The themes of the individual clusters can be identified and named and together these themes form the research front of the field.
6. A coward analysis, which also shows the knowledge structure is done in the same way as in the bibliographic coupling, but instead of citations index terms are used. These terms can be taken from the titles of the publications and substitute the citations in the SciSearch-references. Also in this case the resulting clusters create themes which together form the research front of the field.

The results of the analyses have to be interpreted in relation to other similar studies and should therefore be followed up by parallel seminars, where the students read and discuss literature describing bibliometric studies and try to understand their own results in relation to them. The two methods of mapping the research front are compared and discussed in the seminars.

A project such as this will give the students knowledge about how to gather information for collection development in a new, interdisciplinary field. The students will in the future use electronic networks to a large extent, they will be familiar with online databases and electronic publications. The barrier towards bibliometrics will vanish, because the studies will be easier to perform. An important task for the educational institutions besides teaching the methods will be to teach how the results should be interpreted and implemented in the daily work of the librarian.



## Library Planning in Computer Age

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### Planning

#### ***Basis of Planning***

The first step in organising any administrative force is to organise it into convenient sections according to a carefully thought-out plan. To get a suitable plan is equivalent to finding out an appropriate characteristic as the basis for classifying the entire work cast upon the administrative force. The characteristic chosen will vary with the nature of the business entrusted to the administration. It may be regional or functional or personal or of any other nature—pure or mixed.

The science of administration—yes, administration is fast becoming a science in our lifetime—has already developed a special jargon to label the plans, based on different characteristics. Here are some terms, which are current: series plan, parallel plan, functional plan, divisional plan, line and staff plan, and so on. The Canons of Classification must be borne in mind in the choice of the characteristic which is to be made the basis of the planning of an administration.

#### ***Functional Planning***

Functional planning is found almost universally in nature. In except the very simplest forms of cell life, viz the protista, seem to have learned the advantage of a division of labour. And in the more complex cell colonies, such as animals, we find the degree of specialisation carried so far that the individual cell is fitted only to perform one function, and would quickly perish without the complementary activities of its fellow cells.

Many animals have also learned the advantage of division of labour. From the insect societies to the complex civilisations of the human race we find the principle extensively applied.

**Mechanics of Planning**

In most types of administration—and especially in library administration—the basis of planning likely to yield the best results is a functional basis, adapted to the needs of the particular administration and translated into practical shape in the light of other organisational principles. Hence, the first step in planning is to analyse and isolate the different functions to be performed by the staff of the library. Much of the mechanics of planning is thus concerned with the clear presentation of the factors of a situation, so that the situation may be quickly and accurately grasped. Once that is done, the staff can be divided into the necessary number of sections to perform the different functions. The best way of naming each section is to name it by its function.

**Functional Analysis**

The result of such an analysis of the work is set forth in the contents page of this manual. The functions denoted by the numbers 21 to 28 are the distinctive functions of a library administration, while the functions 31 to 398 are functions which are likely to appear in all administrations. The generic names Distinctive Library Functions and General Office Functions may be applied respectively to these two groups of functions.

The connotation of the terms used to denote the different functions is indicated roughly by the terms themselves. A fuller and more detailed picture of the functions is presented in the respective chapters. The plan of each chapter has already been indicated in section 064. It may be repeated here that each chapter is devoted to a single Function and is divided into eight parts. A perusal of the first three parts of each chapter will give a full and detailed view of the function which gives the name to the chapter.

**Difficulties in the Way**

At present many of the functions are being performed under the weight of a non-progressive and crude tradition, involving many wasteful processes. Library administration is particularly hard hit by this state of affairs owing to two causes.

**Spending Body**

In the first place, a library is a spending department. However much it may remotely contribute to the increase of wealth in the nation, it is not one that directly raises a revenue or earns an income. It is a matter of experience that a department that either raises a revenue or earns a direct income by its operations is indifferent to wastefulness of processes. Comparatively speaking, money is easily forthcoming in its case. On the

other hand, a purely spending department like the library department tends to be usually treated in a step-motherly fashion. It is difficult to get the necessary finance. Hence every possible care is to be taken to devise more economical methods of administration.

### **Dependent Body**

In the second place, by its very nature, it is seldom that a library administration is independent. On the contrary, whatever be the nature of a library, other than being a National Central Library, it is likely to be a department of a larger organisation whose central executive usually tends to take advantage of his privileged position and develop a grasping tendency on the one hand and obstructive tactics on the other. As a result of this, a library is at a perpetual disadvantage in developing either its own distinctive functions or the functions common to all administrations along newer, more scientific, and more efficient lines. The library administration thus rests between two opposing forces.

### **Condition in India**

According to Headicar, in the West the library department still continues to be “the Cinderella” of the bigger organisation of which it is a part. It has not yet become what it should be, “the Mecca” of the bigger organisation, nay, “of government itself”. In India, the situation is still worse and will probably continue to be so for a long time. Hence, the library profession here has a much greater handicap than elsewhere in planning its work satisfactorily. It is at once the duty and the privilege of the members of the present generation of the library profession to face and overcome every discouragement and difficulty, and to evolve a healthy tradition of scientifically managing libraries.

### **Growth in Staff**

As a result of a pioneer’s dedication, the library profession has often to face frustration in another field as a result of the library being a dependent body. It has been particularly so in India, due to the older generation in positions of power not having had the experience of library service. Further, practically all the libraries are young. They are still at the stage of child-growth. If the staff has sufficient enthusiasm to make the library grow from year to year, it leads to a vexatious situation. The authorities seldom realise how quickly the sanctioned staff is out-numbered.

They complain of frequent applications for increase of staff and turn them down. Even with the best of effort, the inadequate staff is unable to render even half the service which they announce and aspire to render. Publicity brings in more readers than can be served and more books than can be organised. The result is complaint and disappointment from all

quarters, and ridicule and under-writing by a handful of cynics whose voice drowns the voice of others. Cowardly and selfish librarians feel frustrated and begin to drift at the risk of the library repelling readers. I have seen this phenomenon recur in library after library in the East and in the West alike. Till recently, I had taken this to be as providential and inexorable as an earthquake. Of late, I am able to see some light and think of some means of averting this form of frustration in the growth of a young library and in the spirit of a hard working enthusiastic, pioneering staff who put service above self-interests.

The means I recommend is that library authorities should once for all agree to a mathematical formula for the staff of library interests in terms of the out-turn of work. Once this formula is accepted, the alteration in the strength of the staff would become mechanical and impersonal. There need not be a recurring opportunity for the play of cynicism and vexation.

This formula is based on my own personal experience in the Madras University Library. I was led to its formulation by my having been invited from 1945 onwards by several libraries for advice on this very question of staff. It was first published in 1948. Since then it has been tested in several places both in India and abroad. It is said to have given satisfaction.

### **Staff Formula**

*Let:*

A = Number of volumes Accessioned in a year.

B = Annual Budget allotment in Rupees.

D = Number of periodicals Documented—that is, abstracted and indexed in a year.

G = Number of Gate-Hours for a year. (One Gate-Hour = One counter gate kept open for one hour.)

H = Number of Hours the library is kept open in a day.

P = Number of Periodicals currently taken.

R = Number of Readers per day.

S = Number of Seats for readers.

V = Number of Volumes in the library.

W = Number of Working days in a year.

[X] = X, if X is one integer.

= The Integer just greater than X, if its fractional part is greater than .25.

= The Integer just smaller than X, if its fractional part is not greater than .25.

SB = Number of persons in Book Section.

SC = Number of persons in Circulation Section.

SL = Number of persons as Librarian and his Deputies.

SM = Number of persons in Maintenance Section.

SP = Number of persons in Periodicals Section.

SR = Number of persons in Reference Section.

ST = Number of persons in Technical—that is Classification and Cataloguing—Section.

*Formulae for Staff of Different Sections:*

SB = A/6000.

SC = G/1500.

SL = HW/1500.

SM = A/3000.

SP = P/500.

SR = [R/50]W/250.

ST = (A+40D)/2000.

*Formula for Total Professional Staff:*

SB+SC+SL+SM+SP+SR+ST

= {3(A+20D)+2(G+3P)+2W(H+6[R/50])}/3000.

*Formula for Non-Professional Skilled Staff:*

B/30,000+[S/100].

*Formula for Unskilled Staff:*

SB/4+SC/2+SL+SM/4+SP/2+SR/8+A/20,000

+D/500+B/60,000+[S/100]/4+V/30,000

= {27A+2(B+120D)+40(G+3P)+30,000[S/100]

+4V+2W(40H+3[R/50])}/120,000.

### **As The Library Grows**

The question may be asked of what use is an elaborate functional analysis in planning the administrative work of a small library, run by one man—a type that is numerically the greatest in the world. My answer is that even a do-all librarian can discharge his duties with greater ease,

thoroughness, and efficiency, if he knows the different functions to be performed, the different jobs to be attended to, and the sequence in which they should be taken up. A well thought-out timetable for the jobs is quite necessary. Again, there is the Fifth Law of Library Science, "A library is a growing organism". The small library of today will soon grow in size and in staff. As it grows, the need for functional planning will become increasingly felt.

### **Progressive Delegation**

As the library outgrows being a one-man concern, a librarian finds that he must delegate to assistants those parts of the work which exceed his own capacity. At first he usually shares with his assistants much of the administrative routine. As the library grows still further, he delegates the entire function of performance.

He has professional assistants, nonprofessional staff and unskilled staff to work under his orders. This stage is reached, we may say, when the strength of the staff grows beyond twenty. Still later, even the work of supervision becomes too great in volume and he is obliged to content himself more and more with indicating plans and objectives, leaving it to the experience of his assistants to find ways of carrying out his plans. This stage is reached as the strength of the staff approaches one hundred.

The diagram at the beginning of this part shows the way in which the functions involved in the administration of a library get divided and subdivided as the staff increases. The diagram presents also an articulated view of the different functions.

### **Inequality in Functions**

#### **Time Required**

Just as all the functions devolve on the do-all librarian at the earliest stage, it is obvious that one and the same person will have to perform more than one function until the staff grows to a sufficient size. Further, all the functions are not of equal magnitude. Hence, two or more of the lighter functions may be assigned to one member of the staff while some of the heavier functions will have, at the same time, to be entrusted to a section of staff consisting of two or more members. This inequality is the result of the unequal demand on time made by the different functions.

#### **Ability Required**

There is yet another inequality among the functions. Some functions are of a routine and mechanical nature. Other functions may exact physical exertion. Some are of a high academic order; while, still others are, in



addition to being of an academic nature, dependent for their satisfactory performance on the entire personality of the staff responsible for it.

### **Number Required**

Thus the sections into which the staff of a library will have to be divided will vary considerably in numerical strength. The equipment, the aptitude, and the higher qualities of the members constituting them will also have to vary.

### **Factors in Planning**

Before leaving this chapter, it may be stated that the first part of most of the chapters of Parts 2 and 3 will be entitled "Planning". It will enumerate the Factors with reference to which the work of the section should be planned. The characteristic forming the basis of the analysis of the factors involved in the function will vary with the function *i.e.* will be different in different chapters. Again all the factors may not give rise to the same amount of work or to an equal number of jobs.

## **Faculty Profile: Library Science**

### **Historical Background**

The School of Library Science was established in 1968, located in an area now fully occupied by the H.T. Coutts (Education) Library. The first class graduated in 1969, a class that still considers itself very special, with a Bachelor of Library Science, a one-year post-baccalaureate degree.

The decision to provide library education in the prairies had not been a hasty one. Library administrators at least, had foreseen the demand for professional librarians and were advocating a graduate programme from the end of World War II. With the tremendous development of educational programmes during this period and a renewed emphasis on adult education, libraries were established in every sphere — schools, colleges, universities, cities, small towns, and rural areas. The demand for librarians in industry and government, especially in the more industrially developed and developing areas, competed with the demand in educational institutions and in the municipalities.

By the 'fifties, the competition for the thin trickle of Canadian graduates was fierce, and librarians from any anglophone area were welcomed. Prairie students were recruited and sent elsewhere for professional education, only to be lured by the libraries and "fleshpots" of the East. In 1961, British Columbia opened a School of Librarianship, the first in the western provinces. Its graduates frequently refused to leave the coast for positions in the prairies. Gradually the prairie librarians managed to

coordinate their efforts: the availability of professional personnel could only be improved by the establishment of a school in the prairie provinces.

The question was where? Winnipeg, Saskatoon, and Edmonton were all interested contenders. Marjorie Sherlock, former Chief Librarian at The University of Alberta had planned the top floor of the Rutherford Library (now Rutherford South) to accommodate a library school, part of the space which the Faculty now occupies. By 1964, the needs were such that a committee of prairie university librarians, chaired by Morton Coburn, Chief of Edmonton Public Library and including Bruce Peel, Librarian to The University of Alberta, on behalf of the library associations of Alberta, Manitoba and Saskatchewan, presented a brief to the Presidents of the western provincial universities, asking them to approve the establishment of a library school to provide for prairie requirements. The brief indicated the extent of, and anticipated need for professional librarians in the area, and evaluated the relative merits of the cities of Edmonton, Saskatoon and Winnipeg as "library bases" for the projected school.

Alberta took up the challenge and a school was approved by the University's Board of Governors in 1965 and assigned by the Universities Coordinating Council to the Edmonton campus in 1966. Thereupon a Search Committee, chaired by President Johns, set about finding a Director. Potential directors and faculty were no easier to find than librarians at any other level, and it was only after considerable effort that the Committee was able to secure the services of Sarah Rebecca Reed, then Library Education Specialist in the US Office of Education. Sarah Reed was appointed Director in 1967. She immediately began recruiting potential faculty even before she left her Washington office.

This was typical of her energy and dedication which, combined with her experience, close association with Canadian librarians, rapid assimilation into, and appreciation of the Canadian library situation, enabled her to develop a firm foundation in facilities, faculty and curriculum. In 1970, the School applied for accreditation by the American Library Association which acts on behalf of the Canadian Library Association. Accreditation granted in 1970 provided recognition that the quality of the graduate programme met the educational standards established within Canada and the United States, thus rendering the graduates competitive within both countries.

In 1971, after four dynamic years of leadership, Sarah Reed returned to the US. She has been succeeded (1971-76) by M.E.P. Henderson, from The University of Alberta;(1976-79) by C.H. Davis, from the University of Michigan, Ann Arbour; and, since 1980, by W.J. Kurmey, from the University of Toronto.

The BLS was a one-year post-baccalaureate degree involving, of necessity, a structured sequence of required courses with a limited number of options allowing individual specialization. The increasing scope and sophistication of library science necessitated a more extensive basic knowledge represented by course content which should be mastered by all students.

The first MLS (Master of Library Science) degree programme was developed in conjunction with library science and media specialists in the Faculty of Education, primarily for school librarians, and was approved in 1970. A year of additional full-or part-time study for experienced librarians with the BLS degree was required. The year 1970-71 saw an increase in courses available for the MLS to accommodate the demand by returning BLS candidates from all sectors of the profession for advanced specialization. The most recently developed programme is an MLS (Learning Resources) degree for teachers which includes significant components of both library science and education courses. Unfortunately, the continuing financial constraints on education do little to encourage teachers to undertake graduate library studies.

The School became the Faculty of Library Science in 1976, discontinuing the BLS degree and adopting a two-year MLS degree in accordance with the pattern of education recommended in 1968 by the Canadian Association of Library Schools and endorsed by the Canadian Council of Library Schools in 1971.

The change to an MLS degree was undertaken following two years of curriculum study and planning involving the faculty, students, alumni, members of the profession, professional associations, and representatives of the Faculty of Graduate Studies and Research. It marked but the first step, for the curriculum has been under review with varying degrees of intensity ever since. The move to expand library science programmes to two years in Canada and the United States is based on a reassessment of educational objectives and on the need to examine new developments within the profession and adjacent fields. With the implementation of the MLS programme by the Faculty, all seven library science programmes in Canada are two-year MLS degree programmes.

As soon as possible, shortly after the first MLS class graduated in 1978, the Faculty applied for accreditation for the new professional degree programme. This too involved considerable effort for two years, gathering and presenting data, much of which consisted of self-study and analysis. The present programme of study was accredited in January, 1979. The Faculty is the smallest in the University' and remains the only Faculty with an entirely graduate programme.

**Professional Education**

Graduate professional library education suffers from the same difficulty which has concerned all professions in all ages; namely, the conflict between theory and principles, and the technical and practical skills employed in professional practice.

A constant concern of the Faculty is the appropriate balance between the apparent extremes. Formal library education until 1935 emphasized technical skills now assumed, in large measure, by para-professional training available in library technician programmes in community and vocational colleges.

In some cases, employers still mistakenly expect this type of training from graduates of professional degree programmes. The information explosion and its pervasive technology is having a galvanic effect on libraries and information services. Professional library education programmes are considering principles and theory as never before.

The activities of the librarian and the nature of professional practice in library science are changing rapidly with the increasing use of automation, the proliferation of commercial information services, the emergence of information delivery to the home environment, the availability of library technicians and para-professional personnel, and the evolving interdependent relationships among the library, the information industry and society.

Social issues associated with the provision of library and information services have had an explosive impact on professional ethics and practice; the conflict between invasion of privacy and speed, convenience, accuracy in delivery of information; the information overload conflict between exponential growth of recorded information and the unchanged capability and capacity of comprehending and assimilating information; the conflict between rapid expansion in increasingly narrow, diverse, specializations and generalization to the extent that a generalist within a profession is now considered a type of specialist; the conflict between the information poor and the information rich, an increased class distinction associated with a lack of basic information skills; the future shock of attempting to keep up with rapid change in all aspects of society where availability and possession of information now denotes power; the intellectual property issue involving conflict between ownership and possession, and accessibility and distribution of information.

The librarian's responsibility and accountability for the quality of professional practice has never before been of such vital concern to a society which now considers the major role of the librarian as the "gatekeeper" of recorded knowledge.

The goal of the Faculty is to educate students to achieve excellence in applying theoretical, analytical, and critical skills to the professional practice of library science.

The role of the librarian as an administrator, designer of information services, or practitioner, requires continual adaptation to change — the only constant in the dynamic and challenging profession of library science.

The Faculty recognizes its responsibility to provide a stimulating learning environment for examination and exploration of the theoretical foundations, functions, services, and potential of library and information science (inside or outside the traditional library institutional environment), and to provide for creative investigation and research into specific aspects of library science with particular emphasis on significant Canadian issues.

The objectives of the MLS degree programme are:

- 1) to prepare students to select, locate, organize, and disseminate information, and to develop and administer programmes of service, in all types of institution environments including the library.
- 2) to provide students with the knowledge of current analytical principles for the organization and interpretation of the intellectual content of print and non-print materials based on intellectual level or subject discipline.
- 3) to introduce students to the theories and concepts of administration and organizational behaviour, and their application within the context of the information industry as a whole, and the library in particular.
- 4) to develop the students' abilities to analyse and critically evaluate the utility, performance, and impact of advanced technological applications, including the potentialities and limitations of computer and electronic communications media.
- 5) to provide students with the knowledge of the social, political, and economic factors influencing the behaviour, growth, performance, evaluation and design of activities involved in the provision of information to communities of information consumers.
- 6) to develop the students' understanding of the principles and methods of research, systems evaluation, and problem solving prior to conducting an investigation of a specific problem of interest to the students.
- 7) to provide the students with an opportunity to expand and develop individual interests in an area of specialization within or related to library science.

- 8) to develop the students' ability in decision making; ability to predict the impact of decisions under varying social, economic, political, and organizational conditions; ability to design selective feedback mechanisms for monitoring and comparing actual behaviour and performance; and the ability to evaluate objectively the entire organizational pattern of an information system adjusting the system parameters to match environmental constraints with priorities in order to achieve long-range and short-range system objectives.

The responsibility of the Faculty includes the provision for encouraging professional development programmes for librarians in the prairie provinces and for the delivery of continuing education programmes to practising librarians in Saskatchewan and Manitoba as well as Alberta.

Graduates of the Faculty should be able to make decisions and either implement them in practice or administer an implementation programme. The decision-making ranges from determining the most effective way to answer a reference question to managing the re-organization of the information services of an entire institution. Graduates of the Faculty have a professional obligation to make an active and intelligent contribution to the profession, if only through assuming responsibility for ensuring a high standard of quality of their own professional conduct and practice.

Significant changes in a well established profession cannot be accomplished overnight. Library science, perhaps more than any other profession, has arrived at a critical juncture at which it desperately needs research to provide a firm foundation for future development. The traditional bibliographic emphasis is alone no longer adequate to meet the changing needs to cope with the "information explosion." There is an evolving recognition that library science has its own area of human experience to analyse, its own body of descriptive and factual data, its own conceptual schemes to formulate and test. Some of the most critical areas in which research is required are:

### **Education**

The techniques, philosophy, and scope of education for library science.

### **Use and Users**

Information and reader services; expressed and unexpressed goals for different kinds of users (students, specialists and the public); variations in user patterns caused by geographic, economic, social, or other factors. Organization of library and information services Administration, management, personnel (including manpower utilization, staffing, labour relations), finance, government relations.



### **Role of Libraries and Information Centres in Society**

Purposes, values, goals, relationship with other educational and cultural institutions; influences of various communications media; public relations; recruiting; the library science profession. Integration of library services in school and academic instructional programmes Curriculum development, planning; instructional programmes at the elementary and secondary levels.

Control of resources Documentation; book, card, microimage catalogues; subject analysis; classification; indexing; abstracting: provision of an optimum collection for communities of users; network and systems planning and analysis: automation (software).

### **Technology**

Preservation of materials; storage and physical access; reprography; automation (hardware).

Among the forms in which research is undertaken in library science are:

- State-of-the-art studies Collection and integration or interpretation of existing research.
- Feasibility studies Identification of the need for and feasibility of research, development, or other research-related activities within a clearly defined subject field.
- Prototype development and hypothesis generation Formulation of an hypothesis or the development of a model to aid in the solution of a problem.

### **Testing and Evaluation**

Test of hypotheses or models in a controlled situation and evaluation of the results.

Demonstration and implementation Application of the generalization to a non-controlled situation to verify and, if necessary, to modify the formulation developed.

It should be recognized that little precedence for the research activities described exists in Canada. The Faculty, which has been increasingly turning its attention to research activity, must play a leading role in developing a more vigorous attitude in this area of library science.

### **Enrolment**

When the Faculty was first established, it was assumed that there would be steady growth in number of students and faculty. Economic

constraints, however, have slowed the prospects of growth considerably. The Faculty has a quota of 35 students with the prime constituency extended beyond Alberta to include Saskatchewan and Manitoba.

The majority of students come from Alberta, Saskatchewan and Manitoba in that order, but students are also accepted from all Canadian provinces and applications are received from the United States, Latin America, and "third world" countries. Graduates are employed primarily in the prairies, but have also found positions in other provinces, in the United States, Great Britain, Australia, Scandinavia, Latin America, Africa and India.

Enrolment stability has been reached with a quota of 35 students in the first qualifying year. Under the quota, the Faculty accepts less than one-half the number of applicants to the programme. This normally results in a student population of 70 full-time students in the two years, plus additional part-time students. With an approved academic staff complement of ten faculty members, only achieved in 1980, and with limited physical facilities, it is unlikely that any substantial increase in student enrolment will be possible, or desirable, in the near future. The faculty is responsible for 42 separate courses in the two years of the programme in addition to supervising thesis and non-thesis projects.

During the period 1969-76, 397 students graduated with the BLS degree. An additional 891 students from the Faculty of Education and 224 special students have completed library science courses.

### **Employment**

Since 1978, 120 students have graduated from the MLS programme, including those intending to graduate in the spring of 1981. Employment prospects for graduates are inevitably fewer than they were in the 1960s. However, with steady, if modest, expansion in the number of positions in Alberta and, to a lesser extent, in Saskatchewan, career opportunities in the prairie provinces are probably the best in Canada. The number of graduates and positions available locally appear to be matched fairly closely. A much less buoyant employment situation in Ontario, where there are two large library schools, provides considerable competition as the Ontario graduates look west for employment.

The mobile graduate, anywhere in Canada, has reasonable expectations of a position. The graduate unable to relocate from a particular city or region may have to search diligently for a permanent position. Part-time and short-term employment is normally available, and very few graduates need wait more than a year for permanent employment, although not necessarily in the preferred areas of specialization or interest. The 1980

statistics in the table above, seem rather encouraging, especially when compared with other parts of Canada. Most interesting is the apparent increase in university library as opposed to special library positions.

As the prairie region has been somewhat tardy in developing libraries, there is a sense of a need to catch up quickly with the rest of Canada. As a result, responsibility and promotion often come early. Graduates of the Faculty are already chief librarians in universities and colleges, in regional libraries, branch libraries or large urban systems, and in government and business libraries of varying sizes. At the assistant chief librarian level, graduates may be found in national libraries, provincial libraries and public libraries. A considerable number of graduates are seasoned middle managers, in both the traditional management situations and in charge of systems development in the widespread move to automated services.

The librarian is no longer confined by the walls of a public service institution. Businesses large and small, banks, research establishments, lawyers' offices, hospitals, and government departments, realizing the benefits of rapid, accurate, current information, are setting up their own libraries and information centres, sometimes their own computer-based networks, employing special librarians. In the last decade, the position of consulting librarian has emerged, selling services for a fee, identifying a client's specialized information requirements and providing individualized information services. The consulting librarian is either self-employed or a member of an information consulting group.

Several graduates have established their own consulting firms. In this arena of library science, experience, competence, imagination and salesmanship are imperative to attain success. There are also career opportunities with the commercial producers of data bases, with publishers and booksellers. At least one graduate has found a position in publishing. Opportunity for career advancement exists in specialty areas throughout the information industry offering exciting and challenging professional prospects in addition to the traditional "library" environment.

### ***Continuing Education***

As prairie libraries and librarians strive to keep up with and perhaps surpass developments elsewhere in Canada and the United States, a demand for continuing education has developed. To meet the demand, more of the regular courses are made available in evenings and in special sessions, especially summer sessions, when it is feasible to bring in specialists to extend the expertise available within the Faculty. Courses in archives administration, legal bibliography, and law librarianship have been recently offered and others are planned.

A survey sponsored by the Faculty was completed in the autumn of 1980, identifying the requirements of libraries in the prairies for continuing professional education. It is still in the process of analysis but is already providing guidance both for course revision within the MLS programme and for the type of contribution that can best be made by the Faculty toward professional development. It is clear that the demand for education in management and automation is paramount. It is also clear that budgetary limitations of libraries make it very difficult for professional staff to obtain release time to attend courses if they must leave their place of employment to do so.

Efforts to provide off-campus and out-of-province courses to help meet these demands have met with limited success. Given a scattered population of librarians, it is difficult to find enough subscribers wanting the same course at the same time. Distance education possibilities are being closely monitored but again, because of the small and scattered audience, they are still economically unfeasible. In both cases, the local resources for supporting degree courses and research are, in many cases, insufficient, presenting a considerable impediment to offering a course. The survey appears to indicate that efforts should be made to provide specific, single topic seminars or workshops which could be organized in conjunction with provincial library authorities and library associations. If appropriate, successful programmes will be moved from centre to centre to respond to the most immediately identified areas of interest and concern.

### **Library Science**

Library science is an interdisciplinary science incorporating the humanities, law and applied science to study topics related to libraries, the collection, organization, preservation and dissemination of information resources, and the political economy of information. Historically, library science has also included Archival science. "The distinction between a library and an archive is relatively modern". This includes how information resources are organized to serve the needs of select user groups, how people interact with classification systems and technology, how information is acquired, evaluated and applied by people in and outside of libraries as well as cross-culturally, how people are trained and educated for careers in libraries, the ethics that guide library service and organization, the legal status of libraries and information resources, and the applied science of computer technology used in documentation and records management.

Academic courses in library science typically include Collection management, Information Systems and Technology, Cataloguing and classification, Preservation, Reference, Statistics and Management. Library science is constantly evolving, incorporating new topics like Database

Management, Information Architecture and Knowledge Management, for example.

There is no generally agreed distinction between *library science*, *library and information science*, and *librarianship*. To a certain extent they can be considered equivalent terms, perhaps adopted to increase the “science” aspect, or improve the popular image of librarians.

The term library and information science (LIS) is sometimes used; most librarians consider it as only a terminological variation, intended to emphasize the scientific and technical foundations of the subject, and its relationship with information science. LIS should not be confused with information theory, the mathematical study of the concept of information, or information science, a field related to computer science and cognitive science. One operational view, implied by some textbooks, is that librarianship means the professional aspects of work as a librarian, such as certification, in-service training, and issues of gender equality.

## **History**

Library and information science, it may be argued, began with the first effort to organize a collection of information and provide access to that information.

### **Early History**

At Ugarit in Syria excavations have revealed a palace library, temple library, and two private libraries which date back to around 1200 BCE, containing diplomatic texts as well as poetry and other literary forms. In the 7th century, King Ashurbanipal of Assyria assembled what is considered “the first systematically collected library” at Nineveh; previous collections functioned more as passive archives. The legendary Library of Alexandria is perhaps the best known example of an early library, flourishing in the 3rd century BC and possibly inspired by Demetrius Phalereus.

### **Ancient Information Retrieval**

One of the curators of the imperial library in the Han Dynasty is believed to have been the first to establish a library classification system and the first book notation system. At this time the library catalogue was written on scrolls of fine silk and stored in silk bags.

### **Jefferson's Method**

Thomas Jefferson, whose library at Monticello consisted of thousands of books, devised a classification system inspired by the Baconian method which grouped books more or less by subject rather than alphabetically, as it was previously done. Jefferson’s collection became the nucleus of the

first national collection of the United States when it was transferred to Congress after a fire destroyed the Congressional Library during the War of 1812. The Jefferson collection was the start of what we now know as the Library of Congress.

### **20th Century**

The term “library science” first appeared in the early 1930’s, in the title of S. R. Ranganathan’s *The Five Laws of Library Science*, published in 1931, and in the title of Lee Pierce Butler’s 1933 book, *An introduction to library science* (University of Chicago Press).

Butler’s new approach advocated research using quantitative methods and ideas in the social sciences with the aim of using librarianship to address society’s information needs. This research agenda went against the more procedure-based approach of “library economy,” which was mostly confined to practical problems in the administration of libraries. While Ranganathan’s approach was philosophical it was tied more to the day-to-day business of running a library. In more recent years, with the growth of digital technology, the field has been greatly influenced by information science concepts. Although a basic understanding is critical to both library research and practical work, the area of information science has remained largely distinct both in training and in research interests.

### **Training in Librarianship**

Most professional library jobs require a professional post-baccalaureate degree in library science, or one of its equivalent terms, library and information science as a basic credential. In the United States and Canada the certification usually comes from a Master’s degree granted by an ALA-accredited institution, so even non-scholarly librarians have an originally academic background. In the United Kingdom, however, there have been moves to broaden the entry requirements to professional library posts, such that qualifications in, or experience of, a number of other disciplines have become more acceptable. For the main discussion of this topic, see Education for librarianship.

### **Subdisciplines**

Subdisciplines of library science include the study of:

- Human Information Behaviours (information-seeking, search strategies, and use)
- Knowledge Organization (which includes bibliographies, cataloguing, classification, indexing & abstracting, metadata, semantic & syntactic analysis (controlled vocabularies, etc.))



- Digital libraries
- Collection development
- Preservation
- Public reference and other services
- Scholarly communication (includes bibliometrics, informetrics, scientometrics, webmetrics).

### **Types of Library Science Professionals**

- Librarian
- Archivist
- Cataloger
- Computer, Data, and Information Systems professionals
- Curator
- Indexers
- Information architect
- Information broker
- Metadata Architects
- Metadata Managers
- Preservation Administrators and Conservators.

### **Librarians in Different Types of Libraries**

#### **Public**

The study of librarianship for public libraries covers issues such as cataloguing, collection development for a diverse community, information literacy, community standards, public services-focused librarianship, serving a diverse community of adults, children, and teens, Intellectual freedom, Censorship and legal and budgeting issues.

#### **School**

The study of school librarianship covers library services for children in schools up until (but not including) university. In some regions, the local government may have stricter standards for the education and certification of school librarians (who are often considered a special case of teacher), than for other librarians, and the educational programme will include those local standards.

School librarianship may also include issues of intellectual freedom; pedagogy; and how to build a cooperative curriculum with the teaching staff.

**Academic**

The study of academic librarianship covers library services for colleges and universities. Issues of special importance to the field may include copyright; technology, digital libraries, and digital repositories; academic freedom; open access to scholarly works; as well as specialized knowledge of subject areas important to the institution and the relevant reference works.

Some academic librarians are considered faculty, and hold similar academic ranks as professors, while others are not. In either case, the minimal qualification is a Master's degree in Library Studies or Library Science, and, in some cases, a Master's degree in another field.

**Archives**

The study of archives covers the training of archivists, librarians specially trained to maintain and build archives of records intended for historical preservation. Special issues include physical preservation of materials and mass deacidification; specialist catalogs; solo work; access; and appraisal. Many archivists are also trained historians specializing in the period covered by the archive.

**Special**

Special librarians include almost any other form of librarianship, including those who serve in medical libraries (and hospitals or medical schools), corporations, news agency libraries, or other special collections. The issues at these libraries will be specific to the industries they inhabit, but may include solo work; corporate financing; specialized collection development; and extensive self-promotion to potential patrons.

**Preservation**

Preservation librarians most often work in academic libraries. Their focus is on the management of preservation activities that seek to maintain access to content within books, manuscripts, archival materials, and other library resources. Examples of activities managed by preservation librarians include binding, conservation, digital and analog reformatting, digital preservation, and environmental monitoring.

**Theory and Practice**

Many practicing librarians do not contribute to LIS scholarship but focus on daily operations of their own library systems. Other practicing librarians, particularly in academic libraries, do perform original scholarly LIS research and contribute to the academic end of the field. On this basis, it has sometimes been proposed that LIS is distinct from librarianship,

in a way analogous to the difference between medicine and doctoring. In this view, librarianship, the application of library science, would comprise the practical *services* rendered by librarians in their day-to-day attempts to meet the needs of library patrons.

Other uses of these terms do not make the distinction and treat them as synonyms.

Powell's widely used introductory textbook does not make a formal distinction, but its bibliography uses the word librarianship as the heading for articles about the library profession.

A library catalogue (or library catalogue) is a register of all *bibliographic items* found in a particular library or group of libraries, such as those belonging to a university system spread out over several geographic locations. A bibliographic item can be any information entity (*e.g.*, books, computer files, graphics, realia, cartographic materials, etc.), that is considered library material (*e.g.*, a single novel in an anthology), or a group of library materials (*e.g.*, a trilogy), or linked from the catalogue (*e.g.*, a webpage) as far as it is relevant to the catalogue and to the users (patrons) of the library.

The card catalogue was a familiar sight to library users for generations, but it has been effectively replaced by the Online Public Access Catalogue (OPAC). Some still refer to the online catalogue as a "card catalogue", but this is incorrect. Some libraries with OPAC access still have card catalogs on site, but these are now strictly a secondary resource and are seldom updated. Many of the libraries that have retained their physical card catalogue post a sign advising the last year that the card catalogue was updated. Some libraries have eliminated their card catalogue in favour of the OPAC for the purpose of saving space for other use, such as additional shelving.

### **Goal of a Library Catalogue**

Charles Ammi Cutter made the first explicit statement regarding the objectives of a bibliographic system in 1876. According to Cutter, those objectives were

1. to enable a person to find a book of which either (Finding objective)
  - the author
  - the title
  - the subject is known.
2. to show what the library has (Collocating objective)
  - by a given author

- on a given subject
  - in a given kind of literature.
3. to assist in the choice of a book (Choice objective)
    - as to its edition (bibliographically)
    - as to its character (literary or topical).

These objectives can still be recognized in more modern definitions formulated throughout the 20th century. 1960/61 Cutter's objectives were revised by Lubetzky and Lubetzky and the Conference on Cataloguing Principles (CCP) in Paris.

The latest attempt to describe a library catalogue's goals and functions was made in 1998 with Functional Requirements for Bibliographic Records (FRBR) which defines four user tasks: find, identify, select, and obtain.

### Catalogue Types

Traditionally, there are the following types of catalogue:

- *Author catalogue*: a formal catalogue, sorted alphabetically according to the authors' or editors' names of the entries.
- *Title catalogue*: a formal catalogue, sorted alphabetically according to the title of the entries.
- *Dictionary catalogue*: a catalogue in which all entries (author, title, subject, series) are interfiled in a single alphabetical order. This was the primary form of card catalogue in the Anglo-American world just prior to the introduction of the computer-based catalogue.
- *Keyword catalogue*: a subject catalogue, sorted alphabetically according to some system of keywords.
- Mixed alphabetic catalogue forms: sometimes, one finds a mixed author / title, or an author / title / keyword catalogue.
- *Systematic catalogue*: a subject catalogue, sorted according to some systematic subdivision of subjects. Also called a *Classified* catalogue.
- *Shelf list catalogue*: a formal catalogue with entries sorted in the same order as bibliographic items are shelved. This catalogue may also serve as the primary inventory for the library.

Producing formal catalogs is relatively easy, as the cataloger can follow a set of cataloguing rules. However, a formal catalogue cannot fully address the second collocating objective above (*e.g.* which works about some subject does the library have?). A subject catalogue just serves that goal, but it is much more difficult to produce, as the cataloguer has to get an accurate impression of the contents of the bibliographic item.

## History

Library catalogs originated as manuscript lists, arranged by format (folio, quarto, etc.) or in a rough alphabetical arrangement by author. Printed catalogs, sometimes called *dictionary catalogs* enabled scholars outside a library to gain an idea of its contents. These would sometimes be interleaved with blank leaves on which additions could be recorded, or bound as *guardbooks* in which slips of paper were bound in for new entries. Slips could also be kept loose in cardboard or tin boxes, stored on shelves. The first card catalogs appeared in the nineteenth century, enabling much more flexibility, and towards the end of the twentieth century the OPAC was developed.

- 1595: *Nomenclator* of Leiden University Library appears, the first printed catalogue of an institutional library.
- 1674: Thomas Hyde's catalogue for the Bodleian Library.

More about the early history of library catalogs has been collected in 1956 by Strout.

## Cataloguing Rules

Cataloguing (or cataloging) rules have been defined to allow for consistent cataloguing of various library materials across several persons of a cataloguing team and across time. Users can use them to clarify how to find an entry and how to interpret the data in an entry. Cataloguing rules prescribe

- which information from a bibliographic item is included in the entry;
- how this information is presented on a catalogue card or in a cataloguing record;
- how the entries should be sorted in the catalogue.

The larger a collection, the more elaborate cataloguing rules are needed. Users cannot and do not want to examine hundreds of catalogue entries or even dozens of library items to find the one item they need.

Currently, most cataloguing rules are similar to, or even based on, the International Standard Bibliographic Description (ISBD), a set of rules produced by the International Federation of Library Associations (IFLA) to describe a wide range of library materials.

These rules organize the bibliographic description of an item in the following areas: title and statement of responsibility (author or editor), edition, material-dependent information (for example, the scale of a map), publication and distribution, physical description (for example, number of

pages), series, note, and standard number (ISBN). The most commonly used set of cataloguing rules in the English speaking world are the Anglo-American Cataloguing Rules, 2nd Edition, or AACR2 for short.

In the German-speaking world there exists the *Regeln für alphabetische Katalogisierung*, abbreviated RAK. AACR2 has been translated into many languages, however, for use around the world. AACR2 provides rules for *descriptive cataloguing* only and does not touch upon *subject cataloguing*.

Library items that are written in a foreign script are, in some cases, transliterated to the script of the catalogue.

### Sorting

In a title catalogue, one can distinguish two sort orders:

- In the *grammatic* sort order (used mainly in older catalogs), the most important word of the title is the first sort term. The importance of a word is measured by grammatic rules; for example, the first noun may be defined to be the most important word.
- In the *mechanic* sort order, the first word of the title is the first sort term. Most new catalogs use this scheme, but still include a trace of the grammatic sort order: they neglect an article (The, A, etc.) at the beginning of the title.

The grammatic sort order has the advantage that often, the most important word of the title is also a good keyword (question 3), and it is the word most users remember first when their memory is incomplete. However, it has the disadvantage that many elaborate grammatic rules are needed, so that only expert users may be able to search the catalogue without help from a librarian.

In some catalogs, person's names are standardized, *i.e.*, the name of the person is always (catalogued and) sorted in a standard form, even if it appears differently in the library material.

This standardization is achieved by a process called authority control. An advantage of the authority control is that it is easier to answer question 2 (which works of some author does the library have?). On the other hand, it may be more difficult to answer question 1 (does the library have some specific material?) if the material spells the author in a peculiar variant. For the cataloguer, it may incur (too) much work to check whether *Smith, J.* is *Smith, John* or *Smith, Jack*.

For some works, even the title can be standardized. The technical term for this is *uniform title*. For example, translations and reeditions are sometimes sorted under their original title. In many catalogs, parts of the Bible are sorted under the standard name of the book(s) they contain. The



plays of William Shakespeare are another frequently cited example of the role played by a *uniform title* in the library catalogue. Many complications about alphabetic sorting of entries arise. Some examples:

- Some languages know sorting conventions that differ from the language of the catalogue. For example, some Dutch catalogs sort *IJ* as *Y*. Should an English catalogue follow this suit? And should a Dutch catalogue sort non-Dutch words the same way?
- Some titles contain numbers, for example *2001: A Space Odyssey*. Should they be sorted as numbers, or spelled out as *Two thousand and one*?
- *de Balzac, Honore* or *Balzac, Honore de?* *Ortega y Gasset, Jose* or *Gasset, Jose Ortega y?*

In a subject catalogue, one has to decide on which classification system to use. The cataloger will select appropriate subject headings for the bibliographic item and a unique classification number (sometimes known as a “call number”) which is used not only for identification but also for the purposes of shelving, placing items with similar subjects near one another, which aids in browsing by library users, who are thus often able to take advantage of serendipity in their search process.

### Online Catalogs

Online cataloguing has greatly enhanced the usability of catalogs, thanks to the rise of Machine Readable Cataloguing = MARC standards in the 1960s.

Rules governing the creation of catalogue MARC records include not only formal cataloguing rules like AACR2 but also special rules specific to MARC, available from the Library of Congress and also OCLC. MARC was originally used to automate the creation of physical catalogue cards; Now the MARC computer files are accessed directly in the search process. OPACs have enhanced usability over traditional card formats because:

1. The online catalogue does not need to be sorted statically; the user can choose author, title, keyword, or systematic order dynamically.
2. Most online catalogs offer a search facility for any word of the title; the goal of the grammatic word order (provide an entry on the word that most users would look for) is reached even better.
3. Many online catalogs allow links between several variants of an author name. So, authors can be found both under the original and the standardised name (if entered properly by the cataloguer).

### Searching with an OPAC

As noted above, the acronym OPAC means Online Public Access Catalogue.

Many libraries have their catalogue accessible via Internet; some of them can be queried using a simple browser, other using a special version of browser (with Javascript and CSS features), some others using Z39.50 clients.

If you are looking for a book or another item, you can access to the OPAC of your nearest library and search for it there. If you cannot find a particular book in the catalogue, it may be obtainable through interlibrary loan, also known to librarians as I.L.L. Ask the nearest Reference librarian for assistance.

If you want to look if a book exists and you have few elements to identify it, you can use a meta-searcher: you can fill the query form once and spread you search over many library catalogues. A service such as MultiOpac does this task for you.

### Library Classification

Library classification forms part of the field of library and information science. It goes hand in hand with library (descriptive) cataloguing under the rubric of *cataloguing and classification*, sometimes grouped together as *technical services*. The library professional who engages in the process of cataloguing and classifying library materials is called a *cataloger* or *catalogue librarian*. Library classification systems are one of the two tools used to facilitate subject access. The other are alphabetical indexing languages such as Thesauri and Subject Headings systems.

A library classification is a system of coding and organizing library materials (books, serials, audiovisual materials, computer files, maps, manuscripts, realia) according to their subject and allocating a call number to that information resource. Similar to classification systems used in biology, bibliographic classification systems group entities that are similar together typically arranged in a hierarchical tree structure (assuming none-faceted system).

Classification of a piece of work consists of two steps. Firstly the 'aboutness' of the material is ascertained. Next, a call number based on the classification system will be assigned to the work using the notation of the system.

It is important to note that unlike subject heading or Thesauri where multiple terms can be assigned to the same work, in classification systems, each work can only be placed in one class. This is true also for faceted

classification systems due to the enforcement of a citation order. Most classification systems like DDC and Library of Congress classification, also add a cutter number to each work which adds a code for the author of the work.

Classification systems in libraries generally play two roles. Firstly they facilitate subject access by allowing the user to find out what works or documents the library has on a certain subject. Secondly, they provide a known location for the information source to be located (e.g where it is shelved).

Until the 19th century, most libraries had closed stacks, so the library classification only served to organize the subject catalogue. In the 20th century, libraries opened their stacks to the public and started to shelve the library material itself according to some library classification to simplify subject browsing.

Some classification systems are more suitable for aiding subject access, rather than for shelf location. For example, UDC which uses a complicated notation including plus, colons are more difficult to use for the purpose of shelf arrangement but are more expressive compared to DDC in terms of showing relationships between subjects. Similarly faceted classification schemes are more difficult to use for shelf arrangement, unless the user has knowledge of the citation order.

Depending on the size of the library collection, some libraries might use classification systems solely for one purpose or the other. In extreme cases a public library with a small collection might just use a classification system for location of resources but might not use a complicated subject classification system. Instead all resources might just be put into a couple of wide classes (Travel, Crime, Magazines etc.). This is known as a “mark and park” classification method.

### **Types**

There are many standard systems of library classification in use, and many more have been proposed over the years. However in general, Classification systems can be divided into three types depending on how they are used.

- Universal schemes covering all subjects. Examples include Dewey Decimal Classification and Library of Congress Classification
- Specific classification schemes. Examples includes Iconclass, British classification of Music
- National schemes specially created for certain countries. Example is SAB.

In terms of functionality, classification systems are often described as:

- enumerative: produce an alphabetical list of subject headings, assign numbers to each heading in alphabetical order
- hierarchical: divides subjects hierarchically, from most general to most specific
- faceted or analytico-synthetic: divides subjects into mutually exclusive orthogonal facets.

There are few completely enumerative systems or faceted systems, most systems are a blend but favouring one type or the other. The most common classification systems, LCC and DDC, are essentially enumerative, though with some hierarchical and faceted elements (more so for DDC), especially at the broadest and most general level. The first true faceted system was the Colon classification of S. R. Ranganathan.

#### ***Specific Classification Systems Used in English-speaking World***

- Bliss bibliographic classification (BC)
- Dewey Decimal Classification (DDC)
- Library of Congress Classification (LC)
- Dickinson classification.

(The above systems are the most common in the English-speaking world.)

- Harvard-Yenching Classification-An English classification system for Chinese language materials.

#### ***Specific Classification Systems in other Languages***

- Nippon Decimal Classification (NDC)
- Chinese Library Classification (CLC)
- Korean Decimal Classification (KDC).

#### ***Specific Classification Systems that Rely on Synthesis (Faceted Systems)***

- Bliss bibliographic classification
- Colon classification
- Cutter Expansive Classification
- Universal Decimal Classification
- Brinkler classification.

Newer classification systems tend to use the principle of synthesis (combining codes from different lists to represent the different attributes of a work) heavily, which is comparatively lacking in LC or DDC.

### Comparing Classification Systems

As a result of differences in Notation, history, use of enumeration, hierarchy, facets, classification systems can differ in the following ways;

- Type of Notation-Notation can be pure (consisting of only numerals for example) or mixed (consisting of both alphabets and numerals or other symbols).
- Expressiveness-This is the degree in which the notation can express relationship between concepts or structure.
- Whether they support mnemonics-For example the number 44 in DDC notation usually means it concerns some aspect of France. For example 598.0944 concerns “Birds in France”. the 09 signifies country code, and 44 represents France.
- Hospitality-The degree in which the system is able to accommodate new subjects
- Brevity-Length of the notation to express the same concept
- Speed of updates and degree of support-The best classification systems are constantly being reviewed and improved.
- Consistency
- Simplicity.

Information architecture is the art and science of expressing a model or concept for information. Information Architecture is utilized in web development, user interactions, database development, programming, technical writing, enterprise architecture, and other activities that require expressions of complex systems. Information architecture has somewhat different meanings in these different branches of what might be called IS and/or IT architecture. Most definitions have common qualities: a structural design of shared environments, methods of organizing and labelling Web sites, intranets, and online communities, and ways of bringing principles of design and architecture to the digital landscape.

Information Architecture (often abbreviated “IA”) is defined by the Information Architecture Institute as;

1. The structural design of shared information environments.
2. The art and science of organizing and labelling web sites, intranets, online communities and software to support usability and findability.
3. An emerging community of practice focused on bringing principles of design and architecture to the digital landscape.

The term *information architecture* describes a specialized skill set which relates to the interpretation of information and expression of

distinctions between signs and systems of signs. It has some degree of origin in the library sciences. Many library schools teach information architecture.

In the context of information system design, information architecture refers to the analysis and design of the data stored by information systems, concentrating on entities, their attributes and their interrelationships. It refers to the modelling of data for an individual database and to the corporate data models an enterprise uses to coordinate the definition of data in several (perhaps scores or hundreds) of distinct databases. Recently, the “canonical data model” is applied to integration technologies as a definition for specific data passed between the systems of an enterprise. At a higher level of abstraction, it may refer also the definition of data stores.

### Origins

The effective organization of information for easy retrieval at a later date dates back to the works of the first librarians, such as the Catalogue created by Callimachus at the Library of Alexandria in the 3rd century BC. The Dewey Decimal System is similarly another such attempt at systematizing and rationally organizing large amounts of data so that library patrons can find the type of information they are looking for.

In 1970, Xerox established the Xerox PARC research lab with a mission to create “the architecture of information.” In 1976, Richard Saul Wurman coined the term “information architect” at that year’s American Institute of Architecture’s convention (the theme was “the Architecture of Information”). As the Web emerged in the mid-1990s, the term began to take on a new shade of meaning, describing an evolving set of Web design practices. In 1996, former Apple creative director Clement Mok launched *Studio Archetype* (now *Sapient*), describing the firm as “identity and information architects,” influencing major clients like IBM to embrace information architecture as a core component of successful Web design. In 1997, Wurman published *Information Architects*. The explosive growth of the Web design industry in the late 1990s fueled a growing demand for professional information architects, leading to the success of Lou Rosenfeld and Peter Morville’s 1998 book, *Information Architecture for the World Wide Web* (aka “the Polar Bear Book”).

### Current Practice

Information architects use a range of tools and techniques from other fields, including human-computer interaction, anthropology, information management and library and information science.



### **User-centred Design**

The practice of IA often utilizes user-centred design (UCD) principles, of designing the architecture around the needs and capabilities of the intended user audience. This is in contrast with more traditional/academic approaches of organizing information, where the focus is on some internal consistency or internal logic.

### **Information Architecture and Technical Writing**

With reference to writing for the Web and producing organizing principles for documentation, it has been said that:

*When a Web site or help system lacks definition and structure, readers can get lost in the content. Information architecture is the practice of organizing and interrelating content so the reader remains oriented and gets answers. By defining formal design patterns for information architecture, content providers can apply tested architectures to improve the user's experience.*

Organizing textual context in this way is often done using a structured approach such as DocBook or DITA.

Information architects in this context help define such things as the division of topics, set the specialization of content types, and set guidelines and examples for the type of information that goes into specific content object types. The creation of categories and taxonomies is inherent in information architecture.

This type of information is often designed for a high level of re-use, with the intent that a single content object can be deployed to different media types, including print, online help, marketing materials and on Web pages.

### **Critiques**

- The term “information architecture” has been criticized, as the term “architecture” may imply that information systems are static like buildings. Information systems are dynamic and should adapt to specific users' actions. This criticism may be due to an assumption on the part of the critics that architecture always is permanent and non-flexible. Structures may be designed to accommodate dynamic changes. Even buildings like skyscrapers are designed to float, sway, and allow for flexible compartment changes. Often the structure of an information system remains static as the information content changes.
- User-Centred Information Designers analyze cognitive, behavioural and emotional processes of users and define User-Centred

Information Systems and taxonomies. Furthermore, some activities involved in the creation of information systems can be similar to activities involved in the creation of “taxonomies”. Some have suggested that the term “information architecture” is analogous with “taxonomy”. A contrary view is that the activities involved in the creation of a taxonomy are a subset of the activities involved in developing an information architecture (since developing an information architecture typically also involves articulating the objectives of the information, and understanding the intended audience). Some practicing information architects specialize in developing taxonomies, as part of their IA “toolkit,” along with deliverables like site maps, flow diagrams and screen-level design prototypes to represent the structure of a Web site or interactive application.

- A usage question raised in the information architecture debate might include a graphic web designer adopting (and thus adapting) the term *information architect*. A similar question might be raised for a programmer using the term seeking computer science as a foundation for information systems.
- Because information architecture practices and techniques became popularized with the advent of the World Wide Web, some information architects may lack experience designing systems that are not web-based where browsing is less related. Users of enterprise systems and business systems typically have different goals than nonprofessional users. Business systems within the enterprise, for example, afford users with tools to expedite required business tasks. In contrast, commerce sites and news sites invite users to explore and browse information in many cases to support their business model. It is important for ‘information architects’ to understand the specific business and user requirements rather than apply the same techniques to shape a system’s information.

## Managers for Modern Library

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Having looked at the broad organisational context of information management, we need now to narrow our focus to individuals in organisations. Because of the responsibilities of managers in strategy development and implementation and in enabling organisations to meet their goals it is appropriate to restrict ourselves to considering managers rather than all individuals in organisations. This discussion of managers and information is in two parts.

The first part deals with the nature of managerial work as described in a number of research studies and draws a number of implications for information management. The second part considers the nature of information from the point of view of individual users of information and is based on work in information science and in management. Again, implications for information management are drawn. The discussion concludes with some propositions about information management.

### **The Work of Managers**

The classic view of managerial functions as planning, organising, communicating, coordinating and controlling (Fayol, 1949) suggest a rational and ordered approach to management activities. Yet studies of managers in their workplaces present a picture of an approach to managerial activities that is quite different. A brief overview of a number of studies based on questionnaires and observation of managers in their workplaces highlight the seemingly active, informal, fragmented and chaotic nature of managerial work.

One study (Mintzberg, 1975) identified ten different roles for managers. The roles were categorised into three groups to form an integrated view of what senior managers do. The interpersonal roles of figurehead, leader and liaison stem from the manager's formal authority. The informational

roles of monitor, disseminator, and spokesman derive from the manager's interpersonal contacts.

In this role the manager emerges as the "nerve centre" of the organisational unit (Mintzberg, 1975: 55). The decisional roles of entrepreneur, disturbance handler, resource handler and negotiator arise from the manager as the formal authority of the organisational unit who can commit the unit to action. This approach to managing acknowledges the action-oriented, outward-looking and ritualistic aspects of managerial work as well as managers' strong preferences for verbal media in finding information.

Another study of managers at work identified three major processes in which they are engaged (Kotter, 1982): agenda setting, network building and implementing their agendas through networks. The key challenges for general managers reflect the information and people oriented demands of these three processes: "figuring out what to do (making decisions) in an environment characterised by uncertainty, great diversity, and an enormous quantity of potentially relevant information" and "getting things done (implementation) through a large and diverse group of people despite having relatively little control over them" (Kotter, 1982: 20).

Networking is a feature of another view of managerial work (Luthaus, *et al.*, 1988). Three other categories of activity developed from the research of managers and their subordinates were routine communication, traditional management and human resources management. Networking includes interaction with outsiders and socialising/politicking inside and outside the organisation; routine communication activities include exchanging information and handling paperwork; traditional management activities consist of planning, decision making and controlling; and human resource management includes motivating/reinforcing, disciplining/ punishing, managing conflict, staffing and training/developing. This study distinguished between successful and effective managers, between those who are promoted and those who have "satisfied, committed subordinates and produce organisational results" (Luthaus, *et al.*, 1988: 62). We are reminded that managers have their own career interests as well as interests in the organisations in which they work. The categories of activity contribute differently to success and effectiveness. Networking had the strongest relationship with success, whereas routine communication had the strongest with effectiveness. The type of activity with the weakest relationship with success is human resource management and with effectiveness the weakest is networking.

The final study considered here explores the work of middle managers. It suggests that managing relationships, finding innovation, creating a

mindset and facilitating learning (Floyd & Wooldridge, 1996) are integral to creating competitive advantage. The study of middle managers focussed on strategy formation, a process that moves away from the overly rational, command and control model of strategy as a two stage process of formulation and implementation and has “more to do with learning than planning” (Luthaus, *et al.*, 1988: 39). Four distinct roles for middle managers in strategy were identified: championing strategic alternatives; synthesising information; facilitating adaptability; and implementing deliberate strategy. By engaging in these roles, middle managers link strategic purpose and organisational action.

These studies of managerial work range across managers at different levels in organisations from senior management to middle management. They also span different kinds of organisational structures from the more traditional hierarchies to post-entrepreneurial organisations (Kanter, 1989) with leaner, flatter structures and participative, team-based work units.

What are some implications for information management that emerge from this overview of managerial work?

1. Information management has the potential to contribute to the effectiveness of managers in their diverse organisational roles.
2. Information management should seek to meet the information needs of managers and enhance their information capabilities.
3. Information management must recognise informal and formal information sources and flows both internal and external to the organisation.
4. Information management needs to enable managers to integrate business strategy and information.

### **Some Definitions of Information**

Because managers in organisations use information and it is integral to their work we need to be clear about what information is at the level of individual users of information. There are two perspectives which are useful to a consideration of information management in organisations. One comes from the field of information and communication, the other from management.

The first is central to the user-oriented paradigm (Dervin & Nilan, 1986) in information studies and it developed as an alternative to the traditional supplier-oriented paradigm which dominated earlier developments in information systems and the applications of information technology to information services. This perspective posits that information is a process that applies to adaptive and creative behaviour. It relies on *Information1*, or “information which describes reality, the innate structure

or pattern of reality....” (Dervin, 1977: 22) and *Information2* or “ideas, the structures or pictures imputed to reality by people” (Dervin, 1977: 22). Individuals move between *Information2*, subjective, internal information and *Information1* objective, external information by *Information3*, a set of behaviours, or the “how” of the information process.

Similar categories of information have been derived from an analysis of dictionary definitions (Buckland, 1991): information-as-thing, information-as-knowledge and information-as-process. Information-as-knowledge is intangible and to be communicated needs to be expressed or represented in some physical way so becoming tangible information-as-thing. The point is made that information-as-thing has a “fundamental role” in information systems (Buckland, 1991: 352), not only computer-based systems but also libraries, museums and collections of potentially-informative objects which might include people, products and events.

The second perspective, based on an analysis of successful companies in Japan, is centred on the individual as a creator of new knowledge (Nonaka, 1991). It draws a distinction between explicit and tacit knowledge. Explicit knowledge is formal, systematic and codified rather like *Information1* or information-as-thing. Tacit knowledge is highly personal, consisting of technical skills and “know-how” as well as having cognitive dimensions such as implicit mental models and beliefs which shape our perceptions of the world. There are similarities among *Information2*, information-as-knowledge and tacit knowledge.

This perspective links individual and organisational knowledge. New knowledge always begins with an individual and it is this individual’s personal knowledge which is transformed into organisational knowledge which is of value to the organisation as a whole. There are four patterns suggested for creating knowledge in an organisation and some indications of the creation process through the spiral of knowledge (Nonaka, 1991: 97-99) are given. These are similar to *Information3* and information-as-process.

1. From tacit to tacit which occurs when one individual shares tacit knowledge directly with another for example through observation, imitation, conversation so that it becomes part of another’s tacit knowledge base. This knowledge rarely becomes explicit.
2. From explicit to explicit which occurs when an individual combines discrete pieces of explicit knowledge into a new whole, for example when a finance director puts together information collected from different sources in the organisation in a financial report.
3. From tacit to explicit which occurs when tacit knowledge is articulated, for example when the finance director develops a new



approach to budgetary control based on tacit knowledge. The explicit knowledge created draws on the director's experience, judgement, insight and know-how and it is then available for sharing with others in the organisation. This process extends the organisation's knowledge base.

4. From explicit to tacit which occurs when explicit knowledge is shared throughout the organisation and others internalise it to broaden, reframe and extend their own tacit knowledge. For example, the finance director's approach to budgetary control is used by others in the organisation and it is eventually taken for granted as one of the organisation's tools or resources.

These two perspectives on information present a contrast between information as an object and information as a construct. Both kinds of information are necessary for managers in organisations. Not only do managers use information as one of the resources available to them but they also have a role in knowledge creation for themselves, their co-workers and their organisations. Because information as a tangible object is usually easier to capture, store, retrieve and disseminate, particularly with the ever-expanding range of communication and information technologies available to organisations, there is a risk that the value of intangible information as a user construct will be overlooked. Yet, it is the "informal, anomalous, multifaceted, interdisciplinary, idiosyncratic individualistic aspects of information transfer" (Bawden, 1986: 210) which is central to creativity and innovation.

What are some implications about information management that can be drawn from a discussion of information as used by individuals?

1. If information in organisations is conceptualised as a process it can then be integrated into strategy formation.
2. Information management needs to encompass information as an object and information as a construct as well as interactions between them.
3. Information management has a role in enhancing the information capabilities of individuals in organisations.
4. Almost all managerial activities have an information component and so information management practice should be responsive to the needs of managers as information users and as information producers or knowledge creators.

Implications for information management have emerged from this overview of managers in their work roles and as users of information. They serve to elaborate and clarify the scope of information management in

organisations. Some propositions about information management are presented in table below.

*Proposition 1:* Managers are in a unique position to integrate information and organisational strategy.

*Proposition 2:* A process approach to information supports the integration of information and business strategy and is a foundation for information management.

*Proposition 3:* Information management must adopt a broadly-based approach to information so that it is concerned with information as an object and as a user construct formal and informal flows of information inside and outside organisations sources of information internal and external to organisations enhancing the information capabilities of individuals in organisations.

*Proposition 4:* The effectiveness of information management can be measured by the impact of information on the organisation.

The propositions based on the nature of the information in organisations and the nature of information in managerial work challenge information management thinking and practice. They underpin a shift in information management away from the provision of information with an emphasis on technology and access towards strategy with focus on information use and its integration into business strategy.

### **Information Management in SMEs**

The propositions about information management shown in tables are based on an overview of organisations, managers' work and information. The propositions are tentative, some more so than others. They are however based on a range of perspectives, the central one being information which has the potential to sustain an organisation's competitive position if it is used effectively by the members of that organisation. The links among the perspectives on information are shown in Figure below.

Broad guidelines for information management have been developed from the propositions and each one will now be explored. The guidelines fall into the categories related to the purpose, scope and implementation of information management. The guidelines are shown in table below.

1. *Purpose of Information Management:* Information and its management contributes to the achievement of organisational goals. A process approach to information management supports the integration of information and strategy
2. *Scope of Information Management:* Information management is contextualised by the organisation and is value-laden. Information

management must adopt a broadly-based approach to information and encompasses:

*information as an object and as a user construct*

*formal and informal flows of information inside and outside organisations,*

*sources of information internal and external to organisations*

*enhancing the information capabilities of individuals in organisations.*

3. *Implementing Information Management:* Managers are in a unique position to integrate information and business strategy. The effectiveness of information management can be measured by the extent of knowledge creation or innovation in organisations.

### **Purpose of Information Management**

Information management contributes to the achievement of organisational goals. There is little doubt that information does contribute to the success of organisations. Whether information is regarded as a resource or a force for change and development it is clear that information can contribute to the achievement of organisational goals. The assumptions are made that the goals of an organisation are explicit, thus are known throughout the organisation and there is some way determining the extent to which the goals have been met.

A survey of high performing companies in the UK (Owens, *et al.*, 1997) found almost universal acceptance of the view that information is a valuable asset. The more successful companies were concerned with information management issues and some were working towards the creation of an information culture as a way of ensuring continued success. In the words of one manager interviewed in the study:

We do recognise that information is an asset and, thereby, we should maximise the value from that asset, and make it available to all those who can obtain value from it. We are working on the devolution of decision making responsibility. We talk a lot about flattening the organisation structure, and we have achieved a certain amount of progress. I think we've got the right attitude, but we're still going through a learning process. I believe the more enlightened managers understand that a facultative management style is the right style for modern business practice.

That staff working in the business processes are best placed to make these processes effective, and these are the ones who really need the information. (Owens, *et al.*, 1997: 25). This manager's concern with the need to link business strategy and information has been shared by managers

in other countries in the western world (Broadbent, 1992). A key factor in linking or aligning business strategy and information has been information technology, a tool essential for business success in a global economy. The potential for information technology and information to transform organisations is evident in those companies which have redesigned their business processes. Information and information technology have acted as enabling and integrating tools for survival and growth in rapidly changing environments (Johannessen & Olaisen, 1993; Moreton, 1995).

A process approach to information management supports the integration of business strategy and information. The calls for integration come from at least three different communities: information management, information systems and management. Successful companies are those that adapt to and shape their environments and do so by using and creating information in a process of continuous improvement and innovation.

Information management has been described in one particular model as a continuous cycle of related activities which encompass the information value chain. The activities in the cycle (Choo, 1995: 24-26) are:

1. identification of information needs defined by subject matter requirements and situation
2. information acquisition involving evaluation of current sources, assessment of new sources and matching of sources to needs
3. information organisation and storage of the organisation's memory or its knowledge and expertise
4. information products and services aimed at enhancing the quality of information
5. information distribution through sharing information informally or formally
6. information use in the creation and application of information in interpretation and decision making.

Implicit in the model is organisational learning and the development of individuals. For example, information organisation and storage activities will ensure that the organisation's knowledge is made available to individuals or groups in an organisation and is built on. Information distribution activities can develop fresh insights and novel solutions which can then be captured through organisation and storage activities and made available for later use. The spiral of knowledge can be seen through this process approach to information.

The activities of identification of information needs and information use are not always regarded as components of information management.

Yet it is these two activities which require the integration of business strategy and information. Information needs will arise in the context of the organisation's goals and the objectives of work teams and it is this context which surrounds the use of information. Certainly these two activities are beyond the scope of information resource management and information systems management as they have been practised.

The integration of business strategy and information also suggests different ways of organising work and designing the organisation. Teams are very appropriate to strategy formation and achieving competitive advantage. In the learning organisation there are three groups of experts who need to work together as knowledge partners (Choo, 1995).

The groups are domain experts in the organisation who create and use knowledge, for example operators, professional managers; information experts with "skills, training and know-how for organising knowledge information systems and structures that facilitate the productive use of information and knowledge resources" (Choo, 1995: 198); and information technology experts who have specialised expertise in building and developing the organisation's information infrastructure.

The focus of each group of experts is different. Organisation effectiveness is the focus of the domain expert, enlightenment is the focus of the information expert and process efficiency is the focus of the information technology experts. As the partners in the teams work together they will create, organise and use knowledge.

The partners will engage in learning and in furthering the organisation's objectives. They will assume information responsibility within the team and for themselves (Drucker, 1988). Key factors for success in SMEs reinforce the need for integration of business strategy and information. Managers in firms see their success as dependent on their organisation's ability to accommodate and manage change and to respond to changes in their environments. The key factors are:

- relationships with customers and suppliers
- flatter management structures and better use of resources
- training and quality
- environmental issues (Abell, 1994: 236).

Each of these factors rests on information, its use, creation, storage and distribution. Issues of the quality of information (in terms of its accuracy, validity, timeliness), its accessibility, availability, presentation, ease of use, and its organisation and storage are the concern of teams or task forces developing strategy or engaging in projects in relation to any one of these factors.

**Scope of Information Management**

Information management is contextualised by the organisation and is value-laden. The earlier discussion of images of organisations suggests different approaches to information management in organisations. While the objectives of information management will be linked to the effectiveness of organisations, information management practice will vary across organisations. For example, in the organisation which is like a machine, the information management function might be centrally located in a unit established to control internally generated information. This unit would have links to an IT unit.

There might also be a library in the organisation which provides an information service based on externally generated information. Depending on the industry sector, the market place, the culture and the nature of work in the organisation, such a structural arrangement for information management might be appropriate. The objectives and priorities for information management will be framed within this context.

By contrast, in the organisation which is like a learner, the information management might be decentralised in a federal structure which supports teams but locates some information management functions centrally. Each team will be responsible for providing information to know how databases accessible through the organisation's intranet. Compared to the previous example, the objectives for information management and priorities for services will be quite different. Some differences will be seen in:

- distinctions made between internally and externally generated information
- the reuse and sharing of information arising from activities in each organisation
- the relationship among library, information management and IT staff
- the applications of IT
- the value attributed to information
- the information ethos
- measures of success used by the organisation and by information management.

It needs to be recognised that the differences in these two examples are valid. There is no one approach to information management which is inherently more effective than any other.

An important element in information management is information politics which indicate the assumptions made about how people generate



and use information in organisations. Some models of information politics (Davenport, *et al.*, 1996) that have been developed include:

- *Technocratic Utopianism*: a heavily technical approach to information management stressing categorisation and modelling of an organisation's full information assets.
- *Anarchy*: The absence of any overall information management policy leaving individuals to obtain and manage their own information.
- *Feudalism*: The management of information by individual business units or functions, which define their own information needs and report only limited information to the overall corporation. The definition of information categories and reporting structure by the firm's leaders, who may or may not share the information willingly after collecting it.
- *Federalism*: An approach to information management based on consensus and negotiation on the organisation's key information elements and reporting structures.

The federalism model is probably most appropriate to the organisation as learner, although it is possible that a number of models could co-exist in an organisation. The models reinforce the point that the context of the organisation is an important influence on information management and a reminder that it may in fact act as a barrier to the development of sound information management practice. The issue of context is applicable to SMEs as well as large organisations. It may be particularly relevant to SMEs which are interested in establishing strategic partnerships with external information services. SMEs will need to clearly state their expectations of any service providers and to evaluate the organisational context of any partners so that the risks associated with potential sources of difference can be assessed.

Information management must adopt a broadly-based approach to information. Just as there is a hierarchy of definitions of information there is possibly a hierarchy of definitions of information management. A possible hierarchy of definitions is suggested.

### **Definitions of Information**

If information management is to influence the development of the organisation then it should recognise as many categories of information as possible, as broad a range of sources and media as possible, and as broad a range of uses of information as possible. The information provided by the information expert in work teams should be seamless and all information created by the team which is likely to be of value should be organised and

stored by the information expert. The information will no doubt be stored on many different media including discs, maps, photographs, brochures, samples, diagrams, videos, reports, printouts, all of which are part of the organisation's memory and history and have the potential to be reused in later projects. The tacit knowledge of the team becomes explicit knowledge for the next team or task force working on a similar project.

Information as resource	Information management as IT systems
Information as commodity	Information resource management
Information as perception of pattern	Information management as aligning information strategy and business strategy
Information as constitutive force	Information management/knowledge management integrating strategy formation and information
* Definitions of information based on Braman (1989).	

### ***Definitions of Information Management***

Information experts have a role in enhancing the information capabilities of individuals in organisations. Efforts to adapt human behaviour to the information systems have not been successful. IT offers some potential for developing interactive systems which should be capable of adapting to human behaviour. Systems are needed for identifying information need by supporting IT experts and managers in articulating their information needs, capturing information or tacit knowledge for storage in databases and adding value to information.

There are a number of approaches to adding value to information already in use but there is room for further development. In organisations information experts might discuss with managers their media preferences, information use strategies and barriers they have encountered in using and applying knowledge. Information experts can then begin tailoring information products and services to enable managers to make decisions, solve problems, think strategically, scan the environment and carry out other aspects of their work roles.

One approach adds value to information to help information users match the information provided by a system with their needs (Taylor, 1985). The added values include ease of use, noise reduction, quality, adaptability, time-saving and cost saving. Another approach is directed toward reducing information overload for managers (34) by increasing the quality of information. Some of the values are related to the scarcity of information and the degree of confidence a manager places in information.

It is possible for SMEs to adopt a broadly-based approach to information and ensure that the information they need in order to maintain their competitive advantage is accessible and usable. There are a number of

published studies and commentaries (Choo, 1995; Taylor, 1985; Browne, 1993; Diamantopoulos & Souchon, 1996) outlining managers' information behaviour and from them further approaches for adding value to information can be developed. The studies challenge some common assumptions held by information professionals about managers' attitudes to information, their use of it in decision making and the strategies they develop to cope with vast quantities of information.

### **Implementing Information Management**

Managers are in a unique position to integrate information and business strategy. Successful implementation of information management presupposes senior management support, expressed most visibly in funding priorities and through information-related activities and projects from training programmes to information system enhancements. The integration of information and business strategy presupposes a learning organisation which is team based. Managers as domain experts are able to use and create information and knowledge so that both information and business strategy are embedded in the innovations, products, processes or services developed by the team.

It is in their daily work that managers have opportunities to integrate business strategy and information. In the knowledge creating company (Nonaka, 1991) there is a continual shift in meaning as new knowledge is diffused through the company. At times the confusion created by this shift escalates to ambiguity and even chaos which can lead to fresh insights and a new sense of direction. The job of managers is then to "orient this chaos towards purposeful knowledge creation" (Nonaka, 1991: 103).

Senior managers articulate metaphors, symbols and concepts about the company's future, middle managers orient the chaos with their co-workers on company teams. In the learning organisation, middle managers make explicit the tacit knowledge of senior managers and their co-workers and incorporate it into new technologies and products. In this sense, managers are knowledge engineers. In other words, middle managers and their teams create information as an object on the basis of the information constructs of others.

This process is similar to some definitions of knowledge work. One refers to "activities using individual and external knowledge to produce outputs characterised by information content" (Davenport *et al.*, 1996: 54).

Another suggests that knowledge work characterised by variety and exception and is performed with a high level of skill and expertise. Included in knowledge work processes are activities such as education, accounting, research and development, law and management processes of strategy and

planning (Davenport *et al.*, 1996). This view suggests that there are five different processes in knowledge work:

1. finding existing knowledge, understanding knowledge requirements, searching for it among multiple sources and passing it on to a user. An example is a competitive intelligence process in an insurance company.
2. creating new knowledge in say creative processes in advertising or research activities in a pharmaceutical firm.
3. packaging knowledge created externally to the processes. An example is the editing, design and proofing processes in publishing.
4. applying existing knowledge, for example is a surgeon applying existing medical knowledge.
5. revising knowledge. Examples are the reuse of existing components in an engineering project or the residential development of former warehouses.

These five processes are used by managers and all are dependent on information. By engaging in these processes in their role in strategy formation managers are able to integrate information and business strategy. These knowledge work processes are possible in SMEs. Smaller organisations might in fact have more flexibility in moving to project teams. They may also have advantages in being able to apply existing knowledge or create new knowledge through innovation. The task of information management is to enable managers to engage effectively in knowledge work. Key contributions by information management include:

- developing information filters so that that volume of information is contained
- enhancing the quality of information
- building know-how databases
- facilitating information sharing across teams.

Managers in SMEs supported by effective information management and information experts, like their colleagues in large organisations, are well placed to integrate information and business strategy.

The effectiveness of information management can be measured by the extent of knowledge creation or innovation in organisations. The evaluation of information management needs to take into account different views on information. Evaluation based solely on information as object or tangible information will be misleading. The focus of evaluation needs to include also information as a construct and information processes. One approach to the evaluation of information management could be based on the processes

of information management discussed earlier. Another approach might be based on innovations in the organisation and might include consideration of the information capabilities of managers and their co-workers.

The measures of the effectiveness of information management will be very similar in SMEs and large organisations. They will be directed towards teams and the organisation itself.

Some measures will require evaluation over a period of time, for example when the information ethos of an organisation is used as an indicator of effective information management. Other measures might be applied over shorter time periods for example in the evaluation of training programmes. The indicators will require qualitative and quantitative measures. The challenge is to identify what it is that information and learning have made possible in an organisation.

Information management has multiple meanings. Its meanings are shaped by different perspectives on information, on organisations and on the work of managers. Information management has the potential to transform organisations but only when information and business strategy are integrated. Managers in SMEs and large organisations have a key role in putting information to productive use and ensuring that their organisations are successful. In the words of Drucker:

“... knowledge is the only meaningful resource today. The traditional “factors of production”-land (ie natural resources), labour and capital-have not disappeared, but they have become secondary. They can be obtained, and obtained easily, provided there is knowledge. And knowledge in this new sense means knowledge as a utility, knowledge as the means to obtain social and economic results.

These developments, whether desirable or not, are responses to an irreversible change: knowledge is now being applied to knowledge. Supplying knowledge to find out how existing knowledge can best be applied to produce results is, in effect, what we mean by management.

But knowledge is now also being applied systematically and purposefully to define what new knowledge is needed, whether it is feasible, and what has to be done to make knowledge effective. It is being applied, in other words, to systematic innovation” (Drucker, 1993: 42).

In organisations, information management is the key to systematic innovation and to the benefits that innovation brings.

### **Collection Development Policy**

- Material published on a cumulative basis and wholly superseded by a later cumulation, *e.g.* when a work is published monthly and

updated cumulatively during the year, culminating in an annual volume.

- Printed national bibliographies used to be kept as a reference tool. However, for many countries these have now been superseded by online catalogues produced by national libraries. In such cases, recent issues of the national bibliography have been discarded.
- Superseded pages of a loose-leaf publication which is updated in the main library and/or dependent libraries.
- Superseded editions of some foreign university calendars and prospectuses (although material of this type received by legal deposit is retained. See also under Periodicals).
- Superseded transport timetables (although timetables received by legal deposit which cover the whole country or which relate specifically to Cambridge are retained).
- Duplicate copies of material in cases where more than one copy is needed for short-term use. Examples of this type are often reference works (*e.g.* Who's Who). In all cases one copy of each publication is always retained.
- Original hard copies of material which has been replaced by a microfilm if the retention of the hard copy presents particular storage or conservation problems. This is a rare occurrence and normally applies only to newspapers.
- In very exceptional circumstances material which proves impossible to store or to preserve may be discarded even though a microfilm is not held. This applies only to newspapers or to other material so voluminous that microfilming is impractical. Examination papers of other universities may fall into this category and some have been discarded, in all cases after ensuring that the issuing university did not require them for its own collection.

The majority of electronic titles is acquired via subscription. They may be cancelled as a result of very low demand, as demonstrated by usage statistics, which are carefully monitored, or when superseded by an alternative format. In the case of electronic titles, continued access is normally available indefinitely following cancellation to those issues published during the subscription period. This does not usually apply to online databases.

Continuing access to electronic titles cannot be guaranteed once the format in which they are published becomes technically obsolete. However, the library supports and participates in research programmes in digital preservation in order to address this issue in the longer term.



### **Donations, Transfers and Deposited Material**

1. Recently published British and Irish books which appear to have been sent direct by the publisher or author as legal deposit copies are treated as such. Other donations of British and Irish books which are not duplicates are normally retained, except for paperback editions of books already held in hardback and for types of material not claimed through legal deposit.
2. Non-duplicate books published abroad are retained if they make a reasonably substantial contribution to research in a subject area of actual or potential interest to users of the University Library.
3. Books in poor physical condition are discarded unless there is a strong reason for their retention. Donations are accepted only if they are made without conditions as to their binding, cataloguing etc. but there may be occasional exceptions.
4. Departmental and faculty libraries are under an obligation to offer to the University Library any book or serial title of which they wish to dispose. The criteria for acceptance are the same as for donations.
5. Collections are occasionally but rarely accepted on deposit.

### **General Principles on Purchase of Books in European Languages**

1. Purchases are concentrated on academic material.
2. Standing orders are placed for many series when it is clear that every volume, or almost every volume, in the series will be appropriate to the collections and would otherwise be ordered individually.
3. Books embargoed in the UK, or withdrawn by British publishers before or after publication, but which are published in other countries, are acquired whenever possible. In some cases these books cannot be made available to readers in the short term for legal reasons (*e.g.* the law of libel) but they are acquired in the expectation or hope that they will be available for use in the long term.
4. While quality of scholarship is an important criterion for acquisition the policy is not totally inhospitable to the maverick, or even to the disreputable or distasteful, in circumstances where the subject matter is of legitimate academic interest.

### **Language**

1. The major part of the holdings is in the English language. The legal deposit collections are overwhelmingly in English. English-language

publications from the United States, from Commonwealth countries, from Scandinavia and the Netherlands, and from a wide range of other countries, form an important part of the University Library's purchases.

2. Nevertheless English-language material is not in itself sufficient. Literary texts and criticism in languages studied in the university are essential, as is a range of other material in many languages. French is the language most likely to be accessible to users and original academic works in most subjects in the humanities and social sciences are collected. German material is collected on a similar basis, numerically in greater quantity in order to reflect the larger publishing output of German-speaking countries, and the predominant importance of German for certain academic disciplines. Books in languages other than English are normally acquired only if they fulfil one or more of the following criteria:
  - a. when they relate to the culture of the language area concerned
  - b. when they are works by an acknowledged expert in the field
  - c. when coverage in English, or in the language appropriate to the area, is generally perceived to be inadequate, or to be inappropriate in the case of less accessible languages
  - d. when the main Library's coverage approaches comprehensiveness *e.g.* on Cambridge
  - e. when it appears that the author is making an important and original contribution to the subject
3. Italian, Spanish and Russian are covered less intensively than French and German and the uneven range of material in these languages reflects their relative importance in specific subject areas. (Details are noted in Appendix A)
4. Editions of texts in classical and later Latin, and in classical and Byzantine Greek, are bought extensively, as are commentaries, bibliographies etc., relating to them, and works on Latin and Greek literature, and all aspects of Greek and Roman history and civilisation generally. Such works are bought in most European languages.
5. European languages not taught in the university do not receive the same level of literary coverage, although important literary material and works by established authors are acquired for the study of comparative literature or for their historical or sociological significance. Historically the Scandinavian languages as well as Hungarian, Czech and Slovak have been strongly represented in

the collections, but since the university discontinued the teaching of these languages there has been less justification for continuing to acquire material on the previous scale.

6. The coverage of material in languages which have never been taught by the university is very restricted. No attempt is made to provide systematic coverage of contemporary literature in such languages. While some material is collected for general reference purposes, purchases are made on a very restricted scale. Such purchases may include material of particular relevance to the country concerned, archaeological, historical, artistic, linguistic or statistical, and of the works of a few clearly established major authors.
7. Other languages which are taught in the university are represented significantly in the collections, especially in literary texts, critical works on the literature, comparative studies, reference works and material relevant to the history and culture of the appropriate country or linguistic area.

### **Categories of Material**

**Translations:** Literary works are acquired in the original language and often in English; translations into other languages are only acquired if the translator or the translation has special significance. Non-literary works may be acquired in English as well as in the original language but, while it is not always necessary to acquire the edition in the original language, this will often be acquired before an English translation is available.

Translations into a more accessible language (usually French or German) are often preferred to the original language, if no English translation exists. Translations from English into other languages are acquired only if the translator or the translation has special significance or if the original author is represented by special collections (e.g. Sterne).

**New Editions:** If there has been substantial revision, if a long period has elapsed since the previous edition, if the subject has undergone rapid change, or if the previous edition has been heavily used, a new edition may be acquired.

**Reprints and Facsimiles:** Reprints and modern facsimiles may be acquired for heavily used items and to save wear and tear on the original edition. Facsimiles of manuscripts are purchased selectively, normally when the manuscript is of outstanding importance or when it complements the existing holdings of manuscripts or printed books.

**Hardbacks and Paperbacks:** Whenever a book is simultaneously available in hardback and paperback, and the content of both versions is identical, the hardback is preferred.

**Pamphlets:** Pagination is often a guide to the importance of a particular item. Pamphlet material (defined as paperback material of 48 or fewer pages) is often not suitable for purchase but exceptions are made for items of particular importance, if the author is of special significance, or if there is a dearth of material published in a more substantial format.

**Theses:** Unpublished theses are not normally purchased although donations may be accepted. The interlibrary loan system is normally a more appropriate method of gaining access to this material. Published versions of theses are considered in accordance with the normal criteria. For Cambridge University theses see 28.7

**Portraits and Photographs:** Works consisting primarily of photographs or illustrations may be purchased if the photographer or the subject is of particular significance, or in special cases if no similar material has been received by legal deposit. For the acquisition of photographs and portraits see 27.11.

**Material of Recreational Interest:** The legal deposit collections will normally meet any need for recreational material relating to leisure activities, hobbies, sport and travel, but if no appropriate material has been received by legal deposit, in special cases purchase can be considered.

### Multiple Copies, Replacement Copies

1. The University Library aims to acquire as many books meeting its selection criteria as possible. In general, this means that only a single copy of each work is acquired, which is then housed at the most appropriate site. Occasionally, however, circumstances necessitate the acquisition of more than one copy, *e.g.* works in very high demand, works where both reference and borrowable copies are needed, works required in more than one location within a library or in different libraries (*e.g.* English language dictionaries), and interdisciplinary works of interest to two or more distinct user groups based close to different libraries.
2. Additional copies, usually of reference books, needed for staff purposes on a long-term and continuous basis are occasionally acquired when a need can be shown.
3. Replacements for missing books are ordered as their absence is reported. Such books are often out of print when they are reported missing and a replacement copy may not be available.

### **Modern Second-hand Material, Purchase of Collections**

Purchase decisions are made in accordance with the importance of the individual item, taking into account its price and physical condition. Items purchased include British and Irish books not originally received by legal deposit at the time of publication, material acquired by the University Library but which has subsequently been stolen, damaged or subject to deterioration, and books for which there is a demand from readers or which fill gaps in existing holdings. Second-hand books can often now be located via the internet.

When collections are offered for purchase they are considered on their merits and are normally acquired on the understanding that unwanted material can be discarded. Occasionally the specialist nature of a collection is such that its purchase enhances the holdings significantly, but collections are not purchased unless they contain a substantial proportion of material which is not held and which the University Library would wish to acquire in accordance with its normal criteria.

### **Reference Works in the Main Library**

The aim of the reference collections is to provide comprehensive coverage of academic subjects, access to full information on specific topics or summary information on broader topics and guidance to further sources of information. Encyclopaedias, dictionaries, bibliographies and directories are extensively acquired in most academic subjects to complement legal deposit material. However, in areas covered by the dependent libraries only those reference works which are historical or biographical or which are appropriate to non-specialist readers are acquired.

Items are selected which cover academic subjects not already represented in the reference collections or whose coverage is more comprehensive, more scholarly or more up-to-date than that of reference works currently held.

Items are extensively acquired from overseas on subject matter relating specifically to the country of origin.

The collection policy builds on the particular strengths of the reference collections which include general encyclopaedias in the principal Western languages; language dictionaries, both monolingual and multilingual (of which one, wherever possible, is English), including dialect, slang, etymology, synonyms and antonyms, loan words and subject-specific; biographical encyclopaedias and dictionaries, including registers of alumni; personal bibliographies and subject bibliographies, including subjects not otherwise well represented in the main Library's collections; directories

of individuals, institutions and organisations. By their nature, however, reference works are well suited to electronic, particularly to online, publication.

Entries can easily be added, amended or updated. Consultation is usually brief and can most efficiently be achieved without the necessity of a visit to the main library. The likelihood of several readers wishing simultaneously to consult a title is greater in the case of reference works, a situation which is less problematic with electronic resources. Therefore, assuming reliable access for all readers, electronic versions of reference works are preferable to print. Whenever possible online equivalents are acquired of serial bibliographies and superseded printed volumes discarded, if bought, or removed to closed stacks, if received on legal deposit. Online equivalents of major monographic reference works are selectively acquired, in the case of a few key titles even when the print edition is received on legal deposit, for example the Oxford English Dictionary and the Oxford Dictionary of National Biography. Print editions of such works are generally retained on the shelves of the Reading Room. Occasionally the online equivalent of an older, but still well-used, monographic reference work is acquired and the printed volumes transferred for reasons of security and conservation to the Rare Books Department.

### **Special Collections in the Main Library**

The main library contains many special collections which contribute to the overall richness of its holdings. Some of these collections are kept together (*e.g.* Royal Commonwealth Society, Bible Society, Society for Promoting Christian Knowledge, Rosenthal collection on South Africa), others are specialities which have grown over the years, such as works by and about particular authors, *e.g.* Joyce, Swift and Goethe. The main library acquires material to build on these existing strengths and aims at extensive coverage of these subjects, which are noted individually in Appendix A.

### **Relationship to the Holdings of other Libraries in Cambridge**

The tripartite system of libraries in the university (main library and dependent libraries, faculties and departments, and colleges) provides library users with a range of different libraries with different functions and offering different services. For historical reasons the pattern of provision is multifarious and difficult to describe in a way which is both concise and accurate. The main library and the dependent libraries provide the research collections in most subject areas but do not attempt to duplicate the holdings of those departmental libraries which contain collections of national, even international, importance in their own subject areas. Many



other libraries in the university also hold specialised collections of considerable importance. The University Library takes these into account when purchasing material for its collections.

The main library is usually the appropriate location for material of interdisciplinary importance. Many publications in the areas of interdisciplinary subjects are more appropriately held in the main library than in any individual faculty or departmental library.

The University Library is hospitable to recommendations for purchase from other libraries in the university.

### **Other Materials**

#### ***Periodicals: Legal Deposit***

The University Library is entitled, under the terms of the Legal Deposit Libraries Act 2003, to claim every periodical and newspaper published in the UK or Ireland. In practice considerable selectivity is exercised. All academic journals are claimed, and almost all are received.

Lists of new periodical titles are circulated to the main library by the Agency for the Legal Deposit Libraries on a weekly basis. New titles are added to these lists through a variety of channels. The lists are not comprehensive and some titles do not come to the Agency's attention, especially in the early stages of their existence. All titles are considered when they appear on a list. Decisions are made in conjunction with the other legal deposit libraries, including the British Library, in accordance with agreed policies and procedures which are designed to ensure, as far as possible, that the National Published Archive contains at least one copy of each title, but also to avoid the unnecessary retention of every title in all six libraries. Consideration is given to the collection policies of the dependent libraries.

The criteria used in selecting non-academic periodicals for claim include subject material, level of coverage, intended readership, publisher, place of publication, pagination (*i.e.* size) and format. Most periodicals intended to be read by professionals in their field are claimed, whereas greater selectivity is exercised for periodicals aimed at general readers, specialised enthusiasts or a narrow geographical community. Publications such as newsletters and information bulletins are normally claimed only if they relate to an academic subject or interest group. Periodicals consisting of advertising material or price lists, puzzle or crossword books and in-house journals of commercial companies are not normally claimed. Publications consisting of 2 or 4 pages containing information about the housing market or emanating from financial institutions are usually rejected, although

more substantial publications of this type are claimed. Borderline material is claimed if it is published in the counties of eastern England (from Essex to Nottinghamshire).

University examination papers are collected and retained for Cambridge Tripos papers only; school examination papers were collected from the major examination boards in the 1960s and 1970s, but they are no longer collected extensively.

University prospectuses were taken extensively up to 2006 but from then on only handbooks, undergraduate and postgraduate prospectuses from the Universities of Cambridge and Oxford, Anglia Ruskin University, and London University are acquired and retained. Postgraduate prospectuses from all UK universities offering courses in librarianship are collected and retained.

The Periodicals department no longer acquires all diaries and calendars and only those where there is a strong case for retaining them are collected.

Mass-market leisure journals are the subject of a 1998 agreement between the legal deposit libraries. New titles in this category are allotted to libraries according to subject. New titles in subject areas not allotted to Cambridge can be claimed and the policy is to claim a small representative sample of titles in these areas. For full details of the mass-market leisure journals subject allocations see Appendix C.

Publications of local interest, intended for circulation in a restricted local area are only claimed if they relate to Cambridgeshire. Local publications containing significant articles on local history or archaeology are claimed, irrespective of locality.

Newspapers are claimable in the same way as other periodical publications. Because of the problems of storage and conservation they are claimed very selectively. National daily and Sunday newspapers are received via legal deposit. Local newspapers are not claimed, with the exception of the Evening Standard and newspapers published in Cambridgeshire and its immediate vicinity (*e.g.* Newmarket, Kings Lynn).

**Purchases:** New recommendations are considered individually by senior library staff. All major academic periodicals are assessed and factors such as academic importance, depth of coverage, language, cost and format are taken into account. Scientific, medical and legal titles are referred to the librarians of the appropriate dependent library. Recommendations for new periodicals are referred to the Journals Coordinator and the committees governing coordination schemes. Where a periodical does not fall into a subject area covered by a coordination scheme it will be referred to the appropriate department or faculty library.

Periodicals are purchased in major languages to support research and teaching in the university, and occasionally in less major languages when the content relates to the appropriate language or geographical area. Purchases are normally restricted to academic journals but also include significant titles of general interest or relating to current affairs, such as *Time* and *New Yorker*. Recreational and leisure journals are not purchased.

Indexing and abstracting periodicals are normally acquired in electronic formats, in which they can be more readily consulted. Electronic versions of subject-specific bibliographies are acquired only where general bibliographies do not cover a given subject in sufficient depth. Where unavailable electronically, print versions are acquired if they cover areas of research interest to the university.

Purchases are made to fill gaps in existing sets, including legal deposit sets, and to provide sample issues to consider for subscription. Reprints or second-hand copies of periodical titles are purchased in accordance with the same criteria, if they were not acquired at the time of publication. Occasionally reprints of periodicals are purchased in order to protect the original edition from heavy use, or to fill in an important gap left by a decision not to claim a legal deposit copy.

Subscriptions are taken out to a small number of titles for staff use, such as *Times Literary Supplement* or *Gnomon*, which are used for bibliographic selection. A few titles are also purchased, duplicating the legal deposit copy, *e.g.* *The Times*, *Times Higher Education Supplement*, *New Left Review*, *Past and Present*. *The Financial Times* is purchased on the day of publication and subsequently discarded, and a microfilm is purchased for long-term use. Some other British and Irish newspapers have been taken in the past but are now received only on microfilm or, in some cases, are now not taken at all.

Whenever possible the University Library acquires periodical titles in their original format. Microfilms may be purchased to complete sets or to fill gaps. However newspapers are an exception to this policy: because of the major problems of storage and conservation, microfilms are normally preferred to the paper copy.

### **Official Publications**

The Official Publications department receives UK material from official bodies under the legal deposit arrangement direct from TSO; the Scottish Parliament; the Welsh Assembly; the Irish Stationary Office and indirect via the Agency for Legal Deposit Libraries. Some non-UK material is received under depository arrangements with such bodies as the United Nations and the European Union. Some material is donated by bodies such

as the Council of Europe and the Organisation for Security and Cooperation in Europe, and some governments such as Turkey and Taiwan.

The type of material described in 16.1 to 16.3 is in many cases available online and it is anticipated that a decreasing volume of this material will be issued in printed format in favour of online access.

Published output from Western Europe, the United States, Canada, Australia and New Zealand is also likely to show a change in emphasis away from printed texts to electronic publications. The department therefore expects to reduce print subscriptions to modern Parliamentary records from these countries and rely increasingly on official websites, such as 'Thomas' in the case of the United States.

Archaeological surveys, official histories, major historical documents, legislation and statistics of all types from the countries mentioned in 16.5 will continue to be purchased until it can be demonstrated that their equivalent in electronic format is both functional and viable. Conventional acquisition will be concentrated in three geographical areas: India, Malaysia and the Far East, The West Indies and Anglophile Africa and collecting will concentrate on:

- Parliamentary records and legislation
- Official histories, historical documents and archaeological surveys
- Publications of the national libraries
- Environmental studies and public health
- Statistics of economic indicators, national accounts, population, trade, industry and transport, and social indicators such as labour, health, crime and education.
- Development plans
- Census reports
- Statistical abstracts.

Material (both in print and electronic form) not deposited by the major intergovernmental organisations such as the World Bank/ IMF, the OECD and the WTO is purchased, but the department is keeping this area under constant review, given that government and intergovernmental publishing is rapidly changing.

## **Music**

Printed sheet music published in the UK and Ireland is received by legal deposit. Major publications not received through the normal procedures are claimed or purchased. Monuments of music and collected editions of composers (class M200) are collected comprehensively.

### **Printed Music**

Printed music by major international composers (classes M205-M400) is collected extensively, and by less well-known composers selectively, often on the recommendation of members of the Music Faculty.

The collections of popular printed sheet music acquired by legal deposit are occasionally supplemented by the purchase of foreign publications, for example of published transcriptions of jazz/popular recordings, or of collections of songs by non-British popular singer-composers, of whom the main library has acquired biographies or collections of verse.

New editions of old printed sheet music (*i.e.* from 19th century and earlier) are purchased if the original is lacking, if the new edition is a significant improvement, or if the original copy is in a non-borrowable class or condition.

Folk music from all parts of the world and non-European art music are purchased, especially from China and Japan, to complement the Picken collection.

Antiquarian and second-hand sheet music is acquired if it is not held in any library within the university (*e.g.* Pendlebury Library, Fitzwilliam Museum Library, King's College Rowe Music Library). This is purchased to fill in gaps in the legal deposit receipts, to complement existing special collections (*e.g.* Marion Scott collection of Haydn editions, F.T. Arnold collection of figured bass music) or to build up a representative collection of examples of the major developments in the history of music printing (to complement the H.E. Poole archive on early music printing).

**Books on music (classes M410-M850):** The collection builds on and extends an extensive English-language coverage of books of music (classes M410-M850) on all topics treated in an academic or serious manner and purchases material to supplement the legal deposit intake in order to achieve this. This includes most books given a review in a select number of musicological or music library journals.

The major European languages and Russian are well represented. Coverage in other languages is more selective, usually restricted to topics specific to the countries of those languages.

Music manuscripts are acquired to complement existing collections (which are strong in 17th century lute tablatures and 18th- and 19th-century scores) and to expand the holdings of 20th century music, particularly of non-published forms of music (*e.g.* film music).

Sound recordings (classes Rec/CD/CT) in the forms of discs, cassettes or CDs are acquired only by legal deposit or donation, or as supplements to purchased printed materials.

Microforms of individual publications or manuscripts are acquired by the Pendlebury Library for specific research requirements. Larger microform collections are acquired generally only of non-British collections, e.g. the Haydn printed music in the Hoboken collection in Vienna, the catalogue of the music collections of the Bibliotheque Nationale or the Bute collection of Italian opera libretti in Los Angeles.

## Maps

The Map department contains the greatest concentration of maps and atlases within the university. Some maps are also in other parts of the main library, and in College libraries. These are taken into consideration in the acquisition policy of the department.

**Legal Deposit:** Particular care is taken to ensure that official topographic and thematic mapping, and locally produced maps and atlases are acquired via legal deposit. Items considered to be of lasting academic importance may be purchased if they are not received via legal deposit.

**Purchase of Modern Maps and Atlases:** The majority of the maps acquired belong to map series. Since the maps of a series are rarely published simultaneously, a standing order often needs to be placed with a supplier for every new sheet published. Whether every new edition of a sheet is acquired will depend on the anticipated demand for that series, but an interval between editions greater than 20 years is considered to be unacceptable.

Countries vary enormously in the extent to which they are mapped by official and commercial bodies. Priority is generally given to the purchase of topographic mapping produced by official mapping agencies. Where commercial mapping is acquired, this tends to be in the form of town plans and road maps or atlases.

Up-to-date maps of the whole world are acquired at a minimum scale of 1:250,000. For areas where there is a known or anticipated demand for larger scale maps these are also acquired. Generally speaking these areas would be European countries and those areas further afield which feature in the teaching and research activities of the university. Except for town plans, maps at a scale larger than 1:25,000 are rarely purchased.

The Map department attempts to acquire all available national atlases. These are usually produced by government bodies in the country concerned and, apart from general topographic coverage, provide a ready source of thematic mapping often unavailable in other forms.

The Map department does not seek to maintain comprehensive coverage of foreign thematic series such as geological or soil maps because of the



massive expense that would be involved. Such mapping may, however, be acquired at a regional or continental level for basic research purposes. The specialist map holdings of, for example, the Department of Earth Sciences and the Scott Polar Research Institute are taken into consideration.

***Purchase of Antiquarian Maps and Atlases:*** Antiquarian purchases are assessed on their individual merits. Gaps in the collection are filled as funds allow. The Map department does not attempt to acquire every single version of a map, since often the differences are very small. The aim, instead, is to acquire examples of mapping from a variety of periods. The Map department purchases a limited number of topographic views, particularly of the local area.

When selecting manuscript maps for purchase the Map department concentrates primarily on the local region-notably the counties of Cambridgeshire, Norfolk, Suffolk, Essex, Hertfordshire, Bedfordshire, Northamptonshire and Lincolnshire. Again, existing holdings are considered carefully before purchasing. The holdings of the County Record Office are also taken into account.

Facsimiles of important antiquarian items, which would otherwise be unavailable to users, are purchased where possible. Facsimiles may also be acquired where it is desirable to save wear and tear on an original or where significant scholarly analysis is included.

***Purchase of Books:*** The Map department recommends for purchase certain categories of books. These include basic reference tools such as gazetteers and catalogues of other important map collections, as well as scholarly works on general, regional and historical cartography and carto bibliographies.

***Language:*** The visual nature of maps means that the language of publication is not always a primary consideration. The language used on most mapping is that of the producing country, but in circumstances where an English or western European language alternative is available this might be chosen in preference.

The language used for books is more significant. Research into the history of cartography is particularly strong in the Netherlands, Spain (especially Catalonia), France and, to a lesser extent, Germany and Italy. Books published in these countries, in their native languages, on some aspect of cartography in that country, would normally be purchased. For books in other languages, particularly in non-Roman scripts, consideration is given to the subject of the work, its international significance, the existence of other works on the subject and, to some extent, the nature of the work-particularly the number of illustrations.

**Donations:** A major source of donated maps, atlases and gazetteers is the Ministry of Defence Map library, which disposes of unwanted material to a number of other institutions according to a list of preferences. Once received by the Map department such items are checked against existing holdings, and material not required is passed to other libraries. The Map department's stated preferences are reviewed from time to time.

The Map department has an extensive collection of postcard views, most of which have been acquired through donation.

**Non-printed Materials:** The Map department acquires large scale mapping of UK material in digital format.

## **Oriental and Other Languages**

### **Chinese**

The Chinese collection is intended to facilitate research in all aspects of Chinese culture. The scope of accessions embraces all periods from prehistory to the present day. Collection policy continues to focus on traditional Chinese culture, but has evolved in accordance with recent developments in teaching and research in the university to place more emphasis on areas such as modern Chinese law, politics and economics, modern Chinese literature and film studies.

Materials collected originate in the territory of the People's Republic of China, Hong Kong and Taiwan and are predominantly in the Chinese (Han) language, with the addition of a few materials written in the languages of ethnic minorities in China. The main library aims at extensive coverage of works of permanent research value in the subject areas covered by class FB.

Translations from western languages into Chinese are not generally collected, nor are works in Chinese on modern science. Special importance is attached to obtaining the latest bibliographies and reference works and to maintaining complete runs of the most significant collectanea or reprint series, which contain rare works not available elsewhere.

Because of the importance of Japanese sinology a considerable quantity of Japanese materials relating to China is added to the Chinese collection.

Policy is co-ordinated with the Needham Research Institute (East Asian History of Science Library), especially in the areas of traditional Chinese medicine, the history of Chinese science and archaeology.

### **Japanese and Korean**

The Japanese collection policy gives priority to primary research materials, reference books, bibliographies, statistics, collections of data

and source materials. The main library has strong historic collections in traditional Japanese studies and purchases books in the humanities to maintain and build on these collections, especially in the areas of classical and modern literature, history, religion (Buddhism, Shinto etc.) and bibliography.

Collections in the social sciences have been developed more recently and there is a greater emphasis on primary research materials. Purchases are made in the areas of modern history, economics, politics, sociology and management. Books are not acquired in the areas of science and technology, except in the history of science.

Japanese books on sinology are acquired and are added to the Chinese collection. Periodicals are acquired extensively across the whole area of the humanities and social sciences. Over 400 current titles are received by purchase, exchange or donation.

Korean books and periodicals are not purchased but donations are accepted in accordance with the overall policy.

### ***Near Eastern Languages***

The 'Near East' is widely defined and, in this context, extends from Morocco to Mongolia and from Ethiopia to Kazakhstan. The languages covered include Arabic, Hebrew, Persian, Turkish, the range of Iranian and Turkic languages across central Asia, the languages of the Caucasus (principally Georgian and Armenian), Coptic, Amharic, Aramaic, Syriac and the languages of the ancient Near East, as well as Yiddish, Mongolian and Urdu.

### ***Arabic***

The main focus of research and teaching is on the classical heritage of Arabic literature in its widest sense, on the turath (the traditional religious, historical and literary heritage), together with the classical and modern language, linguistics, and representative modern literature. The main library aims to acquire material extensively in these areas, but much more selectively in other subject areas.

### ***Hebrew and Yiddish***

The main library acquires material in the area of Biblical studies, Hebrew and Semitic linguistics, other languages of Jewish communities, post-Biblical Judaica, Hebrew literature (including Rabbinic literature and modern Hebrew literature) and academic works published in Israel on near eastern subjects and on Jewish history. A small amount of material in Yiddish is acquired on the same basis as other languages which are not taught in the university.

**Persian**

The main library acquires material in the areas of classical literature, representative modern literature, the Iranian and Persian language in all periods, Iranian and classical Islamic history and culture, Islam, and Qajar and modern Iran.

**Turkish**

The main library acquires material in the areas of Ottoman and Islamic history, with some modern history, classical literature, including works on Islam, language and representative modern literature.

**Central Asian Languages**

The main library acquires basic works on the Turkic and Iranian languages of the area and a small amount of material directly relevant to the Islamic history and Arabic, Persian and Turkic literatures of the area. A few works of modern literature are acquired, especially when these are closely connected to the literature of other Islamic countries (*e.g.* Tajik and Azeri).

**Languages of the Caucasus (Primarily Georgian and Armenian)**

The main library acquires editions of, and the principal works closely concerned with, the Christian oriental texts and the most important works of classical literature. Material is also acquired in the area of Byzantine studies, linguistics, bibliography, manuscripts and Iranian epic and folklore.

**Aramaic, Syriac and Other Semitic Languages, Languages of the Ancient Near East**

The main library acquires research materials relating to these languages and literatures and to their archaeological, historical, religious and cultural background. While most of this material is published in western languages some is published entirely in the relevant script.

**Mongolian**

The main library occasionally acquires material to support the research of the Mongolian Studies Unit, but this is on a very small scale.

**Urdu and other South Asian Arabic Script Languages**

The main library acquires a small amount of material in Urdu and other Arabic script languages of south Asia. (Responsibility is shared with the Indian section but, because of the script, accessions are handled by the Near Eastern section.)

The main library has extensive collections of Hebrew, Arabic, Persian and Turkish manuscripts, as well as the Taylor-Schechter Genizah

Collection. Printed materials relevant to these manuscript holdings are acquired.

### **South Asian and Related Languages**

The main library aims to acquire materials published in the languages of south and south east Asia. Areas covered include the languages and literatures taught in the Faculty of Oriental Studies, archaeology, anthropology, linguistics and history. The collections also support the research and teaching of the Faculty of Divinity, covering Buddhism and Hinduism. The Dharam Hinduja Institute of Indic Research specializes in Vedic studies. Material on the Four Vedas is an important part of the collections.

The languages and literatures covered are, in order of importance, Sanskrit, various Prakrits (Pali, Apabhramsa etc.), Tibetan, Hindi, Bengali, Punjabi, Gujarati and Malayalam. Other languages and literatures of south and south east Asia are collected to a lesser degree.

Dictionaries, grammars and bibliographies form an important part of the collections. Subject areas such as the modern politics and sociology of the region, and other social science areas, are normally covered by the Centre for South Asian Studies and purchases are made in only the most exceptional circumstances.

### **Other Languages**

Materials in the languages of Asia and Africa (other than those covered in 19-22) and in the indigenous languages of America and Oceania are not normally purchased. One notable exception to this general principle relates to linguistics. Donations may occasionally be accepted in exceptional circumstances.

Material may be acquired by either purchase or donation in exceptional circumstances, if the item is of particular bibliographical significance or if its content relates specifically to an area of special strength in the main Library's holdings. The inclusion of a summary in English, or another western language, may be taken into account.

### **Information in Organisations: Directions for Information Management**

Information management is practised in organisations. Yet information is used by individuals in those organisations. The counterpoint between the organisation and its individual members has particular relevance to information management because of its responsibilities to both the organisation at one level and to individuals at another level. This

counterpoint means that we need to consider both the organisation and its members in information terms as a starting point for developing strategies for effective information management in small and medium sized enterprises (SMEs). The purpose of the paper is to develop some general guidelines for effective information management. There are three major topics:

- information and organisations
- information and managers
- information management in SMEs.

SMEs, according to the standard EU definition, employ no more than 249 people, have less than 40 million ECU turnover and no more than 25 percent ownership or control by one or more enterprises which are not SMEs.

### **Information and Organisations**

This discussion of organisations and information has two parts to it. The first provides an overview of organisations by examining a number of images used to describe them and then drawing some implications for information management. The second outlines a hierarchy of definitions of information which are appropriate for organisations and draws further implications for information management. The discussion concludes with a set of propositions about information management.

#### **Images of Organisations**

Machines, organisms, political systems and cultures (Morgan, 1986): these are familiar and conventional images of organisations. To these can be added a fifth image which has emerged in the past decade or so: learner (Senge, 1990). Each image represents a perspective on the nature of organisations. For example the machine image suggests that information is one of the resources that keeps the wheels ticking over and the task of information management is to ensure that information is delivered where and when it is needed through clearly defined and understood communication channels.

The organism image implies that information from internal and external sources is required to keep the organisation in a state of equilibrium. Information management has a critical role in drawing in information about trends and developments in the external environment so that the organisation can respond to changes triggered by social, economic, technological and legislative forces.

The image of the political system recognises quite properly that because different groups in organisations have different interests they will need



and use information differently in the exercise of power and influence, in the seeking of support and negotiating conflict. The image is a reminder of the political and social context of information management and draws attention to the ethics of information management practice. The image of the organisation as culture is particularly powerful with its suggestions of shared beliefs, values, norms and meaning and its emphasis on ritual, myth, language and symbol. It suggests that the use of information in an organisation will have cultural aspects to it, in contrast to the assumption that the use of information is essentially a rational human activity. Information management has a clear role in making meaning and will embody through its practice, the beliefs and values of the organisations.

The image of the organisation as learner suggests a community which regenerates itself through the creation of knowledge, the outcome of learning. Information management needs to ensure that the organisation has the information and information capabilities necessary to continuously adapt to its changing internal and external environments. It does this by adopting a forward-looking approach and by adapting itself to the ambiguity and uncertainties found in these environments. We need to remind ourselves that the image of the organisation as a learner is an emerging one which is still posing questions to some organisation theorists (Spender, 1996; Grant, 1996).

Although none of these five images is by itself an adequate representation, together they highlight the complexity of organisations and the processes which sustain them. It is this complexity which is part of the context of information management in organisations and informs information management practice.

What are some implications for information management that emerge from these images of organisations?

1. Information management has the potential to contribute to the achievements of organisations
2. Information management has different purposes in different organisations. These purposes will be influenced by the organisation's goals as well as by its culture and its stance on information.
3. Information management is practised in a political, social and cultural context which shapes both what information management does and how it does it.
4. Information management practice is value laden and so it has an ethical dimension. The ethics of information management practice are most often implicit.

5. Organisational learning concepts and theory are applicable to information management in some organisations. Not all organisations are ready for this development, nor is it an appropriate direction for all organisations.

### **Some Definitions of Information**

Organisations are increasingly aware of the potential of information in providing competitive advantage and sustaining their success (Porter, 1985) as evidenced in a number of published case studies (Owens, *et al.*, 1996; Grimshaw, 1995) and commentaries (Broadbent, 1977).

The descriptions of information as an asset and a resource (Burk & Horton, 1988; Best, 1996) are no longer unusual. However, the origin of these descriptions in classical economics ignores the place of information in the fabric of a political system or culture of an organisation. If information is to provide competitive advantage then its full potential needs to be considered.

A very useful hierarchy of definitions of information (Braman, 1989) has been developed in the area of information policy studies.

The hierarchy is applicable to organisations for a number of reasons; firstly, it recognises the qualitative differences among definitions of information; secondly, its macro view is more appropriate to organisations than definitions based only on the individual as an information user; thirdly, it provides a range of definitions which are useful in different situations; and fourthly, it foreshadows the need for information policy in organisations.

The hierarchy consists of four levels, each based on a category of definitions drawn from many different fields.

1. Information as a resource. "Information, its creators, processors and users are viewed as discrete and isolated entities. Information comes in pieces unrelated to bodies of knowledge or information flows into which it might be organised" (Braman, 1989: 236).
2. Information as a commodity. Complementary to definitions of information as a commodity is the concept of an information production chain through which information gains in economic value. The notion of information as a commodity incorporates "the exchange of information among people and related activities as well as its use" (Braman, 1989: 238) and implies buyers, sellers and a market. In contrast to the absence of power of information as a resource, information as a commodity has economic power.
3. Information as perception of pattern. Here the concept of information is broadened by the addition of context. Information "has a past

and a future, is affected by motive and other environmental and casual factors, and itself has effects” (Braman, 1989: 238). The concept of information and its processes is broadened so much so that information in this sense can be applied to a highly articulated social structure. Information has a power of its own although its effects are isolated. The example given is of information reducing uncertainty but only in regard to a single specific question.

4. Information as a constitutive force in society. Information has a role in shaping context. “Information is not just affected by its environment, but is itself an actor affecting other elements in the environment” (Braman, 1989:239). The definitions in this category “apply to the entire range of phenomena and processes in which information is involved, can be applied to a social structure of any degree of articulation and complexity, and grant information, its flow and use an enormous power in constructing our social (and ultimately physical) reality” (Braman, 1989: 214].

The hierarchy of definitions of information presents a broadly based view of information and one which reflects the images of organisations which have been discussed.

The traditional view of information management has focussed very much on information as a resource and as a commodity and on information management as providing a service to the organisation. That service has taken the form of providing access to information in a range of sources including on-line commercial databases, archival collections, websites and in-house databases.

The definition of information as perception of pattern extends information management into a place in achieving the goals of an organisation. It is as a constitutive force though that information is most potent as a basis for future action and innovation. Information management shifts from service provision to strategy formation.

What implications can be drawn for information management in organisations from this hierarchy of definitions of information?

1. Information management needs to encompass the full range of information from a resource to a force for change and development.
2. Information can be integrated into organisational processes and so it can influence organisational culture, structure and work patterns.
3. Information management can properly address information products, information services, information flow and information use in an organisation.

4. Useful measures of the effectiveness of information management can be based on the impact of information on the organisation.

Our consideration of organisations and information has provided some implications for information management. They elaborate the scope of information management in organisations and provide a context for information management. The implications have been drawn together in a number of propositions presented.

Proposition 1: Information and its management contributes to the achievement of organisational goals.

Proposition 2: information management is contextualised by the organisation/td.

Proposition 3: To be as effective as possible information management assumes a broad view of information.

Proposition 4: Information can be value laden so too can be information management practice.



## Research Methods in the Libraries

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### Introduction

In academic medicine and health sciences grant writing is a skill that is often self taught or acquired informally by trial and error. Nevertheless, it is a critical skill for graduate students, post-doctoral students, academic fellows, and new tenure-track faculty. Along with publishing and the ability to create and define a research project, obtaining external funding is a key element in a successful career in medical research (Inouye and Fiellin 2005). In fact, writing can have an economic impact on a career in academic medicine and the health sciences. Successful grantsmanship leads to research, research leads to an increase in publications, which in turn leads to an increase in earnings (Freeman, Weinstein, et al., 2001).

In some cases, an academic department or college is fortunate enough to have a full-time grant writer on staff who might be available to provide instruction or guidance, but the primary responsibility of these individuals is generally to help senior faculty and administrators write and obtain grants. The grant writer, therefore, often has neither the time nor the willingness to teach these skills to others. When a new fellow in Cardiology was asked whether there was instruction in grant writing, his response was, "We need to learn on our own." Asked the same question, a new assistant professor of Internal Medicine replied, "It's just something you're expected to pick up if you want to stay around here." Interestingly, a review of the medical education literature suggests that surveys of new physicians in fellowship programmes show grant writing to be one area in administrative skills in which new physicians have asked for increased training (Medina-Walpole, Barker, et al. 2004). Success in academic publishing is also tied to formal training in grant writing: A 2005 study stated that 54% of first-time authors in academic medicine had received formal instruction in grant writing (Reed, Kern, et al. 2005).

Grant writing in Medicine and the Health Sciences remains a competitive venture. Each year, some 60,000 grant applications are received by the National Institutes of Health, but only one third are funded (Coelho 2006). In a trend that many in the sciences find disturbing, it was reported in 1994 that NIH grants awarded to young investigators (those under the age of 37) had decreased by 50% during the preceding eight years (Marshall 1994). In 2001, NIH awarded 6,635 "competing grants"; of these, only 251 went to researchers under the age of 35 (Goldman & Marshall 2002). A number of reasons have been offered for this, but the fact remains that for younger tenure-track faculty, these numbers make the grant process even more daunting.

As resources in all areas of academia become more finite, the need for faculty to obtain support from outside entities increases. That creates an increased demand for grant-related knowledge and services at the reference desk as well as new demands in instruction for grant writing and grant research.

### **Grant Instruction in the University of Utah Libraries**

In the fall of 2001, librarians at the J. Willard Marriott Library and Spencer S. Eccles Health Sciences Library at the University of Utah had a series of instruction-related "sharing classes." Librarians from the health sciences library taught at the Marriott Library, and vice versa. One area where a strong need was anticipated was grant writing and research for faculty in Medicine and the Health Sciences.

The training and background of the librarian who would teach these courses was a central concern. There had been no formal education in this area for anyone at either library; however, there were numerous opportunities to learn to teach the basics of grant writing to varied audiences. The workshops at the Foundation Centre, for example, were highly recommended and reasonably priced. Initial support for continuing education in this area was provided by the Assistant Director for Public Services at the Marriott Library for a librarian to attend continuing education courses at the Foundation Centre branch library in Cleveland, Ohio.

In the spring of 2002, the first courses in grant research were offered at the Eccles Health Sciences Library. Two one-hour sections were offered at the beginning of the semester. The average attendance for these new offerings was six students per class, but the feedback from the attendees at the classes was overwhelmingly positive. Patrons who took these courses began requesting more instruction in grant research and grant writing. At the same time, the new Head of the Technology Assistance Curriculum Centre (TACC) was very enthusiastic about offering an introductory course



in grant writing and grant research as part of TACC's services. TACC is housed in the Marriott Library and its purpose is to help University of Utah faculty members integrate technology into their teaching. It offers a series of short courses each semester in applied technology for improving teaching. "Grant Writing and Research" is now among the short courses offered to faculty. Additional funding was provided by TACC for continuing education for the same librarian through the Foundation Centre.

### **Expansion of Instruction**

Courses were expanded in the fall of 2002. The new two-hour short course included an overview and introduction to grant and proposal writing, a summary of the roles of the Office of Development and the Office of Sponsored Research at the University of Utah, and instruction in using databases relevant to grants research. Informal observation indicates that individuals with a clinical background seem most interested in learning to use the grant databases. Graduate students and individuals from non-clinical backgrounds seem most interested in how to write a grant and the thought process that goes into writing one.

Currently, two sections, with an average attendance of eleven, are offered each semester at the Eccles Health Sciences Library. Maximum enrolment is fourteen, to ensure individualized instruction. The courses are tailored for the Health Sciences. Those taking the courses have included departmental coordinators, study coordinators, medical editors, new tenure-track faculty in the health sciences, and doctoral candidates from the College of Science, College of Health, the College of Nursing, the School of Medicine, and the Huntsman Cancer Institute.

Faculty in the departments of Foods and Nutrition and Biochemistry now regularly refer their graduate students to the courses. The Department of Political Science and Public Administration has a librarian teach a section on grants research as an integrated library instruction component in a graduate course in non-profit management. Interestingly, doctoral candidates from several departments within the College of Science and the College of Social Sciences have stated that they were expected to write mock grant proposals for their research as part of comprehensive exams for the doctorate, but that there was little or no formal instruction in grant writing in their graduate programme. The short courses were the only formal instruction they received. In addition, customized presentations have been made to several academic departments on campus to reflect grant opportunities in their disciplines.

The same librarian instructor offers courses to other areas of the university, via the TACC. These courses tend to have lower faculty enrolment, about four on average. Departments on campus that are always

seeking outside funding (arts and humanities) have not taken particular advantage of this instruction. The courses are being publicized to those departments in the hope of attracting more interest. In undergraduate instruction, grant writing and research have been included for fine arts students in the university's LEAP programme, concentrating on community grants for the arts. LEAP stands for Learning Engagement Achievement Progress and is defined by the university as "a year-long learning community for entering University students. It consists of two three-credit-hour courses... taken with the same professor and classmates, allowing students to build community. LEAP's two classes fulfil the diversity requirement and two general education requirements and are linked to optional classes in writing, library research, major selection, and service." It is an excellent audience for an introduction to the library's resources and services.

### **Community Interest and Participation**

Individuals affiliated with pharmaceutical and biotechnology firms with ties to the University of Utah have also attended the library's short course on grants. Unexpectedly, professionals in the community's non-profit arena have discovered these courses, although there was no advertising to promote them outside the university. Among those who have attended are social workers, public health professionals, and development officers from such organizations as the Department of Health of the State of Utah, US Public Health Service, the United Way, the ARC of Utah, Catholic Social Services, and the LDS Church Foundation. When people from outside the university were asked how they learned about these classes, the answer was always the same. The classes were found through the Eccles Health Sciences Library web pages in a Google search for grant writing classes at the University of Utah.

Well-attended presentations on grant writing and research have also been given to several professional organizations, including the Utah State Library Association, the New Mexico Library Association, the Mountain Plains Library Association, the Utah Museums Association, and the Western Association of Social Scientists. A modest investment in grants education for a public services librarian has resulted in a value-added service offered at two libraries on the campus of the University of Utah. This has led to an unexpected avenue of outreach and an increase in instruction for both libraries through offering additional classes and promoting the collections and services of the libraries.

### **Research Authority: Equilibrium Sought**

Once upon a time not so long ago in college libraries, there was a settled pattern of relationships in the research process. Instructors sent students to find information in books and journals, and librarians helped

them do it. One key basis of these relationships was authority: that is, the search for reliable sources. Behind this search, however, lurked a hidden struggle over who determined reliability and who provided access.

Before the digital age, information derived its authority from author credentials and the reputation of a limited number of publishers. The authority of instructors to accept or reject content as valuable rested on their academic credentials and content knowledge. Furthermore, instructors provided the context for information seeking, since they authorized students' research in the first place. At the same time, the authority of librarians to select and provide access to published information was based on their credentials and their access to bibliographic tools.

Students, however, had little authority when it came to information seeking and relied on instructors for content knowledge and on librarians to teach them how to find and evaluate information. Nevertheless, while students began their college careers with little authority to evaluate or access information, they gained it as part of the initiation into research that college provided.

This state of affairs (simplified for purposes of argument) held true through the development of online catalogs and electronic databases, up to the introduction of the World Wide Web in the mid-1990s. The web, Web 1.0 as it might be called in retrospect, caused a major shift in the relationship of students, instructors, and librarians to information. This shift was due to three fundamental changes to authority in the research relationship in terms of web publication, access to content and technical know-how.

First, the authoritativeness of available information now fell along a much broader continuum because suddenly information consumers could easily produce and publish information without undergoing the editorial process of traditional print information or bumping up against its traditional barriers, notably money and access. Thus for librarians and instructors invested in the traditional scholarly publication cycle, the web represented a significant break with tradition.

For students, on the other hand, the authenticity and validity of information that was implicit in books and journals transferred over to web-based information sources, perhaps due to what Marilyn Lutzker (248) has called the "magical" quality of the computer and "its power of instant retrieval." Second, because traditional authorizing or gate-keeping mechanisms such as publishers who select what to publish, librarians who select published material for libraries and bibliographic tools that point to published materials could suddenly be bypassed, students gained easy and direct access to a great deal of content. In effect, students could evade the traditional mechanism of authority to find information. Third, students themselves gained newfound authority as savvy, experienced users of

technology, and the web in particular. Thanks to hours spent online chatting with friends, surfing websites, shopping, and more, students' technological confidence and comfort level far outstripped that of many of their instructors and librarians. Of course, time online did not necessarily equal experience in academic research and a struggle over control of authority played out in the library.

To the chagrin of librarians and instructors alike, students often perceived any results as search success. Student tendency to value convenience over quality in resources exacerbated the problem of students seeing search engine rankings of results as authoritative, even though the sometimes meaningless ranking of results in early search engines led students to pages of dubious scholarly, or even informational, value. To make matters worse, cut-and-paste plagiarism of online sources proliferated. Student use of the web was thus seen as a threat to research quality and also to the status quo of information authority. Instructors responded with prohibitions on the use of web resources in student work. Academic librarians responded with efforts to improve web use: they produced lists of useful and scholarly websites so students could bypass search engines and their problematic results and placed a strong, new emphasis on web evaluation criteria in bibliographic instruction. Librarians worked to bridge the student/instructor divide: they kept up with online tools and resources better as a whole than the instructors, and they continued their efforts to keep students aware of scholarly issues raised by web research. Librarians strived to maintain their gate-keeping role while recognizing that both the students at the gates and the information beyond the gates were very changed.

The Google search engine introduced in 1998 proved a second critical turning point for online research. This new search engine was a quick and effective way to locate relevant and often authoritative information from reliable sources. There was no turning back from Google's highly effective relevance-ranking of results.

Google marked a new era of constantly improving and innovative web search tools. Its new search engine contained within its PageRank algorithm the first inklings of the second wave of the internet revolution: that is, authority based on popularity. PageRank is a link-analysis algorithm that uses links to a page to determine its relative rank in results lists. Importantly, the "popularity" of a page is based on not only how many links, or votes as Google calls them, there are to a page, but also on how popular those linking pages are in turn ("Google Technology"). In effect, Google's new search engine looked at links in web pages (*i.e.* popularity as measured by links) as authority, or at least influence, for ranking. Google's new authority by popularity in ranking differed from traditional information

retrieval: off the web, the traditional publication process itself provides a chain of authority from author to publisher to library to researcher. On the web, Google's new PageRank method introduced authority based *onconsumer input*: the age of Google had begun.

Revolutionary at the time, consumer-based authority on the web is now widespread, particularly in social media such as social bookmarking at delicious, movie suggestions from Netflix, product reviews at consumer websites such as Amazon.com, and opinion and discussion on blogs. The new interactivity and openness of the web is a major characteristic of the age of Google and is also known popularly as Web 2.0, "a second generation of the World Wide Web that is focused on the ability for people to collaborate and share information online" ("Web 2.0"). The pervasiveness of the user input phenomenon is evident in Time Magazine's person of the year 2006: "you," the Internet user. "The new Web," the author writes, is "a tool for bringing together the small contributions of millions of people and making them matter" (Grossman).

Importantly, this new consumer-based information exists at the same time as traditional information publication, but has introduced a new kind of authority and has changed user expectations and by extension has begun to influence even traditional access tools. In the current web environment, a new equilibrium in the authority in research is being sought (if not actually achieved) in college libraries. In the new balance of power, academic professionals have regained their authority as knowledgeable, sophisticated information seekers with much to teach college students about finding and understanding information. While anyone can do a web search, academic content experts can quickly identify a potential high quality source on a results list based on their prior knowledge, for example they might quickly parse a Google Scholar search and recognize the types of records returned based on format and content details such as publisher name, as well as recognize other scholars' names and relevant key terms in titles. They can also more quickly understand and use the new source whether it's a document or a tool. The kind of content knowledge and experience that underlie this academic information literacy give librarians and instructors authority as information searchers.

Librarians and instructors also use the new age-of-Google tools to deliver better and more relevant access to authoritative information and to give students the skills to locate and evaluate, then process and apply information. Librarians in particular are taking the lead in making use of the new tools: instant massaging tools for virtual reference, wikis for subject research guides, blogs for news and commentary, and RSS feeds for sharing news and even search results, to name a few. While use of web tools is not in and of itself authority, librarians are harnessing these tools



to deliver authoritative information in the medium students know best. In the new equilibrium librarians are experts in age-of-Google tools as well as in disciplinary content and modes of scholarly communication. Increased information literacy on the part of librarians lends them authority in presenting resources and in teaching information literacy to students.

The students' brief moment as online experts has ended. While students are *still* online all the time, they are still primarily socializing on the web. They require librarians and instructors, however, to help them discover the potential of the hidden, and now perhaps not-so-hidden, web of scholarly databases and the free web. Though studies have shown that students view themselves as successful online researchers (OCLC 3), they can get into deep swamps of information out on the web because they do not (yet) have the searching savvy or subject expertise to evaluate the reliability of the information they come upon. To become authoritative researchers, students need to learn information literacy skills, in particular evaluation, and learn disciplinary content and models of scholarly communication.

Despite much wailing and gnashing of teeth by librarians concerned about "real" research (and their not-so-hidden agenda: job security), traditional authority in the research process remains in force, though coexisting with new forms of authority. In academic circles, information from a book or journal published by an academic press is still considered more authoritative than that published on websites. At the same time, web-based access points, *i.e.* the gate keeping mechanisms, have become infinitely more sophisticated and useful. Services such as Google Scholar, Google Book Search and Worldcat.org not only provide remarkably broad access to published materials through their regular services and "linking" programmes, they point researchers back to published journal articles and books and thus reaffirm the continuing authority of officially published works. Furthermore, as a number of authors (Noruzi 170; Pomerantz 54) have shown, Google Scholar is emerging as an important tool for determining academic authority through its function as a citation index. Thus the free age-of-Google tools are being used to support traditional authority.

Nevertheless, thanks to the web, libraries and their bibliographic tools no longer provide the primary point of access to authoritative information. Age-of-Google tools combine powerful search technology with ease of use: anyone can access them, and anyone can use them with some degree of success. In fact, some of the tools on the web are superior to subscription resources: for example, for sheer user-friendliness there is no comparison between Google Scholar and Scirus on the one hand and ISI's Web of Knowledge on the other-the free web-based searches win hands down. At the same time, as Noruzi (173-5) has shown, many library-based information access tools such as ISI, the MLA Bibliography and Lexis-



Nexis still offer much more precision and coverage in searching. Libraries must take seriously the challenge free web-based tools make and demand improved bibliographic tools and with straightforward, useable search interfaces to meet researcher needs and expectations. Librarians' role as gatekeepers to information, whatever its authority, is more vital than ever-as information literacy experts they know better than most researchers what the range of tools is, how to use them and when to use or abandon them in the context of a search.

Though the academic value of user-authenticated information-for example in Wikipedia articles or Amazon.com and Internet Movie Database reviews-is still a topic of some debate on college campuses and library lists, there is a growing acceptance of these resources. Google Scholar promises much with its ease-of-use and linking features, not to mention its connection to the popular Google Web search. Wikipedia-the much-discussed, user-created online encyclopedia-is now regularly consulted by researchers of all categories as a starting point or background for research. Librarians have begun to teach these tools too, as can be seen in two recent discussions of Wikipedia on Association of College and Research Libraries' information literacy and instruction discussion list (ILI-L).

The flurry of emails revealed that while some vehemently oppose the use of Wikipedia and actively warn researchers off it entirely, most librarians who responded felt that Wikipedia has a place in library instruction, not the least because researchers, students in particular, are *\*already\** using Wikipedia and that librarians must respond to that. For example, one respondent commented that, "Banning a source like Wikipedia (rather than teaching how to use it wisely) simply tells students that the academic world is divorced from real-world practices" (Badke). Active discussion and debate like this helps librarians stay abreast of current issues and contribute to the negotiation of authority in research.

Academic librarians in particular serve as the counterweight in the new research equilibrium. Librarians continue to do what they have long done, that is, provide a meaningful context for research and provide a kind of nuanced, empathetic, thoughtful help no online search tool can provide. Furthermore, with the many authoritative tools at their disposal, including those of the age of Google, they work toward a shared mission: to lead all researchers, especially students, to relevant, reliable information they can understand and use. Librarians can help all researchers to decode and evaluate information found, and to understand the power and limits of databases free and hidden.

Much more than just a warehouse of print materials or a portal to online ones, the library is "a social dynamic institution of communication and knowledge dissemination" (Keresztesi 1982, 2). At its best, the academic

library can be a kind of contact zone where both students adept in web searching and faculty adept in content knowledge learn to harness the power of age-of-Google and library tools and the information they access.

### **Work Motivation, Job Satisfaction, and Organisational Commitment**

The management of people at work is an integral part of the management process. To understand the critical importance of people in the organization is to recognize that the human element and the organization are synonymous. A well-managed organization usually sees an average worker as the root source of quality and productivity gains. Such organizations do not look to capital investment, but to employees, as the fundamental source of improvement. An organization is effective to the degree to which it achieves its goals. An effective organization will make sure that there is a spirit of cooperation and sense of commitment and satisfaction within the sphere of its influence. In order to make employees satisfied and committed to their jobs in academic and research libraries, there is need for strong and effective motivation at the various levels, departments, and sections of the library.

Motivation is a basic psychological process. A recent data-based comprehensive analysis concluded that competitiveness problems appear to be largely motivational in nature (Mine, Ebrahimi, and Wachtel, 1995). Along with perception, personality, attitudes, and learning, motivation is a very important element of behaviour. Nevertheless, motivation is not the only explanation of behaviour. It interacts with and acts in conjunction with other cognitive processes. Motivating is the management process of influencing behaviour based on the knowledge of what make people tick (Luthans, 1998). Motivation and motivating both deal with the range of conscious human behaviour somewhere between two extremes:

- reflex actions such as a sneeze or flutter of the eyelids; and
- learned habits such as brushing one's teeth or handwriting style (Wallace and Szilag 1982: 53).

Luthans (1998) asserts that motivation is the process that arouses, energizes, directs, and sustains behaviour and performance. That is, it is the process of stimulating people to action and to achieve a desired task. One way of stimulating people is to employ effective motivation, which makes workers more satisfied with and committed to their jobs. Money is not the only motivator. There are other incentives which can also serve as motivators.

Specific employee attitudes relating to job satisfaction and organizational commitment are of major interest to the field of organizational behaviour and the practice of human resources management. Attitude has direct impact on job satisfaction. Organizational commitment

on the other hand, focuses on their attitudes towards the entire organization. Although a strong relationship between satisfaction and commitment has been found, more recent research gives more support to the idea that commitment causes satisfaction. However, most studies treat satisfaction and commitment differently, especially in light of things like downsizing that are part of modern organizations.

The way librarians in research and academic institutions perceive motivation influences their level of satisfaction and commitment. While job satisfaction and commitment have been the topic of many studies, but the present studies is presents new information and a new perspective, describing job satisfaction, motivation and commitment of librarian particularly in the context of Oyo state, Nigeria.

### Literature Review

Along with perception, personality, attitudes, and learning, motivation is a very important part of understanding behaviour. Luthan (1998) asserts that motivation should not be thought of as the only explanation of behaviour, since it interacts with and acts in conjunction with other mediating processes and with the environment. Luthan stress that, like the other cognitive process, motivation cannot be seen. All that can be seen is behaviour, and this should not be equated with causes of behaviour. While recognizing the central role of motivation, Evans (1998) states that many recent theories of organizational behaviour find it important for the field to re-emphasize behaviour. Definitions of motivation abound. One thing these definitions have in common is the inclusion of words such as "desire", "want", "wishes", "aim", "goals", "needs", and "incentives". Luthan (1998) defines motivation as, "a process that starts with a physiological deficiency or need that activates a behaviour or a drive that is aimed at a goal incentive". Therefore, the key to understanding the process of motivation lies in the meaning of, and relationship among, needs, drives, and incentives. Relative to this, Minner, Ebrahimi, and Watchel, (1995) state that in a system sense, motivation consists of these three interacting and interdependent elements, *i.e.*, needs, drives, and incentives.

Managers and management researchers have long believe that organizational goals are unattainable without the enduring commitment of members of the organizations. Motivation is a human psychological characteristic that contributes to a person's degree of commitment (Stoke, 1999). It includes the factors that cause, channel, and sustain human behaviour in a particular committed direction. Stoke, in Adeyemo (1999) goes on to say that there are basic assumptions of motivation practices by managers which must be understood. First, that motivation is commonly assumed to be a good thing. One cannot feel very good about oneself if one is not motivated. Second, motivation is one of several factors that go

into a person's performance (*e.g.*, as a librarian). Factors such as ability, resources, and conditions under which one performs are also important. Third, managers and researchers alike assume that motivation is in short supply and in need of periodic replenishment. Fourth, motivation is a tool with which managers can use in organizations. If managers know what drives the people working for them, they can tailor job assignments and rewards to what makes these people "tick." Motivation can also be conceived of as whatever it takes to encourage workers to perform by fulfilling or appealing to their needs. To Olajide (2000), "it is goal-directed, and therefore cannot be outside the goals of any organization whether public, private, or non-profit".

### Strategies of Motivating Workers

Bernard in Stoner, et al. (1995) accords due recognition to the needs of workers saying that, "the ultimate test of organizational success is its ability to create values sufficient to compensate for the burdens imposed upon resources contributed." Bernard looks at workers, in particular librarians, in an organized endeavour, putting in time and efforts for personal, economic, and non-economic satisfaction. In this era of the information superhighway, employers of information professionals or librarians must be careful to meet their needs. Otherwise, they will discover they are losing their talented and creative professionals to other organizations who are ready and willing to meet their needs and demands. The question here is what strategies can be used to motivate information professionals, particularly librarians? The following are strategies:

**Salary, Wages and Conditions of Service:** To use salaries as a motivator effectively, personnel managers must consider four major components of a salary structures. These are the job rate, which relates to the importance the organization attaches to each job; payment, which encourages workers or groups by rewarding them according to their performance; personal or special allowances, associated with factors such as scarcity of particular skills or certain categories of information professionals or librarians, or with long service; and fringe benefits such as holidays with pay, pensions, and so on. It is also important to ensure that the prevailing pay in other library or information establishments is taken into consideration in determining the pay structure of their organization.

**Money:** Akintoye (2000) asserts that money remains the most significant motivational strategy. As far back as 1911, Frederick Taylor and his scientific management associate described money as the most important factor in motivating the industrial workers to achieve greater productivity. Taylor advocated the establishment of incentive wage systems as a means of stimulating workers to higher performance, commitment,

and eventually satisfaction. Money possesses significant motivating power in as much as it symbolizes intangible goals like security, power, prestige, and a feeling of accomplishment and success. Katz, in Sinclair, et al. (2005) demonstrates the motivational power of money through the process of job choice. He explains that money has the power to attract, retain, and motivate individuals towards higher performance. For instance, if a librarian or information professional has another job offer which has identical job characteristics with his current job, but greater financial reward, that worker would in all probability be motivated to accept the new job offer. Banjoko (1996) states that many managers use money to reward or punish workers. This is done through the process of rewarding employees for higher productivity by instilling fear of loss of job (e.g., premature retirement due to poor performance). The desire to be promoted and earn enhanced pay may also motivate employees.

**Staff Training:** No matter how automated an organization or a library may be, high productivity depends on the level of motivation and the effectiveness of the workforce. Staff training is an indispensable strategy for motivating workers. The library organization must have good training programme. This will give the librarian or information professional opportunities for self-improvement and development to meet the challenges and requirements of new equipment and new techniques of performing a task.

**Information Availability and Communication:** One way managers can stimulate motivation is to give relevant information on the consequences of their actions on others (Olajide, 2000). To this researcher it seems that there is no known organization in which people do not usually feel there should be improvement in the way departments communicate, cooperate, and collaborate with one another. Information availability brings to bear a powerful peer pressure, where two or more people running together will run faster than when running alone or running without awareness of the pace of the other runners. By sharing information, subordinates compete with one another.

Studies on work motivation seem to confirm that it improves workers' performance and satisfaction. For example, Brown and Shepherd (1997) examine the characteristics of the work of teacher-librarians in four major categories: knowledge base, technical skills, values, and beliefs. He reports that they will succeed in meeting this challenge only if they are motivated by deeply-held values and beliefs regarding the development of a shared vision. Vinokur, Jayarantne, and Chess (1994) examine agency-influenced work and employment conditions, and assess their impact on social workers' job satisfaction. Some motivational issues were salary, fringe benefits, job security, physical surroundings, and safety. Certain environmental and



motivational factors are predictors of job satisfaction. While Colvin (1998) shows that financial incentives will get people to do more of what they are doing, Silverthorne (1996) investigates motivation and managerial styles in the private and public sector. The results indicate that there is a little difference between the motivational needs of public and private sector employees, managers, and non-managers.

### **Job Satisfaction**

Locke and Lathan (1976) give a comprehensive definition of job satisfaction as pleasurable or positive emotional state resulting from the appraisal of one's job or job experience. Job satisfaction is a result of employee's perception of how well their job provides those things that are viewed as important. According to (Mitchell and Lasan, 1987), it is generally recognized in the organizational behaviour field that job satisfaction is the most important and frequently studied attitude. While Luthan (1998) posited that there are three important dimensions to job satisfaction:

- Job satisfaction is an emotional response to a job situation. As such it cannot be seen, it can only be inferred.
- Job satisfaction is often determined by how well outcome meet or exceed expectations. For instance, if organization participants feel that they are working much harder than others in the department but are receiving fewer rewards they will probably have a negative attitudes towards the work, the boss and or coworkers. On the other hand, if they feel they are being treated very well and are being paid equitably, they are likely to have positive attitudes towards the job.
- Job satisfaction represents several related attitudes which are most important characteristics of a job about which people have effective response. These to Luthans are: the work itself, pay, promotion opportunities, supervision and coworkers.

Job satisfaction of the librarian naturally depends on the economically, social and cultural conditions in a given country (Ebru, 1995). A librarian who can not get a sufficient wage will be faced with the problem of maintaining his or her family's life. This problem puts the librarian far from being satisfied. Especially the social facilities (transportation services, and consumer cooperatives-cash boxes) are sufficient because of the economic conditions. Low wages and lack of status and social security affect motivation. Job satisfaction cannot be talk of where there is absence of motivation. Job satisfaction of the librarian who has an important place in the information society will affect the quality of the service he renders. In this respect, the question of how the material and moral element affect the job satisfaction of the librarians gains importance (Ebru, 1995).



Job satisfaction is so important in that its absence often leads to lethargy and reduced organizational commitment (Levinson, 1997, Moser, 1997). Lack of job satisfaction is a predictor of quitting a job (Alexander, Lichtenstein and Hellmann, 1997; Jamal, 1997). Sometimes workers may quit from public to the private sector and vice versa. At the other times the movement is from one profession to another that is considered a greener pasture. This later is common in countries grappling with dwindling economy and its concomitant such as poor conditions of service and late payment of salaries (Nwagwu, 1997). In such countries, people tend to migrate to better and consistently paying jobs (Fafunwa, 1971). Explaining its nature some researcher (*e.g.* Armentor, Forsyth, 1995, Flanagan, Johnson and Berret, 1996; Kadushin, and Kulys, 1995) tend to agree that job satisfaction is essentially controlled by factors described in Adeyemo's (2000) perspectives as external to the worker. From this viewpoint satisfaction on a job might be motivated by the nature of the job, its pervasive social climate and extent to which workers peculiar needs are met. Working conditions that are similar to local and international standard (Osagbemi, 2000), and extent to which they resemble work conditions of other professions in the locality. Other inclusions are the availability of power and status, pay satisfaction, promotion opportunities, and task clarity (Bolarin, 1993; Gemenxhenandez, Max, Kosier, Paradiso and Robinson, 1997).

Other researchers argue in favour of the control of job satisfaction by factors intrinsic to the workers. Their arguments are based on the idea that workers deliberately decide to find satisfaction in their jobs and perceive them as worthwhile.

Studies of job satisfaction and librarianship seem to consistently show there is a relationship between professional status and the job satisfaction. High levels of job satisfaction are observed in those professions that are of good standing in society. Age is one of the factors affecting job satisfaction. Different studies conducted show that older workers are more satisfied (Davis, 1988:100). Kose (1985) found a meaningful relationship between the age and job satisfaction; Hamshari (1983), age and professional experience (Delia 1979; Hamshari 1986), educational level (Well-Maker, 1985; Hamshari, 1986); level of wages (Vaughan and Dunn in Adeyemo, 1997); sex (D'elia 1979; Lynch and Verdin, 1983).

St. Lifer (1994) reports the results of a survey of librarians' perceptions of their jobs. These include compensation and benefits, advancement opportunities, and technological challenges. The result showed that salaries and benefits are related to job satisfaction. Horenstein (1993) reported on a study that examined the job satisfaction of academic librarians as it related to faculty status. The finding indicated that librarians with academic

rank were more satisfied than non-faculty groups. Predictors of satisfaction included perceptions of participation and salary. Nkereuwen (1990) reviews theories on job satisfaction and evaluates their relevance to the work environment of libraries.

Parmer and East (1993) discuss previous job satisfaction research among Ohio academic library support staff using Paul E. Specter's job satisfaction survey. The 434 respondents indicated general satisfaction among females with less experience who worked in public services. Tregone (1993) tried to determine the levels of cooperation of media specialists and public librarians. A significant correlation was shown between the level of satisfaction and the type of library, although librarians in public libraries showed greater satisfaction.

Similarly, the result of some other studies have shown meaningful relations between job satisfaction and wages, management policy, working conditions, possibilities of promotion, gaining respect, the size of the organization and self development and achievement of the use of talents (Ergenc, 1982a; Sencer, 1982; Kose, 1985; Yincir, 1990). Philips (1994) studied the career attitudes of 109 master level librarians and the relationship between age, career satisfaction and career identity. His results indicate that over time librarians become more happy with their profession and more committed to their line of work.

### **Organizational Commitment**

A wide variety of definitions and measure of organizational commitment exist. Becker, Randal, and Riegel (1995) defined the term in a three dimensions:

1. a strong desire to remain a member of a particular organization;
2. a willingness to exert high levels of efforts on behalf of the organization;
3. a define belief in and acceptability of the values and goals of the organization.

To Northcraft and Neale (1996), commitment is an attitude reflecting an employee's loyalty to the organization, and an ongoing process through which organization members express their concern for the organization and its continued success and well being.

Organizational commitment is determined by a number of factor, including personal factors (*e.g.*, age, tenure in the organization, disposition, internal or external control attributions); organizational factors (job design and the leadership style of one's supervisor); non-organizational factors (availability of alternatives). All these things affect subsequent commitment (Nortcraft and Neale, 1996).

Mowday, Porter, and Steer (1982) see commitment as attachment and loyalty. These authors describe three components of commitment:

- an identification with the goals and values of the organization;
- a desire to belong to the organization; and
- a willingness to display effort on behalf of the organization.

A similar definition of commitment emphasizes the importance of behaviour in creating it. Salancik (1977) conceives commitment as a state of being in which an individual becomes bound by his actions and it is these actions that sustain his activities and involvement. From this definition, it can be inferred that three features of behaviour are important in binding individuals to act: visibility of acts, the extent to which the outcomes are irrevocable; and the degree to which the person undertakes the action voluntarily. To Salancik therefore, commitment can be increased and harnessed to obtain support for the organizational ends and interests through such things as participation in decision-making.

Based on the multidimensional nature of organizational commitment, there is growing support for a three-component model proposed by Meyer and Allen (1991). All three components have implications for the continuing participation of the individual in the organization. The three components are:

**Affective Commitment:** Psychological attachment to organization.

**Continuance Commitment:** Costs associated with leaving the organization.

**Normative Commitment:** Perceived obligation to remain with the organization.

Guest (1991) concludes that high organizational commitment is associated with lower turnover and absence, but there is no clear link to performance. It is probably wise not to expect too much from commitment as a means of making a direct and immediate impact on performance. It is not the same as motivation. Commitment is a broader concept and tends to withstand transitory aspects of an employee's job. It is possible to be dissatisfied with a particular feature of a job while retaining a reasonably high level of commitment to the organization as a whole. When creating a commitment strategy, Armstrong, 1999 asserts that "it is difficult to deny that it is desirable for management to have defined strategic goals and values. And it is equally desirable from management point of view for employees to behave in a way that support those strategies and values." Creating commitment includes communication, education, training programmes, and initiatives to increase involvement and ownership and the development of performance and reward management systems.

Studies on commitment have provided strong evidence that affective and normative commitment are positively related and continuance commitment is negatively connected with organizational outcomes such as performance and citizenship behaviour (Hackett, Bycio, and Handsdoff, 1994; Shore and Wayne, 1993).

Based on this finding, it is important for library employers to identify librarians' commitment pattern and map out strategies for enhancing those that are relevant to organizational goals.

Researchers (*e.g.* Mayer and Allen, 1997) have found that age was positively correlated with affective and normative commitment, but not to continuance commitment. Meyer and Allen (1991), in an exploratory and confirmatory analysis of factors that can significantly predict job satisfaction and organizational commitment among blue collar workers, reported that promotion, satisfaction, job characteristics, extrinsic and intrinsic exchange, as well as extrinsic and intrinsic rewards, were related to commitment. Dornstein and Matalon (1998) describe eight variables that are relevant to organizational commitment.

These are interesting work, coworker's attitudes towards the organization, organizational dependency, age, education, employment alternatives, attitude of family and friends. The variables explain 65% of the variance in organizational commitment. Glisson and Derrick in Adeyemo and Aremu (1999) in their study of 319 human service organization workers analyzed the effects of multiple predictors (job, organization, and worker characteristics) on satisfaction and commitment. They showed that skill variety and role ambiguity are best predictors of satisfaction, while leadership and the organization's age are the best predictor of commitment. Ellemmer, Gilder, and Heuvel (1998) found that background variables as gender, level of education, or team size were not clearly related to three forms of commitment.

Adeyemo (2000) reported a positive correlation between education and organizational commitment. Irving, Coleman, and Cooper (1997) found that age was not related to organizational commitment. Meyer and Allen (1984) earlier argued that age might be correlated with commitment by postulating that it serves as proxy for seniority that is associated with opportunity to better one's position in the work. On the issue of gender, Mathieu and Zajac (1990) reported its relationship to organizational commitment. Similarly, it was found by Irving, et, al. (1997) that the men in their sample had higher level of commitment than the women.

The following research questions were developed to guide the study.

1. What is the relationship between work motivation, job satisfaction, and organizational commitment of the library personnel?

2. What is the difference in the work motivation of professional and nonprofessional library personnel?
3. What is the difference in the job satisfaction of the library personnel in academic and research libraries?
4. Will there be difference in the commitment of library personnel based on their years of experience?

### **Instrument**

A modified questionnaire tagged Work Motivation, Job Satisfaction, and Commitment Scale (WMJSCS) was used for the collection of data on the study. The questionnaire was specifically designed to accomplish the objectives of the study. The first section collected information such as age, sex, experience, professional status, marital status, position, and so on. The second section contained the items, and was divided into three parts.

**Part 1.** This measures motivation. It is a 15-item questionnaire using a Likert scale with responses ranging from Strongly Agree= SA; Agree = A; Disagree = D; and Strongly Disagree = SD. The items were adapted from Work Motivation Behaviour Scale of the Akinboye's 2001 Executive Behaviour Battery. The modification yielded an  $r = 0.74$  Cronbach Alpha.

**Part 2.** The second part of the instrument contains items that measure library personnel's job satisfaction. It is a 5-point Likert scale: Very Dissatisfied = VD; Dissatisfied = D; Undecided = U; Satisfied = S; and Very Satisfied = VS. Items in this section were adapted from the Minnesota Satisfaction Questionnaire by Weiss (1967).

**Part 3.** This part contains fifteen items that measure organizational commitment, using a Likert scale of four points: Strongly Agree, Agree, Disagree, and Strongly Disagree. Items were adapted from organizational commitment questionnaire (OCQ) by Mooday, Steer, and Porter (1979). The overall reliability co-efficient of the instrument yielded an  $r = 0.83$  cronbach alpha.

### **Procedure**

The researcher travelled to all nine libraries in the study and administered the instrument to library personnel after the approval of their management. Following the instructions on the instrument, the questionnaires were filled and returned.

### **Data Analysis**

Descriptive statistics, Pearson Multiple Correlation, and Multiple classification methods with t-test were employed to analyse the collected data.

**Results**

The results of the analysis on the study are presented as follows:

Research Question 1. What is the relationship between work motivation, job satisfaction, and organizational commitment of library personnel?

**Discussion**

The findings of this study reveal that a correlation exists between perceived motivation, job satisfaction, and commitment, although correlation between motivation and commitment was negative. No difference was observed in the perceived motivation of professional and nonprofessional library personnel. Moreover, findings also show that differences exist in the job satisfaction of library personnel in academic and research libraries, and that no relationship exists in the organizational commitment of library personnel based on their years of experience.

The correlation that exists in this study among perceived work motivation, job satisfaction, and organizational commitment corresponds with (Brown and Shepherd, 1997) who reported that motivation improves workers' performance and job satisfaction. The result also agrees with Chess (1994), reported that certain motivational factors contribute to the prediction of job satisfaction.

However, negative correlation between organizational commitment and work motivation as reported in this study may be a result of the fact librarians are not highly motivated by their deeply held values and beliefs regarding the development of a shared vision as put forward by Brown and Shepherd (1997). Tang and LiPing (1999) report that a relationship exists between job satisfaction and organizational commitment, and Woer (1998) finds that organizational commitment relates to job satisfaction, which both support this result. Furthermore, Stokes, Riger, and Sullivan's (1995) report that perceived motivation relates to job satisfaction, commitment, and even intention to stay with the firm corroborates this present result.

The second result obtained on this study was that no significant difference was observed in the perceived work motivation of professional and nonprofessional library personnel. Williams in Nwagu (1997) reported that motivation potential is linked to five core characteristics that affect three psychological states essential to internal work motivation and positive work outcome. That idea complements the present finding. Similarly, the finding by Colvin (1998) that financial incentives increase productivity, corroborates this result. Professional and nonprofessional library personnel have the same perceived work motivation if they are given the work environment and incentives that they need and deserve. The issue of professionalism in librarianship is a very important one, but nonprofessional



library employees are essential to library operations and their motivation and commitment are also essential. Many libraries, therefore, take the same approach to motivation for all of their employees, irrespective of status and qualifications. Hence, the non significant difference in their perception of work motivation is probably connected with this issue.

The fact that no relationship was observed between the organizational commitment of the library personnel and their years of experience, contradict some previous findings of studies. For instance Irving, Coleman, and Meyer (1994) suggest that job experience early in one's career plays a prominent role in the development of commitment. It is commonly felt that experience increases the level of commitment of workers in an organization, and this may be the case under normal circumstances. The result obtained in this study may be due to particular local situations.

The findings of this study have pointed out some salient issues in the field of librarianship. It is imperative for library management to meet the demands of their personnel to strengthen their motivation, satisfaction, and commitment to minimize turnover.

Governments and library management should concentrate on improving the conditions for library personnel. One crucial area is on-the-job training to cope with the integration of information technology into library practices. Career survival would depend on career resilience (Casio in Sinclair et al. 2005) and pragmatic adjustment to change (Borgen, in Adeyemo, 2000). Librarians and library staff must readily re-invent themselves and take responsibility for managing their careers with support from employers. Satisfaction might be found in "sacrificial labour," otherwise referred to as labour of love by (McDonald, 1996). Uppermost in our minds should be the quest for self-actualization described by Maslow.

Library personnel must acknowledge that mental health is better anchored in intrinsic motivational factors within one's control. The need to assume responsibility for one's career, especially in a depressed economy, cannot be overemphasized (Heinz, 1987). Attainment of job satisfaction among library personnel through value clarification, personal problem solving, and a creative approach are insightful and intrinsic motivational approaches that are recommended in this study.

It is important to note some limitations of this study. First, the study is correlational and as such we cannot assume any causal relationship between job satisfaction, organizational commitment, and work motivation. Second, the samples used for this study are library personnel in academic and research libraries in Oyo State, Nigeria. One cannot generalize findings to other states of the federation. Future researchers may focus on the limitations and work improving the generality of the results.

**Users' Perceptions of the Use of Academic Libraries*****Learning in the Modern World***

In each society there are facilities other than classrooms that can contribute in no small measure to the teaching and learning process. For learning to take place, learners must have access to necessary materials, information and resources. They have to interact with tangible and intangible resources and institutions to ensure some level of performance (Obanewa, 2002). Dewy (1983) posited that, "libraries are schools and the librarian in the highest sense a teacher." Oyedeji (1980) describes a library as having "a machinery" for the use of the collection. In the modern world, a wide range of information is disseminated through the printed word, yet it is impossible to have access to all forms of information and knowledge through wide reading alone.

Other facilities and agencies thus exist that emphasize audiovisual learning. They include electronic media such as radio, television, cable satellite, the Internet. These media give wide publicity to events, objects, discoveries, scientific findings, new products, and new services.



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## Manual of Library Research

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In this chapter we look behind the library aggregates and consider trends in three major categories of direct library expenditures: staffing and staff salaries; expenditures on materials and binding; and other expenses (in recent years, principally outlays related to automation). In the last part of the chapter we examine the rising fraction of the expenditures for materials that has been devoted to the purchase of serials, a development with broad implications for scholarly communication as well as for the economics of university libraries.

### Staffing

Libraries are labour-intensive entities, and wages and salaries appear to have constituted over half of all current expenditures for as many years as records exist. Salary data, however, are less reliable in early years than figures showing the number of staff employed; therefore, we begin by looking at changes in staff size. The long-term growth in number of staff in Research 1 libraries was steady between 1912 and the early 1960s, allowing for the inevitable fluctuations associated with two world wars. Taking the years since 1912 as a single period, we find that the total number of professional and supporting staff at Research 1 libraries has increased at an average annual rate of approximately 3.7 percent.

While all parts of this record are of historical interest, it is the patterns since World War II (and especially over the last three decades) that are most consequential. Distinct subperiods stand out. Following the war, there was a considerable rebuilding of staff (which lasted from 1944 to about 1949); once this was accomplished, staff size grew only modestly until about 1960. At that time the entire face of higher education began to change rapidly. The general expansion of colleges and universities had a dramatic effect on the size of the library staff as well as on library acquisitions.

Between 1960 and 1970 the average size of the staff in the Research 1 libraries almost doubled (increasing by 94.7 percent), or an average of about 7 percent per year. While some of these increases in staffing were no doubt required by higher workloads associated with increased enrolments and the need to cope with an increasing volume of acquisitions (discussed later), another significant part of the explanation for this unprecedented growth in library staffing surely has to do with the equally unprecedented expansion of graduate education that occurred simultaneously. More branch and departmental libraries were established, and bibliographers, cataloguers, and reference librarians were needed in larger numbers than ever before.

The growth in staff size then came to an abrupt halt. In the fifteen years between 1970 and 1985 the average size of the library staff at these same Research 1 universities increased by only 6.9 percent (less than 1/2 of 1 percent per year). Most recently, there has been a modest "recovery," in that the average size of the library staff grew by another 5.9 percent over the next six years.

More complete staffing data for all four of our composites (including data on total salaries paid, which are presented later) exist from 1963 on, and they show both the same high rates of increase in staff size during the 1960s and the same virtual halt to net additions during the 1970s. While the expansionary period of rapid increases in staff size lasted somewhat longer at the Research 2 universities than at the Research 1 universities, a sharp deceleration in the rate of new hiring followed by a period of essentially no change is evident in the plots for all four composites. In none of these sets of libraries, however, is there evidence of any absolute decline in the size of the staff during the 1970s. (The negative blips in a few individual years appear to be due to shifts in the numbers of temporary employees, associated with the birth and death of special projects.) The essential point is that there was very little net expansion in library staffs between the early 1970s and the mid-1980s.

Another perspective on changes in staffing at Research 1 universities is obtained when we compare the growth in staff with changes in the size of collections. The long-term rates of increase in volumes held and volumes added per year have been roughly comparable to the long-term rate of increase in staff, with the average annual growth rate for volumes held (3.7 percent per year) exactly the same as the growth rate for personnel (3.7 percent per year) and the average annual growth rate for volumes added (3.1 percent per year) only modestly lower. But beneath these long-term similarities are some sharply divergent trends.

The ratio of volumes held per staff member was reasonably steady during the pre-World War II years (fluctuating in the range of 10,000 to

13,000 volumes per staff member); it then fell sharply during World War II (to a low of about 8,000 volumes per staff member in 1948) before climbing back to roughly the 11,000 level in the early 1960s. During the decade of the 1960s the ratio of volumes held per staff member fell sharply and reached a level lower than that observed at any previous time (excepting only the World War II trough year). Since volumes held continued to increase after 1970, when staff size ceased to grow, there has been a steady and steep rise in the number of volumes held per staff member, which has continued to the present day.

An ever-larger collection is being managed by a staff that for the last 20 years has not increased at anything approaching a comparable rate. The result is that volumes held per staff member at the Research 1 universities is now at an all-time high of nearly 15,000 volumes.

The second measure of changes in collections—the annual number of volumes added gross, the measure of annual flow into the system as contrasted with the previous measure of the size of the stock—also declined in relation to staff size during the 1960s. The net additions to library staff were so great that they dominated even the substantial increase in the rate of acquisitions that also occurred during that decade (as well as, *a fortiori*, the increases in volumes held). However, while the ratio of volumes held per staff member then rose sharply, the ratio of volumes added per staff member continued to decline during the 1970s and 1980s.

The reason for this decline is very different, however, from the reason for the decline during the 1960s: the retrenchment in higher education that began in the 1970s had an even stronger restraining effect on new acquisitions than it did on new staff.

In sum, then, library staff have faced contradictory trends in the early 1990s. They have had to manage a larger collection per staff member than ever before; at the same time, the number of new acquisitions per staff member has fallen back to the level of the mid-1950s.

### **Broad Shares of Library Expenditures**

The three principal components of the library budget for which we have reliable data going back to the early 1960s are (1) expenditures for library materials and binding; (2) total salaries and wages, including the compensation of student assistants; and (3) other operating expenditures, which have been affected significantly by outlays for the computerization of libraries.

While absolute expenditures in all three categories have of course increased substantially over the last three decades, there have been some noteworthy shifts in relative shares. The basic pattern is most easily presented and described via snapshots taken at four different points in

time: 1963, 1970, 1982, and 1991. Expenditures on materials and binding at these 24 libraries have been a remarkably constant share of total library expenditures, moving from 33 percent to 35 percent, back down to 33 percent, and then back up to 35 percent. The noteworthy trends concern the other two components. Salaries have fallen steadily, from an average of 62 percent of total expenditures in 1963 to 52 percent in 1991. The remaining component, other operating expenditures, has risen just as steadily, climbing from an average of just 6 percent in 1963 to 14 percent in 1991.

These shifts in salary percentage may be more consistent with the trends in number of staff discussed in the preceding section than they first appear to be. What is surprising initially is the sharp decline in the salary share between 1963 and 1970 given the rapid increase in the number of staff between those two years.

The explanation, we believe, is that the age distribution of the staff probably changed markedly during the 1960s, since most of the new additions to staff can be assumed to have been relatively young. Rapid increases in staffing are often accompanied by less rapid increases in payroll costs because of the growing fraction of the staff earning entry-level salaries. The post-1970 declines in the salary share of total expenditures require no special explanation, since they follow directly from the halt in recruitment described in the previous section.

The increase in the share of total expenditures of the other operating expenditures category has been dramatic by any reckoning. This share has more than doubled, rising from 6 percent to 14 percent. By all accounts, increasing outlays related to computerization have been the driving force, and it is therefore not surprising that the largest jump in share occurred between 1970 and 1982, when the new technology was first introduced on a large scale.

Before commenting further on computerization, it is worth noting that the pattern just described has characterized all four of our library composites with only slight variations among the sets of libraries.

Shares of expenditures devoted to other operating expenditures started from a lower base in the Public 1 and Public 2 composites (5 and 4 percent, respectively) than in the private composites and then rose relatively rapidly in these two public composites. But there is little more to be said about differential rates of increase in the shares of any of these components. The point to emphasize is surely the commonality of the trends.

Pronounced similarities in the absolute levels of the shares across composites are also evident. In 1991 the share of total library expenditures devoted to expenditures on materials and binding ranged from a low of



33 percent in the Private 1 composite to a high of 36 percent in the Public 1 composite. The salary share in 1991 ranged from a low of 50 percent in the Private 2 composite to a high of 53 percent in the Public 2 composite (with values of 52 percent in both Private 1 and Private 2). And the share devoted to other operating expenditures in 1991 ranged from lows of 12 percent in Public 1 and Public 2 to a high of 15 percent in Private 1 and Private 2.

### **Operating Expenditures and Computerization**

At this point a brief explanation of three of the functions that have been automated over the past two decades will help provide a better understanding of operating expenditures and the kinds of developments that have encouraged reallocations of funds within the total budget for the library. We will then discuss the issue of budgetary trade-offs more explicitly.

At many institutions the first of the functions to be automated was circulation, which was seen as an obvious candidate for such treatment. At many institutions barcode labels that are optically scanned at the moment the book is charged out have replaced cards, which in the past had to be removed manually from the volume and filed. The advantages of storing the title, call number, and author's name electronically are obvious: any of the elements can be retrieved and a patron need know only one element of the three in order to request information about the volume.

The automation of the cataloguing function has been of even greater importance; indeed, in Warren J. Haas's words, "[c]ataloguing is what turns an accumulation of material into a library collection," and the technological advances of the past few decades have afforded a degree of standardization within the entire system nationally that previously would have been impossible.

In the past a professional cataloger at a particular institution would either write his or her own catalogue copy or make use of cards provided by the Library of Congress, which sometimes required revision resulting from a different classification scheme or minor differences between the volume actually in the possession of the cataloger engaged in writing copy and the volume catalogued by the Library of Congress. Subsequently, Library of Congress copy was made available online from one of the national vendors, in particular OCLC (originally the Ohio College Library Centre, now the Online Computer Library Centre) and RLIN (the Research Library Group's Research Libraries Information Network). Individual member libraries also contribute records written by their professional cataloguers to both the RLIN and OCLC databases.

The advantages of this approach are obvious: copy made available online can readily be reformatted to fit specifications peculiar to a particular

institution. Moreover, because member institutions contribute copy there are additional sources of records in the absence of Library of Congress copy, which obviates the need for original copy to be written at each individual institution and offers the promise of greater uniformity in the content of the records. In the past the Research Libraries Group charged member institutions that used the RLIN database a per-transaction fee. Members may now purchase transactions in blocks (500,000 searches annually, for example) and are given rebates for each record contributed to the database.

The acquisitions function has also benefitted from automation. The Research Libraries Group, for example, provides a service that enables a member library to search the database for information about items it may wish to purchase, and order forms may then be generated directly from the database. Similarly, invoices in machine-readable form are often included with shipments of books. The information that the invoices contain is integrated into computer files and affords a means of achieving various kinds of control over the acquisitions budget generally and the performance of vendors. These technological developments mean that while the basic library functions continue to be performed, they are now performed in very different ways. And the costs of performing them are now allocated somewhat differently among categories of expenditure than they were in the past. In effect, trade-offs have been made between staffing and automation—which is not to say that this has been a conscious, carefully articulated process. As Kendon Stubbs has put it, in commenting on an earlier draft of this manuscript:

It is true that other operating expenditures have risen faster than total expenditures and staffing somewhat less. But I doubt that any library director would say that over the past 15 or 20 years there has been a deliberate shifting of money from staff to automation and other “other operating” expenditures. In fact, as you note, the absolute size of ARL staffs has never declined; it has just grown more slowly in recent years.

Thus, in the various places in this study where you suggest a conscious trade-off between staffing and automation, I would be more inclined to suggest something less planned. ARL libraries tend to be conservative and to hold onto staff, often for traditional functions even when those functions are no longer cost-efficient (though in the very recent past, under the impact of the recession, there is evidence that the libraries are being more hard-nosed about relinquishing staff in traditional but low-impact functions).

It may be closer to the truth to say that by the mid-seventies new staffing positions were harder to come by than they had been in the sixties, so that increases in staffing (and staffing expenditures) slowed; while the

then relatively small amount devoted to other operating expenditures was allowed to grow at its own pace, chiefly driven by automation. I don't know if this formulation comes out sounding really different from yours; but it does propose that the flow of money from staff to other operating was more fortuitous than planned up to very recent years. One piece of evidence for the unplanned nature of the historical trend is that during the late seventies and up to the past few years it was reported as axiomatic in library literature that automation does not save staff. If you were a library director and were requesting funding for an online cataloguing system, you had to sell the concept to your administration while at the same time telling them that you could not give up any cataloguing staff after you were automated.

This was an unrealistic sales job, even if the library community had convinced themselves that it made sense; and university administrations may have reacted by putting reins on new staffing, while hoping that automation would stabilize library costs.

Surely no one would suggest that librarians sat down, plotted the changes in the production possibility curves facing the library that resulted from technological change, superimposed the relative costs of different inputs on the diagram, and then decided to shift "x" amount of resources from staff salaries to automation.

The process of reallocating resources was surely far less planned and more evolutionary, as Stubbs suggests. Nonetheless, there has been an inexorable character to these developments, and the results have been much the same as those that one would have derived from a more formal cost-benefit model. The implications of new technological possibilities could not simply be ignored, and by changing the very nature of key library functions these technologies altered the staffing needs of the library with consequences for both total staff size and the relative mix of staff members in various employment categories.

We conclude this part of the discussion by noting that it is difficult to determine with precision how the effective functioning of the library has been affected by the redistribution of shares of library expenditures from staffing to automation. The reason is that the automation of circulation, cataloguing, and acquisitions has changed the nature of these functions. Our strong impression is that the quality of these services has been enhanced, in some instances quite appreciably, but this is hard to prove definitively.

### **Expenditures within the Materials Category**

There is one remaining trend in the composition of library expenditures that must be mentioned because of its potential consequences, even though

reliable data are available only since 1976. The overall stability in the share of the total library budget that has been devoted to expenditures on materials and binding conceals a pronounced internal shift in the allocation of the acquisitions budget: a far higher proportion of the acquisitions (or materials) budget is now being spent on serials.

In both the Research 1 and Research 2 composites the percentage of the materials budget devoted to serials increased rapidly during the 1970s and peaked about 1981. After a period of decline in the early 1980s, the serials share began to rise again beginning in 1986. The main difference between the Research 1 and Research 2 composites is the absolute share of the materials budget devoted to serials. Throughout this entire period the Research 2 libraries spent approximately 10 percent more of their materials budget on serials than the Research 1 libraries. This difference apparently results from the fact that the materials budgets of the Research 2 libraries are generally smaller. At the smaller institutions librarians may feel that first priority has to go to purchasing a reasonably comprehensive set of serials.

The somewhat erratic path of this time series is due to varied rates of increase in expenditures for serials. Serials expenditures have increased rapidly for the entire period since 1976, but three subperiods can be distinguished—1976-81, 1981-86, and 1986-91—with the middle period one of somewhat more moderate increase and the last the period of most rapid increase. Between 1986 and 1990 the All 24 composite increased at an average annual rate of increase more than 11 percent.

Trends in the prices of serials are discussed at some length. We can anticipate that discussion by noting that the price increases have been the driving force in increases in the serials share of the materials budget. Evidence for this assertion is the fact that larger and larger expenditures for serials have *not* led to a comparable increase in the number of serials acquired. In fact, between 1986 and 1990 the number of serials received at Research 1 libraries actually decreased by 6 percent. During this same period, nominal expenditures increased by 73 percent.

Price increases for journals vary significantly by field, and the experiences of individual universities illustrate the effects of these increases on serials budgets in recent years. For two individual universities for which we were able to collect data (a Public 1 university and a Private 2 university), the percentage of the serials budget expended for science serials has increased steadily since the mid-1980s. At the Private 2 university we calculated the science serials expenditures as a percentage of all serials expenditures for humanities, social sciences, and science departments. (General serials expenditures were not included in the total.) This percentage has increased from 58.9 in 1983-84 to 62.9 in 1990-91.

Although data on the number of serials were not available, we have been told that the total number of serials stayed relatively constant, with the few serials that were added concentrated in the humanities and social sciences rather than in the sciences.

At the Public 1 university, expenditures for science serials as a percentage of the total were remarkably comparable to those at the Private 2 university. In this instance, expenditures for science serials increased from 59.1 percent of the total (including humanities, social sciences, sciences, nonscience libraries, and area studies) in 1985-86 to 64.2 percent in 1990-91. Again, data on the number of serials are unavailable for those years, but we can get an idea of the magnitude of these figures with data from 1991-92. In this year 1,947 science serials constituted only 28.7 percent of the total number of serials in the same areas included in our total expenditures—that is, expenditures for science serials constituted approximately 65 percent of the serials budget and provided approximately 29 percent of the total number of serials. Conversations with librarians at other universities suggest that percentages such as these are not uncommon.

The rapid increases in serials expenditures documented earlier and the substantial redeployment of materials expenditures toward serials and away from monographs may now be more fully understood as responses to external forces that have had such pronounced effects on the functioning of academic libraries. *Indeed, it would not be an exaggeration to say that of the various factors in the constellation affecting university libraries in recent years, the rapidly rising prices of periodicals have in many respects been the most important.* They explain the de facto encumbering of the materials budget, and they surely go a long way toward explaining the widening gap between the numbers of volumes added gross and of book titles published, since the redeployment of the materials budget toward serials has constrained libraries' ability to purchase monographs. As we have seen, there has been little increase in the number of serials acquired annually, and these developments can therefore be understood as retarding the growth of the collections. It is not surprising, then, that in writing of the situation, authors have invoked such metaphors as "the library doomsday machine" and "the journal that ate the library."

There are a number of possible ways of looking at the inability of libraries to accommodate fully the changes in the serials and book industries. Both internal and external factors are involved. Emphasis could be placed, on the one hand, on the inadequacy of the materials and binding budget. Since materials and binding expenditures increased at a lower rate than total educational and general expenditures throughout the 1970s and 1980s, one might argue that the level of institutional support for acquisitions



was inordinately low and that an appropriate response in light of the increases in both title output (books and serials) and the prices of library materials would have been to increase the percentage of the educational and general budget expended on the acquisition of library materials.

On the other hand, there are always many competing claims on university resources, and each such claim, no matter how important, has to be evaluated in relation to the others. On this basis one could argue that the relevant external forces, no matter how pressing, simply did not justify the extraordinary redeployment of institutional resources that would have been necessary had individual universities attempted more comprehensive coverage. The issues are not unlike those involved in evaluating the continued viability of a need-blind admissions policy, for example. Such a policy remains an exceedingly important objective at many institutions and is considered vitally important to institutional health. Nonetheless, there are other critically important objectives—compensating faculty members adequately, supporting faculty research activity adequately—that also require attention.

In that sense, the forces contributing to the widening gap between rates of increase in volumes added and rates of increase in title output can be said to have been principally external rather than internal, in that the external demands were far too great for individual institutions to undertake the kind of response necessary to meet them more fully. Those demands, in short, were out of phase with institutions' ability to respond.

### **Book and Serial Production**

There was a virtual halt in the rate of increase in the annual number of volumes added at university research libraries during the 1970s and much of the 1980s. The effects of this development on the comprehensiveness of library collections can be understood only by examining the changes in acquisition rates in the context of trends in the numbers of books and periodicals published.

### **Broad Trends and the Issue of Quality**

The deleterious effects of the slowing in acquisitions during the 1970s and 1980s might have been mitigated to some extent had the shift in the rate of increase in acquisitions been paralleled by a similar slowing in the rate of increase in domestic and international book and serial production. The conventional assumption, however, is that precisely the opposite occurred—that there has been a substantial increase in scholarly output over the past several decades. Indeed, data collected by means of an unpublished 1988 U.S. Department of Education faculty survey suggested that “[e]ach of the nation’s estimated 489,000 full-time faculty members



produced an average of two refereed journal articles and 0.6 scholarly books, chapters in edited volumes, monographs, or textbooks during the previous two years.”

There is certainly no absence of comment, largely negative, on a phenomenon characterized as “academic overdose” in an article in *The New York Times* entitled “Where Information Is All, Pleas Arise for Less of It.” The article suggested that “[a]s the population of books and journals continues to explode, librarians complain that shelf space is running out and expenses are spinning out of control” and reported that “[i]n February 1988, Harvard Medical School issued new guidelines for tenure review, recommending that the faculty consider requiring no more than five published works for a candidate for assistant professor, seven for associate professor and 10 for full professor,” a decision made against a background of expressions of concern that “the multiplicity of mediocre publications makes it impossible to sift out the ones that contain fresh ideas.

The proliferation of books and journals seems to have narrowed access to information instead of widening it.” More recently, Donald Kennedy, then president of Stanford, was quoted as saying that “[t]he overproduction of routine scholarship... tends to conceal really important work by its sheer volume... and is a major contributor to the inflation of academic library costs.”

Others argue that concerns about a putative decline in quality are unjustified, that they mask other, unstated concerns about how scholarly fields are defined and about changes in methodologies and perspectives with which many of those who express such concerns simply disagree. Two papers, among others, make the very important point that the increase in the number of journal articles and books is in part a function simply of an increase in the size of the professoriate. Any assumption about a decline in quality or an increased emphasis on research based largely on the increase in the number of items published may fail to take adequate account of the statistical fact that these two papers highlight. The per-person output, that is, may not be significantly higher now than before.

On one important issue, however, there seems to be little disagreement: the basic problem, if indeed the phenomenon is a problem, results in large part from the nature of the reward system. Appointment to the professoriate and advancement within it are contingent upon scholarly output, as measured (qualitatively and quantitatively) by one’s record of publication. Moreover, the intense competition for places that characterized many academic labour markets in the 1970s and 1980s only intensified the pressure to publish.

We have no new insights to offer on this range of issues concerning the quality of scholarly output, and we can do no more here than

acknowledge the importance of the debate. We must limit ourselves to the more mundane task of calibrating output and not attempt judgments as to whether more or less of it is valuable now than was the case in earlier days.

How precisely can we document trends in the production of books and periodicals and relate them to rates of increase in the acquisition of library materials? "Book industry statistics," Chandler Grannis wrote, "may... be likened to a handful of wet spaghetti. They may be more or less digestible, even a bit nourishing; but they are messy, slippery, elusive, never tidy." Though such statistics have improved in recent years, there nonetheless remain many inconsistencies and anomalies in the reporting. In some instances, for example, it may be that apparent recent increases in the number of titles published is simply a function of improved data collection: a larger percentage of the items produced is now being "captured."

Moreover, all but one of the data sets used here to measure trends in book-title output have an important limitation for purposes of this study: they count items, perhaps even a great many items, that academic libraries would not choose to purchase. The fact that these data include publications written by nonacademics does not necessarily limit their usefulness, since academic libraries purchase many such items. Their usefulness is limited because, in addition to such materials, they also include items of other types—mass market paperbacks in some instances, university theses and government pamphlets in others—that do not figure in the acquisitions practices of many libraries. These limitations notwithstanding, the available data do permit us to make some provisional observations about changing levels of book-title production, seen in relation to acquisitions.

### **Book Titles Published**

Book production, not surprisingly, mirrors general economic, historical, and political developments. The numbers of titles published reflect wars, economic depression, and, in the case of university presses, the financial condition of the presses' parent institutions. Thus, a period of rapid increase in the number of titles published in this country in the late 19th and early 20th centuries was followed by periods of contraction in the decade between 1910 and 1920, modest recovery between 1920 and 1929, contraction during the Great Depression, recovery from the mid-1930s to early 1940s, substantial contraction during World War II, and, beginning in 1945, extraordinary expansion. This expansion was particularly rapid during the first half of the 1960s.

Our principal concern is the relationship between levels of book production and levels of library acquisitions. Since 1912 the overall average

annual rate of increase in volumes added gross at our Research 1 composite has been more rapid (3.2 percent) than that of total titles published domestically (2.8 percent). However, most of the growth over the past three-quarters of a century in the number of volumes added gross occurred during the single decade of the 1960s.

This unprecedented expansion was presumably the result of systematic retrospective purchasing permitted by double-digit increases in the materials and binding budget and, perhaps more important, the founding of many new serials and thus an increase in the number of volumes available for acquisition in any given year. The slopes of the curves diverge dramatically after 1970, with the annual number of volumes added gross staying more or less constant while the number of book titles published continued to rise at a steady rate.

While these data document trends in the entire domestic book industry for the past century, inspection of data for a group of fields more relevant to the acquisitions practices of academic libraries provides a sharper sense of developments during the past two decades. The shapes of the two curves are quite similar, with the same peaks and valleys, albeit with publications in the select fields growing at a slightly slower rate during these decades than publications in all fields (2.0 percent versus 2.3 percent). During this same period, the number of volumes added gross at our All 24 library composite actually declined slightly—at an average annual rate of 0.6 percent. The steadily growing gap between acquisitions and titles published is evident in the figure.

It is also useful to look even more closely at publications disaggregated by particular fields, since shifts in the relative field-shares are relevant to the acquisitions practices of academic libraries. Just as university curricula are redesigned in response to changes in the nature of scholarship and the emergence of new fields of inquiry, so libraries are expected to be responsive to shifts in the relative shares of title output represented by particular fields, even while continuing at the same time to build collections in fields that previously represented a larger share of the total number of titles produced. Shifts in relative proportions also are important because the price of published materials can differ enormously by subject area (discussed later).

The numbers of titles in many of the traditional arts and sciences fields—such as biography, literature-poetry-drama, and art-music—as well as in education have decreased as a percentage of total publications over the past two decades. The most significant drop is in the share of publications represented by the combined field of literature-poetry-drama, which fell from 17.2 percent in 1970 to 9.1 percent in 1988. Concurrently, there were increases in the shares of many professional-applied fields, including

business, law, technology, and particularly medicine. Between 1970 and 1988 there has been an overall shift of approximately 9 percentage points toward the professional-applied fields. Once again, it is important to note that these counts include many titles that academic libraries would not acquire. Insofar as they are indicative of general trends, however, they are illuminating and confirm our impression of “global” shifts in publication patterns.

This redistribution of publications by field has had a real impact on library budgets because of differential pricing. Those fields that experienced the most significant gain in percentage share of publications since 1970 are precisely those with the highest average per-volume prices of hardcover copies—business (\$37.51), law (\$50.85), medicine (\$66.59), and technology (\$65.26). (Science also had a very high average per-volume price [\$66.91], and maintained a fairly constant but significant percentage share of about 9.5 percent.) The fields that experienced the largest losses in percentage share of publications had significantly lower prices—biography (\$25.99), education (\$33.55), literature (\$30.85), and poetry and drama (\$28.02).

Some part of the redistribution of publications by field is related, albeit in a complicated way, to shifts in enrolment patterns at both the undergraduate and graduate levels. At the undergraduate level, the arts and sciences share of baccalaureate degrees conferred declined after about 1970, especially at comprehensive institutions, concurrent with increases in degrees conferred in preprofessional subjects. At the graduate level, the number of Ph.D.s peaked in 1973 and then began to decline, particularly rapidly in the arts and sciences. Concurrent with this decline was an increase in the number of degrees awarded in professional fields—especially medicine, law, and business.

There was also a shift in the composition of doctoral degrees awarded within broad fields toward more applied subjects; for example, engineering grew faster than the sciences between 1973 and 1988, and, within the social sciences, clinical psychology grew faster than anthropology. This general movement away from the arts and sciences may well have had a dual effect on the book publishing industry—creating both a declining pool of potential authors in the arts and sciences and a declining demand for books in these fields.

Trends in book publishing over the last three decades are reflected also in the experiences of university presses. The activities of this set of publishing institutions are especially relevant for present purposes because academic libraries are likely to purchase a large proportion of the aggregate list of their publications. Data compiled from records maintained by the Association of American University Presses (AAUP) show patterns that are something of an amalgam of the trends shown here for all domestic

publishers and the financial histories of the universities that are homes to most of these presses.

The AAUP data also show a rapid increase in the number of titles published throughout the 1960s. Beginning in 1969, however, there was a period of very little growth at these presses, a pattern not seen in the Bowker data (which show continued increases until about 1979). This flattening is similar to that documented in the first section of this study with respect to library acquisitions and the number of Ph.D.s awarded nationally. The financial condition of university presses is in some cases linked to that of their parent institutions, and the difficult circumstances of the 1970s inevitably had an impact on the number of titles that they could afford to publish. Moreover, given that academic libraries constitute one of the principal markets for monographs published by university presses, restrictions on their acquisitions budgets are more likely to affect the activity of university presses than of commercial presses, which predominantly serve other markets.

Beginning in 1979, there was a substantial recovery in the number of titles published annually by these university presses, and rapid expansion has continued without abatement through at least 1988 (the last year for which we have these data); the number of titles published annually by the university presses increased by a factor of 1.75 over this eleven-year period (5.2 percent per year). The average annual rate of increase since 1970 for these university presses has also been more rapid (3.6 percent) than the rate over the same period for all domestic presses in our selected fields (2.3 percent), despite the fact that the domestic presses expanded over that entire time period while the expansion at the university presses did not really begin until 1979. Moreover, growth in the aggregate number of titles published by all AAUP member presses is understated by our data because we have excluded those presses that did not begin to report titles published until after 1963.

This extraordinary increase in titles published by university presses was probably due to a confluence of forces including greater availability of good manuscripts as a result of the shifting boundary between commercial and university presses. The recovery of AAUP presses was probably influenced as well by the desire to respond to the emergence of new scholarly fields. (This latter development is particularly relevant to trends in scholarly periodicals and is discussed in greater detail later.) Significantly, the increase in titles published was *not* a function of a recovery in the purchasing power of acquisitions budgets, since, as we have seen, the average number of volumes added gross has actually declined since 1970. A direct comparison of titles published by university presses and volumes added by all 24 of our research libraries shows clearly that since 1974 new university press publications have far outstripped acquisitions.



One other dimension of publishing activity must be considered in assessing the implications of recent trends in acquisitions by research libraries—namely, international publishing trends, since these libraries collect many materials published outside the United States. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has collected data documenting international book production for several decades, and we have sought to construct a subindex that would be particularly useful for our purposes, based this time, however, on countries rather than on subject matter. We have aggregated publishing data for six Western European countries (France, West Germany, Italy, the Netherlands, Switzerland, and the United Kingdom) and combined them with comparable data for the United States.

International production of books—predictably—dropped sharply between 1938 and 1944 and then began to rise again in 1945. A period of rapid expansion between 1945 and 1948 was followed by four decades of more moderate but remarkably consistent growth.

The average annual rate of increase in titles published between 1950 and 1988 in Western Europe (3.7 percent) was greater than the annual rate of increase in volumes added at our Research 1 composite during those same years (3.0 percent), but again these overall averages mask major differences in growth rates during specific time periods. Until 1970, the rate of increase in volumes added gross was much greater than the rate of increase in titles published in Western Europe. The rate of increase in volumes added gross peaked in that year and has even declined slightly since then, while the number of titles published has continued to increase steadily over the past two decades.

In this context what is especially important is the relative percentages of the total represented by output in the United States and in Western Europe, and these percentages are changing. In 1971 American titles represented almost 40 percent of the total book production in the United States and these six Western European nations. By 1988 the U.S. share had dropped by more than 5 percentage points to about 34 percent. The decrease in the United States's share was due to a flattening in the number of titles published annually in this country concurrent with a continued increase in the number of titles published in these Western European countries. Moreover, with the exception of Germany, the countries that produce the greatest number of titles annually—the United Kingdom, France, and Italy—are also those that have had the most rapid rates of increase since 1970 (between 3.5 and 5.0 percent per year compared to 1.1 percent for the Netherlands and 2.7 percent for Switzerland). Germany, starting from a base larger than any other Western European country's in this data set, has had a more moderate rate of increase since 1970 (2.6



percent) but a rate still greater than that of the United States (2.1 percent). In brief, the number of titles published in Western Europe has been greater than the number published in the United States and has increased more rapidly.

Disadvantageous rates of exchange during the late 1970s and the mid- to late 1980s exacerbated the consequences of these trends for the acquisitions practices of American research libraries. Between 1985 (when the Plaza Accord depreciated the U.S. dollar against other major currencies) and 1988, the exchange rates for the dollar fell against these Western European currencies by at least 60 percent. West Germany stands out as the country that published the greatest number of titles annually and for which the rate of exchange was least favourable since the early 1970s. In all countries, however, the confluence of these two factors—rapid increases in book production and unfavourable rates of exchange—has had important consequences for American academic libraries that wished to maintain collections international in character.

For present purposes what is most important is the disparity between the rates of growth in the number of titles published shown by all these data sets and the number of volumes added by our group of research libraries. During the 1960s the average annual rate of increase in book titles published was comparable to that of volumes added only for the university presses. During this period, university libraries still constituted the principal market of the university presses, and the expansion in higher education during those years surely was the main factor propelling this extraordinary expansion of title production.

Then, however, the number of volumes added yearly within this group of 24 libraries decreased between 1970 and 1982 at an *annual rate of -1.4 percent while the number of titles published, domestically and internationally, was increasing at a rate of greater than 2 percent per year*. Furthermore, the number of titles published (according to all the data reported here) continued to expand into the 1980s. While the contraction in volumes added gross by these libraries appears to have tapered, there is no evidence of any major recovery. It appears, then, that libraries have been able to respond less effectively and comprehensively to developments in the publishing industry—in particular, the steady expansion in the number of titles published since the 1960s—than at any previous time in the 20th century.

The potential consequences of these trends are evident. Some members of the library profession are concerned that as acquisitions budgets are less adequate to perceived needs and permit less comprehensive coverage of the world's output of books, there is a tendency to concentrate on core materials, with the result that library collections are perhaps beginning

to resemble one another more than before and lose some of the variety that previously distinguished them and some of the richness that characterized the entire national collection. To describe the significance of these developments in starkest form: as libraries are increasingly unable to respond effectively to increases in the numbers of book published, the national collection is characterized by less comprehensive coverage of the world's title output, and access to information, the "capital" of scholarship, may be said to be narrowing in this important respect.

### **Serial Titles Published**

These statistics on book publishing allow us to document the problems faced by libraries in seeking to acquire some share of the universe of scholarly materials. For many university libraries, however, the more pressing acquisitions problem is that of serial subscriptions. Articles about the rapidly increasing numbers and prices of serials abound, and at many libraries serial subscriptions consume an increasingly larger—and highly significant—proportion of the total acquisitions budget. At our Research 1 and Research 2 composite libraries, for example, we have seen that expenditures for serials were roughly 54 percent and 63 percent, respectively, of the total materials budget in 1991 and that these serials shares were up about 10 percentage points from the comparable percentages in the mid-1970s. For a variety of reasons, statistics on trends in the production of serials and periodicals are not as easily acquired as those for book production.

Unlike monographs, which can be defined clearly albeit arbitrarily by a minimum number of pages, there exists no clear definition as to what constitutes a serial. The Association of Research Libraries, for example, uses a fairly standard definition of a serial as "a publication issued in successive parts, usually at regular intervals, and as a rule intended to be continued indefinitely." Nevertheless, there has been some uncertainty as to whether items such as government documents and monographic serials should be counted in this category. Also illustrative of definitional difficulties is the fact that between 1972 and 1974 ARL used this same definition but called the relevant category "Current Periodicals."

Moreover, what is most relevant to research libraries is not the total universe of serials but the subset of scholarly journals, which are even more difficult to define. In a preliminary report to the Mellon Foundation one economist wrote, "...no existing definitions precisely distinguish between journals and 'other periodicals,' much less, scholarly journals and 'other journals.' Lack of agreement on proper classification criteria has led to an enormous range in estimates of the number of journals published: figures from less than 5,000 to upwards of 100,000 have been cited."

Even if clear definitions of “serials” (or “journals”) existed, counting would still be very difficult. “Publication,” wrote Allen B. Veaner, “is a living thing, and trying to count its components may be as futile as attempting to number the cells of the human body.” This description seems especially characteristic of serial publishing since a single title may be “alive” for several decades or even centuries. Moreover, unlike books, serials may merge, split, or even change title during their lifetimes; publication of particular titles may be assumed by another publisher. In the past few decades commercial publishers, benefiting from economies of scale, have achieved a significant role in the academic serials arena and now publish, for example, the proceedings and other publications of academic societies that were once published by the societies themselves.

Despite these complications, we can document very general trends, particularly with regard to the timing of periods of expansion. This is important because the proliferation in the number of journals has been one of the primary sources of pressure on library budgets both directly and indirectly through effects on serials prices.

The largest serials database that exists is Ulrich’s, which includes “all publications that meet the definition of a serial except general daily newspapers, newspapers of local scope or local interest, administrative publications of major government agencies that can be easily found elsewhere, membership directories, comic books, and puzzle and game books.” The 30th edition of *Ulrich’s International Periodicals Directory* lists more than 118,500 titles.

We can compare the growth in this serials universe to the growth of current serials in our All 24 library composite beginning in 1972. The upward trend in the number of serials contained in the Ulrich’s universe was particularly rapid during the 1970s. Beginning in about 1983, however, the growth appears to have tapered. The pattern for current serials was similar; however, the rate of growth was slower during the 1970s, and beginning in the early 1980s the curve was essentially flat. As the proliferation of serials continued, libraries did not—probably could not—respond with more serial subscriptions, and the gap between serials published and serials acquired began to widen. The trends displayed here are not independent of each other; the slowing of the growth in the Ulrich’s universe of serials during the mid-1980s may be attributable, at least in part, to the declining demand for serials earlier in the 1980s.

Another way of looking at the question of the timing of expansion in serials publication is to take all periodicals currently available and graph their founding dates. This method does not take into account journals that have ceased publication, but it does give an idea of when the “continuing” journals were first published. This figure shows that the real proliferation

in science literature began in the 1950s, with the number of journals founded in that decade more than double that of the previous decade. This growth continued into the 1960s and 1970s, with 43 percent of the journals in this list founded in those two decades alone. The proliferation tapered somewhat during the 1980s, with the number founded almost returning to the 1960s level.

Data on periodicals in the field of modern languages and literature may serve as a rough index of trends in the general availability of scholarly journals outside the sciences. In this field there were substantial increases in the number of journals founded throughout the post-World War II era. The decade of the 1970s, however, stands out, as it alone witnessed the founding of more than 400 new journals. Although there was a pronounced slowing in the rate of increase in the 1980s, *more than half of the titles currently available were first published during the last two decades.*

This picture must be modified somewhat by the conclusions reached by Daniel Uchitelle, director of the Centre for Information Services at the Modern Language Association, in a very recent unpublished paper in which he tracks the dates when journals in literature ceased publication throughout the 1970s and 1980s. When this information is combined with the more familiar numbers of new journals begun in this period, it appears that the total number of journal titles increased only gradually. Indeed, Uchitelle suggests that the number of journal cessations has been larger than the number of inceptions in recent years.

The founding of so many journals in the decade when the academic labour market was at its weakest point may be attributable in part to a heightened pressure to publish and to the efforts of academics to seek new outlets for their scholarship. Also, it has been argued that the established journals are slow to reflect changes in scholarship and that the resultant founding of new journals is a function of the redefinition of scholarly disciplines.

The proliferation of journals in the humanities is surely related in some way to the debates that have occurred in many of these fields (and in some of the related social sciences) about the virtues and limitations of various methodologies and theories. These developments have served to transform the character of scholarly discourse and have led in some instances to the founding of new journals, as have changes in the content of various disciplines (the interest in the experiences of "nonelites," for example, and of women and members of various racial and ethnic minorities). The increase in specialization is yet another force at work here.

Such increases in the number of serials inevitably raise questions about a decline in the quality of scholarship, although the increases do

not in themselves substantiate such concerns. One need not enter into arguments about quality, however, or about the virtues of various scholarly approaches to appreciate that the proliferation of journals has had important consequences for academic libraries. Even journals that in some quarters are considered less prestigious or whose methodological approaches are deemed problematic will contain some number of items of interest, and many libraries will want to continue to maintain serials collections that are comprehensive in scope. Nonetheless, despite the substantial redeployment of library acquisitions funds toward the serials budget, the number of current serials acquired has increased only modestly. The obvious inference is that—as all librarians know too well—the prices of serials have also increased significantly, especially during the decade of the 1980s. We now turn to this difficult and complex topic.

### **Book and Serial Pricing**

The findings presented demonstrate that in recent years libraries have been spending more of their financial resources to buy fewer materials. Moreover, expenditures for serial subscriptions have been increasing more rapidly than any other component of the materials and binding budget and thus have been consuming an increasingly larger proportion of this budget. This trend has been accompanied by little or no increase in the number of serial subscriptions purchased, and in very recent years this number has declined at many libraries.

It is clear, then, that the rising prices of serial subscriptions and their impact on acquisitions practices are major concerns. Indeed, anyone conversant with recent developments affecting academic libraries will be aware of the so-called serials crisis. The purposes of this chapter are to provide statistical documentation of the magnitude of the problem and then discuss conceptually the interlocking factors that seem responsible for the escalation in prices. While the main emphasis will be on serials, we shall also discuss book prices.

### **General Trends in Book and Serial Pricing**

Some historical perspective is useful in understanding the context of the current concern with the prices of library materials. The recent *Report of the ARL Serials Prices Project* observes that the serials pricing problem has recurred throughout the 20th century but that during the last five years “it has spiralled out of control.” We have been able to assemble reasonably reliable national price indexes only for years since 1963 (and, in the case of periodicals, only for U.S. publications). More specific price data are of course of greater interest to individual libraries. Such data are used principally for budgetary planning, and the need is for precise information that is as pertinent to local circumstances as possible. For our



purposes—to illustrate broad trends in the prices of library materials and to relate them generally to trends in levels of acquisitions—national data on the prices of printed materials are more relevant.

When we compare increases in the average price of hardcover books and the average price of periodicals subscriptions, we find that between 1963 and 1970 the respective price indexes increased at comparable rates. Over these seven years the prices of these types of publications also increased roughly in line with the overall price index for all goods and services (the GNP price deflator).

Beginning in 1970, however, the pattern changed profoundly. While the price of books continued to increase at about the same rate as the GNP deflator until about 1978, the price index for periodicals began to increase much more rapidly and to diverge sharply from both the index for books and the overall index. This was precisely the decade when a great many new journals were founded, and there are reasons to believe that the proliferation of specialized journals had a marked effect on the prices of periodicals. Over the entire time period from 1963 through 1990, the average price of periodicals increased at an average annual rate more than one and one-half times that of hardbound books—11.3 percent per year versus 7.2 percent per year. Moreover, the prices of both hardbound books and serials increased more rapidly than the general price level (which increased at an average annual rate of 6.1 percent). In the single decade of the 1980s, the GNP deflator increased by a factor of 1.6 while the average prices of books and periodicals increased by factors of 1.9 and 2.8, respectively; the corresponding average annual rates of increase are 3.9 percent, 6.3 percent, and 10.4 percent.

It must be emphasized that the price data included in the periodicals index documents increases in the costs of periodicals published only in the United States, and much of the concern expressed over the rapidly increasing cost of materials has been directed specifically at foreign materials and the pricing practices of foreign publishers. While we cannot provide a reliable estimate of magnitudes, there is no question but that a broader index, which included foreign as well as U.S. publications, would show an even steeper rate of increase. Furthermore, as we noted in the book, to the extent that foreign periodicals are purchased in the country of origin, the dramatic decline since 1985 in the value of the dollar vis-a-vis foreign currencies has exacerbated the effects of rising prices on the acquisitions budgets of libraries.

### **Book Prices by Field**

Average price increases, of course, vary significantly by field, as well as by type of publication. When we compare trends by broad field over the years since 1970, we find that increases in the prices of science-technology



books have far outpaced increases in other fields. Prices in these fields veered sharply higher about 1978 and have increased at an average annual rate of 8.9 percent per year since then. In sharp contrast, price increases for books in the arts and humanities, the social sciences, and business have not diverged greatly from the general movements of the GNP deflator over these two decades. Prices of books in medicine also followed similar trajectories until the most recent years, when they increased much faster than the general inflation index.

Trends in book prices take on more meaning when we look at the actual dollar prices of the “average” book in specific fields. (Where fields are ranked by the average price of books in 1990.) Comparisons spanning several decades fail to highlight what has happened most recently, as the data on this table illustrate so well. Between 1980 and 1986 book prices in only four fields increased at a rate greater than inflation, and one of these fields, education, was in the lower half of the range of prices. What is more significant is that between 1986 and 1990 book prices in all fields but one increased at a rate greater than inflation. Books published in only six of the sixteen fields included in table had average price increases of less than 30 percent over this four-year interval; five had increases of more than 40 percent, and two more had increases of 39 percent.

It should also be noted that the two fields with the greatest percentage increases in price (technology and medicine) were among the top three fields with respect to the most expensive books. It appears, then, that price increases have been more significant since the mid-1980s and that the most expensive books are also those that have been increasing most rapidly in price. This evidence suggests that book prices are now showing some of the tendencies characteristic of serials—not an encouraging sign for those who must be concerned about library budgets.

### **Serials Prices by Field**

It will come as no surprise to anyone familiar with discussions of the serials crisis that prices of journals also vary considerably by subject matter and that the rapidly rising prices of scientific and technical journals are widely seen as the principal villain of the day.

Data from the *Library Journal* suggest a more than eleven-fold increase in the price of scientific and technical journals between 1970 and 1990, which is equivalent to an average price increase of 13.5 percent per year. It is certainly easy to understand why such an extraordinary rate of increase would give a subscriber pause, to say the least. (We discuss later some of the reasons why prices have risen so rapidly.)

While price increases of science and technology journals clearly head the list, prices in *all* fields are seen to have increased since 1970 at a rate

significantly greater than inflation. We can illustrate the magnitude of what has transpired more clearly by taking a “snapshot” look at prices in actual dollars for subscriptions in specific fields in specific years (1963, 1970, 1982, and 1990). In almost every field, by far the largest *relative* price increases occurred during the twelve-year period between 1970 and 1982.

In the fields of chemistry-physics, the “typical” U.S. journal cost \$33 in 1970 and \$178 in 1982; in engineering, the corresponding dollar figures are \$12 and \$62; in mathematics and other sciences, \$18 and \$88. Medicine is the one professional field with a similar experience. In these groups of fields it was normal for serials prices to rise by factors of five-plus over this period (approximately 15 percent per year, on average). In the social sciences, absolute levels of prices are lower and rates of increase, while still rapid, were not quite as great as in the sciences—for example, the typical journal in political science increased in price from \$7 in 1970 to \$26 in 1982.

The experience in the arts and humanities was roughly comparable to that in the social sciences. In history, for example, the average journal cost \$7 in 1970 and \$20 in 1982; and in literature and languages, the corresponding costs were \$8 and \$19. In the humanities and social sciences, serials prices rose rather consistently at average annual rates of about 10 percent per year over this period, a rate of increase that looks modest only in comparison with the 15 percent-per-year rate of increase that occurred in the sciences, engineering, and medicine. During the eight years between 1982 and 1990, serials prices continued to rise very rapidly but not quite as rapidly as previously.

Prices in chemistry-physics, mathematics and the other sciences grouped with it, and in engineering rose at average annual rates of roughly 10 to 11 percent (as compared with increases averaging about 15 percent per year during the 1970-82 period). In the humanities and social sciences, average rates of increase fell to 6 to 7 percent (as compared with increases of 10 percent per year in the period 1970-82). Of course, the absolute dollar increases were much greater in the more recent period as a result of higher base values. The most extreme case is, again, chemistry-physics, where the average price of a journal in 1990 was \$413, as compared with \$178 in 1982. When confronting such prices, it is small consolation to be told that the relative rate of increase has slowed.

Three more general points can be made:

- First, in all three subperiods we have been examining serials prices rose faster than the GNP deflator. Only between 1963 and 1970 was the relationship at all similar, and even then prices of science and technology journals frequently rose twice as rapidly as the

general price index; it was the journals in the humanities and social sciences that had price increases roughly comparable to the GNP deflator.

- Second, there is a striking consistency of rates of increase within similar groups of fields (in the humanities, history, literature-languages, and philosophy-religion; in the sciences, chemistry-physics, mathematics and other sciences, and engineering); clearly subject matter and associated variables count for a great deal in explaining both price levels and differential rates of increase in price.
- Third, the data reveal a persistent tendency for the most expensive serials to experience the largest relative price increases. One consequence is that the relative price differential between serials in, say, chemistry-physics and in literature-languages has steadily expanded: this ratio was 3.5 in 1963 (that is, the average serial in chemistry-physics was 3.5 times more expensive than the average serial in literature-languages), 5.4 in 1970, 9.2 in 1982, and 13.5 in 1990.

### **Origins of the Serials Crisis**

These developments—not surprisingly, given their obvious importance—have spawned a substantial literature that has attempted to determine the reasons for the rapid price increases, explored the potential consequences of the trends if left unchecked, and proposed possible responses on the part of libraries and the institutions they serve.

Several studies have identified the principal distinguishing attributes of the serials that command the higher prices and have witnessed more rapid price increases. Subject matter, as we have seen, is of particular importance: scientific and technical periodicals are generally more expensive. Titles published by commercial publishers tend to be more expensive than those published by learned societies or associations or other scholarly publishers (universities, university departments, university presses, museums, and research institutions). Other specific attributes that affect costs—a larger number of issues per year, a larger number of pages per issue, the presence of art work—naturally correlate positively with price. Journals that contain advertising were found to have lower prices.

Other studies have specifically considered the pricing practices of foreign commercial publishers, whose titles often command the highest prices. Some price differential is, of course, to be expected, since increased distribution costs have to be recovered in some way. The question has been raised, however, whether the differential between what is charged local

subscribers to European periodicals and what is charged North American subscribers is justified by the cost differentials. Prices of foreign periodicals often appear to correlate with various indicators of use and value, which suggests that in those instances pricing practices are largely value-based rather than cost-based.

It has also been argued that some publishers are engaging in discriminatory pricing. The producer can charge different prices in different markets when (1) the various markets for a particular product are clearly distinguishable, (2) the demand for the product within each differs, and (3) there is little or no possibility for resale of the product from one market to another. Discriminatory pricing of journals apparently originated in the early 1980s, when foreign publishers were seeking to offset losses resulting from disadvantageous exchange rates; however, there were no compensatory decreases when the U.S. dollar subsequently weakened.

The pricing practices of a small number of foreign commercial publishers—Elsevier Science Publishers, Gordon and Breach, Pergamon Press, Springer-Verlag, Taylor and Francis, and others—have been subject to particular scrutiny, and one institutional study revealed that subscriptions to titles published by Elsevier, Pergamon, and Springer alone accounted for 43 percent of the increase in serials expenditures at the university in question between 1986 and 1987. Elsevier's acquisition of Pergamon in the spring of 1991 intensified concerns about possible oligopolistic control of the market. This synopsis of views represents some of the concerns expressed by members of the library profession. Publishers, for their part, have argued that any valid analysis has to take account of cost increases resulting from such factors as increases in the number of pages per issue, and some of the more elaborate studies (such as the one described here) are concerned with trends in subscription price per page. The most fully articulated model of journal pricing has been developed by Roger Noll and W. Edward Steinmueller and their colleagues at the Centre for Economic Policy Research at Stanford University. The Stanford group proposes a model that explains the interaction of various attributes of domestic journals, especially their cost structure and the nature of the demand for them.

The principal elements of the underlying cost structure of scholarly publishing, which is shared with other media products, are relatively high first-copy costs (the costs incurred in producing the first copy of the title—editorial work, typesetting, and so on) and relatively low marginal or incremental costs (the costs of printing and distributing each subsequent copy of the title). The publisher has to recover first-copy costs by charging a sufficiently high unit price—that is, in the case of scholarly journals, the price of a subscription. The average cost of each copy produced decreases

as the number of subscriptions increases, and a small subscription base compels the publisher to charge a relatively high price in order to recover first-copy costs.

Critical to the degree of market control is limited substitutability of products (the *Musical Quarterly* cannot be substituted for the *Journal of the American Musicological Society*; research libraries must subscribe to both) and relatively inelastic demand (a market in which sales are relatively unresponsive to price increases because of the inability of the purchaser to find a good substitute and the perceived need of the purchaser for the product). Demand for periodicals tends to be less elastic than demand for monographs, either because of an implicit assumption about the greater importance of the scholarly journal as a vehicle for scholarly communication or because, in Richard De Gennaro's words, "[l]ibrarians have a weakness for journals and numbered series of all kinds. Once they get volume 1, number 1 of a series, they are hooked until the end.

They love neat and orderly serials records and complete runs of periodicals on their shelves. Journals, in short, are the sacred cows of libraries." The basic cost structure, moreover, has further important effects in a market where new entrants compete for limited resources. Subscriptions gained by new entrants almost inevitably serve to reduce the subscription base of existing journals, in turn resulting in upward pressure on unit prices as publishers are compelled to spread first-copy costs over a smaller number of subscriptions. Preliminary results from the Stanford study suggest that subscription price indeed correlates strongly with circulation; other things being equal, titles with smaller subscription bases ordinarily command higher prices and vice versa.

The demand side of the equation (that is, the demand for a particular journal) is affected by both library budgets and the pressures exerted by readers, especially faculty members, to purchase journals. Noll and Steinmueller make the important if obvious point that "to understand the market for journals requires an understanding of faculty utilization of them." After describing the role of publication (especially in the "best" journals) in determining promotions and salary increases, they observe that:

As more faculty seek publication outlets, the demand to be published in a fixed number of "best" journals grows, and a smaller proportion of scholars succeed in publishing at the top of hierarchy. Recognizing this, both publishers and scholars seek to create new publishing outlets that create a new hierarchy, rather than enter at the bottom of an established one.

Thus, scholars and publishers seek to narrow the scope of journals, attempting to create an outlet that will be read by people in a subspecialty



and that will attain the status of being the second best place to publish for that subspecialty, rather than the twentieth or thirtieth best place to publish in the entire discipline. The result is a special kind of journal proliferation. As more academics seek to publish, and as more universities try to promote faculty research and reward scholarly publication, faculty and publishers jointly seek to create not only more journals, but ever more specialized journals that become important to all scholars in a subspecialty, although irrelevant to most scholars and students in a discipline.

From the standpoint of market structure, we find here a kind of monopolistic competition, in which producers differentiate their products and focus on serving particular subsets of an overall market. This permits each producer to set a price above marginal cost. New entrants seek to chip away at the markets of established journals, and the results are an erosion of the subscriptions to the “first” journal and upward pressure on subscription prices. Circulation, then, is a key variable in explaining prices. Noll and Steinmueller note:

Journal proliferation and specialization drive down the average circulation of journals, which drives up the average subscription price. Moreover, because faculty prefer to avoid a lengthy hierarchy of journals in a discipline, in some sense all new journals are “essential” in that they constitute a natural home for articles of value. In a sense, all journals become at least second best in the hierarchy for a small number of scholars. Hence, libraries face not only increasing average prices owing to declining average circulation, but also intense demand to subscribe to all journals because every one is in some sense important.... The resulting performance of the journals market is socially undesirable and economically inefficient....

This conceptual model helps explain the rapid increase in journal prices during the 1970s as in no small part a direct result of the proliferation of journals during the 1970s. This model also offers a particularly persuasive explanation of the nature of the interaction between library acquisitions practices and the publishing entities with which they interact. Any study that neglects the essential link between circulation and subscription price will fail to explain the relevant phenomena. It is also easy to see why prices of titles published by commercial publishers are almost inevitably higher than prices charged by nonprofit publishers. Nonprofit publishers—scholarly societies, for example—have a variety of ways of reducing first-copy costs so that unit prices can be kept relatively low.

There are a variety of hidden subsidies that are unlikely to appear in the calculus of commercial publishers: in some instances societies levy page charges, which provide revenues denied the commercial publisher; and in many instances, perhaps most, the editor of a scholarly journal published by a nonprofit press is either not compensated at all or receives



only modest compensation. Ironically, the potential for revenue from advertising would appear to be greater for commercial publishers. Such revenue could, in theory at least, be applied primarily against first-copy costs.

This set of relationships, which underlies production of the scholarly journal, is likely to produce exactly the pattern we have seen: the size of the periodicals universe increases; relatively fixed materials budgets at libraries result in a decrease in the number of subscriptions per title, as available resources are redistributed among a greater aggregate number of available titles in the periodicals universe; prices per title increase as publishers seek to recover first-copy costs from smaller subscription bases; libraries redeploy materials expenditures in response to periodical price increases, protecting serials subscriptions at the expense of other library materials but still cutting back on some subscriptions; and library budgets are encumbered by rapidly rising outlays for serials.

Although the existing literature principally concerns the economics of the scholarly journal, there is some evidence of a similar kind of market dynamic in the production and acquisition of scholarly monographs. At one academic press whose experience is thought to be representative, the average number of hardcover copies sold per title in the humanities and social sciences declined between 1976 and 1986, from between 1,250 and 1,500 to fewer than 1,000. The smaller press runs caused by this decline in copies sold per title unquestionably put upward pressure on unit prices, since here too first-copy costs must be spread over the relevant number of units sold. Concomitantly, there was an increase in the number of titles published. One explanation offered by several university press directors was that there have been fewer sales of each title to academic libraries, one of the principal markets for university press books. Here again, we see the interaction between acquisitions practices and an underlying cost structure.

More generally, this set of interrelationships—among cost structures, patterns of demand, market characteristics, and the forces leading to more scholarly output—are entirely consistent with the empirical realities. They explain why in recent years increases in dollars spent on library materials have yielded little or no increase in the overall rate of acquisitions, while at the same time the number of items available for purchase has continued to increase. They are the explanation for the widening gap between the number of volumes added gross and book titles published. Over the short term, libraries have responded to these circumstances primarily by redistributing their resources. This mode of response cannot be sustained indefinitely, however, and it is already under challenge as both temporizing and inadequate. Increasingly, there is the realization that *no* institution,

no matter how amply endowed with resources, can hope to maintain a self-sufficient collection into the indefinite future.

The decisions of some of the wealthier institutions to increase acquisitions expenditures may be seen as only an interim expedient, although a critically important one, since maintaining reasonable continuity of coverage of the world's scholarly output must be considered an important objective, in order that the even more fundamental objective of maintaining access to the capital of scholarship can be met.

A more viable long-term solution will almost certainly entail fundamental reconfiguration of the dynamics of scholarly communication: perhaps some modifications to a reward system that in part explains the proliferation of scholarly journals and monographs; certainly some application of developing technologies to the problem of first-copy costs; surely much fuller use of new technologies to facilitate greater sharing of resources; and, conceivably, even alterations in the law that governs the rights to "published" material. Part 2 of this study discusses a range of options, most of which depend on greater use of new technologies, that could lead to quite different patterns of scholarly communication.



## Manual of Management System in Libraries

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### Performance Indicators for Electronic Library Services

This deliverable report presents the finalised set of electronic library performance indicators (PIs) devised during the EQUINOX project after extensive consultation with the professional community. The purpose of this set of indicators is to enhance and complement the indicators for traditional library services presented in ISO 11620: Library Performance Indicators. They are not intended to replace these indicators and indeed it is strongly recommended that these indicators be collected together.

Great care is needed when using any performance indicator to make comparisons between libraries. Indicators which are based on the target population are particularly problematic, because each library will define that population to reflect its own operational environment. Careful analysis of the definitions used to establish each dataset is therefore essential if valid comparisons are to be made. It is also recommended that sampling methods be agreed in advance between libraries where comparison is to take place. For example, academic libraries in a region or public libraries in a national context may agree to use the same methods and instruments. It is important that the level of confidence be stated explicitly when sampling methods have been used.

At this present point in time it is not possible to extract all of the datasets required for these performance indicators from all electronic library services. Some service suppliers continue to provide very little or no usage statistics in relation to their services. Even for those services where usage statistics are made available, different data may be available from each supplier. It is hoped that the datasets required for these performance indicators may give service suppliers some indication of the

sort of data that libraries would like to be able to extract from electronic library services, so that comparable data would be available from all systems. While the current situation pertains, some datasets may be impossible to collect for all services, although some data may be collected by user survey, where this is appropriate.

Where a particular dataset is not available for a service, this service must be excluded from the indicator. Alternatively the data may be collected by user survey, if appropriate.

This Report is structured in the following way:

- A summary of the finalised set of electronic library PIs (Section 2)
- A consolidated list of the datasets needed to calculate the PIs (Section 3)
- Definitions of terms (Section 4)
- Dataset collection and PI calculation methodologies (Section 5).

In addition Appendices are provided to present a short bibliography, a note on the deliberations which led to the production of the current document and the XML DTD specification.

### **Electronic Library Performance Indicators**

Performance Indicators:

1. Percentage of the population reached by electronic library services
2. Number of sessions on each electronic library service per member of the target population
3. Number of remote sessions on electronic library services per member of the population to be served
4. Number of documents and entries (records) viewed per session for each electronic library service
5. Cost per session for each electronic library service
6. Cost per document or entry (record) viewed for each electronic library service
7. Percentage of information requests submitted electronically
8. Library computer workstation use rate
9. Number of library computer workstation hours available per member of the population to be served
10. Rejected sessions as a percentage of total attempted sessions
11. Percentage of total acquisitions expenditure spent on acquisition of electronic library services

12. Number of attendances at formal electronic library service training lessons per member of the population to be served
13. Library staff developing, managing and providing ELS and user training as a percentage of total library staff
14. User satisfaction with electronic library services.

### **Consolidated List of Datasets**

[ELS = Electronic Library Services. LCW = Library Computer Workstations.]

*Total number of persons in the target population*

*Total number of persons in the population to be served*

*Number of persons in a sample who have used ELS during a specified time period*

*Total sample size used to establish the percentage of the population reached by ELS*

*Total sample size for user satisfaction survey*

*Sum of the values for each ELS indicated by the users in the satisfaction survey*

*Number of sessions on each ELS by members of the target population during a specified time period*

*Number of sessions on ELS by members of the population to be served during a specified time period*

*Number of sessions on each ELS during a specified time period*

*Number of remote sessions on ELS by members of the population to be served during a specified time period*

*Proportion of total sessions which are remote for services where this information is available*

*Number of rejected sessions on a licensed ELS during a specified time period*

*Number of documents viewed from each ELS by members of the population to be served during a specified time period*

*Cost of each ELS for a specified time period*

*Acquisition expenditure on electronic library services*

*Total acquisitions expenditure*

*Number of information requests submitted electronically during a specified time period*

*Total number of information requests received during a specified time period*

*Mean number of LCW at a specific point in time*

*Number of LCW provided at a specific point in time*

*Number of LCW provided during a specified time period*

*Number of hours the library is open during a specified time period*

*Number of full-time equivalent library staff providing, maintaining and developing ELS and providing user training*

*Number of full-time external staff providing, maintaining and developing ELS and providing user training*

*Total full-time equivalent library staff*

*Number of attendances at formal ELS training lessons during a specified time period.*

### Definitions of Terms

The term 'library' is used throughout this document but can be taken to refer to an information service irrespective of its title. Standard definitions have been used where possible. Whether the definition is taken from an ISO document or has been defined by the EQUINOX project is indicated in bold after the definition.

**Cost:** Acquisition, subscription, license and pay-per-view costs for electronic library services made available by the library. Network and hardware costs should not be included. EQUINOX

**Database:** Collection or file of electronically stored data or unit records with software for the retrieval and manipulation of the data.

**Document:** Recorded information or material object which can be treated as a unit in a documentation process.

[NOTE: Documents can differ in their physical form and characteristics.]

**Document or Record Viewed:** Any full text of a digital document or electronic resource that is uploaded, or any catalogue record or database entry that is fully displayed during a search.

**Downloading Transaction:** Any procedure that aims to reproduce electronic data onto a local storage medium or printing facility.

**Electronic Library Resources:** Every document in electronic form which needs special equipment to be used.

[NOTE: Electronic resources include digital documents, electronic serials, databases, patents in electronic form and networked audiovisual documents.]



**Electronic Library Services:** A service which is either supplied from local servers or accessible via networks.

[NOTE: Electronic library services comprise the OPAC, the library website, electronic resources, electronic document delivery and internet access offered via the library.] ISO/DIS 2789 [NOTE: referred to as ELS throughout].

**Entry:** Bits of information, especially from reference databases or directories *e.g.* records, abstracts etc. ISO 5127-1.

**Information Request:** Information contact that involves the knowledge or use of, or recommendations, interpretation or instruction in the use of, one or more information sources (such as printed and non-printed materials, machine-readable databases, the library's own and other institutions' catalogues) by library staff. May also involve recommendations, interpretation or instruction in the use of such sources.

[NOTE 1: The request can be delivered personally or by means of telephone, regular mail, fax or electronic media.

NOTE 2: It is essential that libraries do not include directional or administrative enquiries *e.g.* for locating staff or facilities, regarding opening times or about handling equipment such as reader printers and computer terminals.

NOTE 3: Enquiries are also excluded if asked for the purpose of locating items of stock that have already been identified bibliographically.] ISO/DIS 2789.

**Library Collection:** All documents provided by a library for its users.

[NOTE 1: Comprises documents held locally and documents on remote resources for which access rights have been acquired at least for a certain period of time.

NOTE 2: Access rights may be acquired by the library itself, by a consortium and/or external funding.

NOTE 3: Acquisition is to be understood as deliberately selecting a document, securing access rights and including it in the OPAC or other databases of the library. Interlibrary lending and document delivery and excluded.

NOTE 4: Does not include links to Internet resources for which the library has not secured access rights by license or other contractual agreement. ISO/DIS 2789.

**Library Computer Workstation:** Public access networked and stand alone computers, provided in the library, though not necessarily by the library, offering access to electronic library services. EQUINOX.

**Session:** An established connection to an electronic service, usually by a log-in.

[NOTE 1: Connecting to a website is regarded as a session if the referring link is external to the website.

NOTE 2: Connections to a general entrance or gateway page should be excluded.] ISO/DIS 2789

**Population to be Served:** Number of individuals for whom the library is set up to provide its services and materials. ISO 11620

[NOTE: For public libraries this will normally be the population of the legal service area; for academic libraries this will normally be the total of academic and professional staff plus students. Each library must decide who to include in its population to be served and this must be carefully recorded to facilitate benchmarking.]

**Rejected Session:** Unsuccessful attempt to connect to an electronic library service because of requests exceeding the simultaneous user limit.

[Note: Rejection through entry of wrong passwords is excluded.] ISO/DIS 2789

**Remote Session:** A session established from outside the library building. EQUINOX

**Target Population:** Groups of actual and potential users appropriate to an individual library as the object of a specific service or as the primary users of specific materials. ISO 11620

[NOTE: The target population may be the population to be served by the library, a specific group within that population, or some other group that the library is aiming to serve. The target population must be defined by the library in each instance and carefully recorded to facilitate benchmarking.]

## Digital Libraries and Special Libraries

### **Initial Concerns of Special Libraries in the Social Welfare Sector**

The National Institute for Social Work (UK) has begun to explore what librarians working in special libraries in the social welfare sector think about the possibilities and threats offered by digital libraries.

The project arose out of a concern that whilst there has been a major focus in recent years in the library and information field on the Internet, and digital/electronic/virtual libraries, the impact of such developments on special libraries, particularly outside the commercial sector, has not received as much attention. The project also addressed the extent to which practitioners working in local government or voluntary social service

agencies are being prevented from accessing digital library developments-through lack of access to the UK Higher Education network JANET, the digital resources academic library provide themselves and various collaborative schemes which offer access to digital resources across the academic network as a whole.

### **Questionnaires**

The first part of the research with special libraries involved an approach to a number of librarians who were asked to complete a questionnaire intended to gather baseline information. This covered the use those libraries were making of the Internet, and potential barriers, threats and opportunities that the librarians could identify to their participation in digital library developments.

The participating libraries were from a range of national and regional social welfare agencies, including the National Society for the Prevention of Cruelty to Children, the National Children's Bureau, the Policy Studies Institute, and the London Voluntary Services Council.

The libraries surveyed were found to have library databases and a range of "free" and fee-earning services. A small number had published their databases on CD-ROM, but few had input into the construction of their organisations' website (where one had been developed).

### **Focus Groups**

Following on from the initial questionnaires, a focus group was held to which a number of librarians were invited. All librarians who had participated in the questionnaire phase of the project expressed an interest in attending, and a dozen were invited and accepted. Last minute cancellations reduced the number of participants on the day to six.

The librarians were asked the following question:

*What are the main issues to be faced by Library and Information Staff in Special Libraries in promoting and developing digital libraries?"*

They were invited to record their replies individually and then to pool the results. They were then asked to select five issues each and to prioritise these by awarding points from 5 (most important) down to 1 (fifth issue). The issues identified and scores awarded were (in order of decreasing priority) the following:

1. Funding of the whole project
2. Staffing skills; relevant expertise
3. Access and connectivity

4. Managerial attitudes-“wasting time surfing” and changing managerial attitudes
5. Constantly changing-keeping up to date
6. Cost and problems in obtaining the information you retrieve
7. User education
8. Outside University system: feel excluded (from JANET)
9. Quality of the information on the Internet (compared with *e.g.* Medline)
10. Staff time taken to do searches
11. General staff expectations-“Everything is on the Internet”
12. Lack of technical knowledge and difficulties in keeping up with changes
13. Identification of valuable and reliable sources
14. Time (to develop system)
15. Security problems
16. No longer have hard copies to thumb through
17. Ownership issues: libraries having to work with IT
18. How long stuff will be archived
19. Electronic copyright
20. Attitudes of publishers and Library System developers: they assume that the Internet is already developed
21. Changing role of Librarians as teachers
22. Medium within which material is archived (technology constantly changing)
23. How to organise information collected (Bookmarks).

Those items which received most votes were looked at in greater detail.

### **Finance**

Funding was the top-ranked issue and involved the following concerns:

- Competing for capital bids that are not just cosmetic
- Building a business plan to show savings (*e.g.* through Internet access to Government publications)
- Pilot projects may provide a way forward but entail staff time which may not be available
- Recognition of a stepped rather than incremental cost progression for development (the next stage may cost substantially more)

- Consortial responses to seeking capital funds (but this may lead to expanding the clientele beyond organisational aims)
- Willingness of organisations to provide information is an issue (earning income v disseminating information)
- Hantsnet was suggested as a local authority model: a county council network which enable staff to access resources both internal to the council and external resources
- Scope for joint underwriting: joint initiatives with shared costs across several libraries.

### **Skills Development and Training**

The librarians identified substantial unmet training needs. There were problems concerning training of information staff and developing their skills and expertise where staff had some competence, resulting in packaged training being inappropriate. They saw part of the answer as focused (customised) off-site training.

The librarians also discussed the problem of managing the transition from manual to IT-based information systems and of providing appropriate training when staff were operating in both worlds—"maintaining the old and exploiting the new".

### **Managerial Attitudes**

The librarians pointed to external pressures as increasing the demand for IT application and suggested that it had to be "sold" to managers in terms of "business critical" issues. They also drew attention to unreal management expectations—the media building up a picture of the Internet as containing all the information that is needed and where "everything is free".

### **Operating Costs**

This discussion led the librarians into a more detailed discussion of operating costs (as distinct from the larger financial issues already discussed) including:

- The costs of obtaining items located, which could tend to act as an information censor if too many items were identified and requested—the identification of bizarre and obscure references when much more suitable material was available locally
- The prohibitive cost of commercially valuable information that would be useful
- Substituting costs, that is offsetting the "new" costs against savings from information that is now more freely available *e.g.* reassigning

Hansard (UK parliamentary proceedings) subscriptions, which are expensive in print format but freely available Internet.

### **Access and Connectivity**

Predictably, access and connectivity issues were raised;

- The issue of the next development step (expensive)
- Fast connections (dedicated connections faster than a 28.8kbps modem are relatively costly)-ISDN is considerably more expensive in the United Kingdom than in many other countries
- Searching via libraries (giving users better access)
- Low quality searching by users
- The need for a strategy of associating libraries with digital information.

### **Change**

The librarians saw themselves as living in a world of constant change which required continuous education through workshops, electronic groups, and other means. Keeping up to date with changes was difficult.

The Focus Group enabled a range of key issues to be identified and discussed in some detail. Participants shared an interest in digital library developments, but were able to outline a range of obstacles, whether the libraries in question were at the very initial stages of utilising the Internet and other resources, or were in fact more developed-to the extent of publishing their own databases on CD-ROM. The potential for working co-operatively at various levels to address these issues, and the potential for more coordinated networking across the social welfare library sector was identified. The next stage in the project is to share the issues outlines from the Focus Group with a larger group of participants in an effort to develop a coordinated strategic framework for the social welfare library sector.

### **Special Libraries in China: Present and Future**

We are living in the era of information. The significance of the role played by information in all kinds of human activities, especially socioeconomic development in changing and developing societies, is too great to ignore. In a sense, information service is all the more needed in developing countries. As we know, technology, equipment, quality, economy, living standard and society in developing countries are all inferior to those in developed countries.

They must, therefore, refer to the successful experiences of advanced nations and incorporate and use the latest achievements in science and



technology in their endeavour to catch up with developed countries. Information service is the vehicle to provide and facilitate exchange of information and thus plays a key role in their endeavour.

Information service is *raison d'être* of a special library, whose objective is to provide information in support of the objectives of its parent organization. The special library must provide information in a more efficient and economical way than other libraries. In developing countries, the special library occupies a predominant position over public and college libraries in serving the development of local economy and society. Special libraries in developing countries is obliged to fulfil this role.

### **Libraries**

Information service in China is mainly provided by more than 3,700 libraries with different clientele. These libraries are generally classified into six categories: national, public, academic, research, school and military. Beijing Library (the *de facto* national library), founded in 1960s and now administered by the Ministry of Culture, is the biggest library in the country with a holding of 18 million titles.

It offers a variety of services such as acquisition, cataloguing, distribution and SDI (Service of Directed Information) to all walks of life. Over 700 public libraries, which are maintained by local governments of all levels and technically guided by the national library, provide information service to local residents with collections on literature, languages, arts, sports and so on.

More than 1,300 academic libraries, or university libraries as known in some other nations, are located in the universities and colleges throughout the country.

Their users are mainly students and faculty members. School libraries refer to those libraries in the middle or high schools. At present, they exist only in those famous middle schools in such big cities as Beijing, Shanghai and Guangzhou. Military libraries obviously offer services to scholars, engineers, technicians in defence industry, and military officers and soldiers.

The research libraries, so called by Chinese library scholars, are similar in definition and characteristics to the special libraries commonly known in the West. Information services such as "Document and Information Centre" or "Scientific and Technical Information Institution" in China, therefore, belong to the category of special libraries.

By the end of 1994, there were 1,100 of special libraries at different levels with a total staff of 100,000 and a combined collection of 100 million titles in China. Thus, special libraries, together with public and academic libraries, are three pillars of the national information service.

## Special Libraries

**Structure:** The special libraries are an important component of the Chinese library system. All Chinese special libraries are maintained by government agencies and institutions and are under the jurisdiction of those agencies and institutions. There are two types of special libraries in China—libraries of the Academy of Sciences (natural sciences and social sciences), libraries in the numerous research institutions under the Academy; and libraries in various ministries or commissions such as the ministries of geology, medicine, agriculture, and industry as well as in their numerous branches.

The libraries of the Academy of Sciences include the Document and Information Centre of the Chinese Academy of Sciences (DICCAS), and the Document and Information Centre of the Chinese Academy of Social Sciences (DICCASS). Both DICCAS and DICCASS have many branches throughout the country. The principal collections of DICCAS are mathematics, physics, chemistry, astronomy, geography, biology, interdisciplinary science, and high technology whereas DICCASS holds collections mainly in the social sciences.

The special libraries in China's ministries and commissions are divided into three classes. The first class (*i.e.*, the national class) includes four special libraries: 1) the Institutes of Scientific and Technical Information of China (ISTIC), maintained by the State Science and Technology Commission (SSTC); 2) the China Defence Science & Technology Information Centre (CDSTIC), maintained by the Commission of Science, Technology and Industry for National Defence (CSTIND); 3) the Document Centre of the Patent office of China; and 4) the Standards Information Centre of China (SICC), maintained by the State Bureau of Technology Supervision (SBTS).

ISTIC's principal collections are engineering and technology, management science and high technology. CDSTIC's primary collections are military science, military industry and weaponry. ECPOC's principal collections address patent specifications, bulletins and classification index in China and from other countries.

SICC's main collections are national standards, regional standards, specialized standards, enterprise standards, and measurement documents in China. It is also the national centre which collects international standards such as those formulated and issued by ISO (International Standardization Organization) and IEC (International Electricitization Committee) and other standard materials from abroad.

The second class (*i.e.*, the ministry class) are specialised document and information centres maintained by the ministries or commissions under

the State Council. Their principal collections are materials closely related to their specialties, such as textiles, geology, medicine, aeronautics, and nuclear engineering. These special libraries also organise and coordinate the information services of their specialised fields (including acquisition, distribution, procession, and other services) and provide users within the ministry, commission, or branch with specialised information services. There are about 60 libraries of this class in China.

The third class (*i.e.*, the local class) includes the scientific and technical information institutes of provinces, prefectures, and counties. Their principal collections are materials closely related to the local economy and society, and meet local information needs with practicable technology information such as standards information and trade literature. These libraries are maintained mostly by local science and technology commissions.

The fourth class (*i.e.*, the enterprise class) are virtually information-consulting organisations which have mushroomed after Chinese government established a policy to enhance scientific and technological information system development in late 1992. These special libraries are independent financially. However, they have few information resources of their own due to financial problems. They provide customers with information service by collecting information from other information resources outside their organization.

**System:** The Chinese government established a policy of unified management and planning over the system of special libraries. SSTC manages all the special library's system on behalf of the Chinese central authorities and is in charge of the exchange of information and cooperation within the libraries, building and leading the national information network, and establishing and implementing the rules, laws, and standards concerning information services.

Under the unified management, the information services network of special libraries and the national special libraries' system have been formed, and play an active role in the national information exchange and rational distribution of document resources and services. The structure and system of the special libraries in China.

**Information Service Pattern:** Information is an important resource for the development of the national economy, science, technology, and society. As early as in 1956, the Chinese government established a policy that gave considerable importance to the building and development of special libraries. More than 30 years later, the special libraries in China have established an information service pattern (including the scope and types of information services) suitable to the Chinese condition. The scope of information services of the special libraries is illustrated in Table.

*Scope of Special Libraries' Information Services*

Industry	Including import and export, trade, developing new products, public relations and investment, etc.
Research	Including appraising the achievement, user education, and varied research, etc.
Society or Public	Including market supervision, law affairs, arbitration of trade, agriculture, citizens' education, etc.

***Scope of Special Libraries' Information Services:*** The types of information services are many and varied, including: information consultation, information searching, SDI, foreign materials translation, reading services, secondary processing, trade literature, user education, subject information research and "enterprise diagnosis."

During "enterprise diagnosis," information staff, together with technology and management experts, economists and others, go to an enterprise to identify the problems in management, technology, process or financial affairs, and then provide consultation services or other type of assistance. This is an advanced information service quite suitable for enterprises in developing countries.

DICCAS concentrates particularly on scientific research, and DICCASS on social science research. ICSTND's primary focus is on military science and military industry, while the other "first class" special libraries pay particular attention to industry, society, and research. To sum up, the first-class special libraries serve the growth of national economy. The second-and third-class special libraries serve mainly the development of industry and the countryside. The forth-class special libraries are focus on the business and societies as well.

The special libraries in China have, step by step, developed a widespread and qualitative information service. Before the death of Mao Zedong (*i.e.*, Mao Tse-Tung) in 1976, Chinese special libraries largely followed former Soviet conventions in their information services and management, serving only for scientific and technical researches. After Den Xiaoping came to power in 1979, China began to reform and open to the outside world. Then Chinese government began to emphasize its economic development and improvement of people's living standard, which resulted in tremendous demand of information and information service.

Consequently, Chinese special libraries started providing industry and enterprises with information service. After 1992, the policy of deep reforms and widespread opening to the outside world required that special libraries extend their services to the Chinese society as a whole. Since

then, the content and types of information services special libraries provide have gradually become more varied and flexible. This has enabled special libraries to fulfil even more varied needs while highlighting the need for information and the importance of special libraries and information professionals.

### **Distinguished Features of Information Services**

***Audiovisual Information Services:*** Audiovisual information services have become an important part of the Chinese special libraries' information service system. They mix technology and art together and are vivid, lively, and easy to understand. Therefore, they are suitable forms of information services for general users.

The special libraries' audiovisual information service network covers nearly all of China. Chinese special libraries now have 1,800 full-time staff for audiovisual information services, more than 800 facilities for production, translation and broadcasting, and more than 1,000 locations to show and distribute audiovisual materials. In recent years, Chinese special libraries have produced more than 2,500 scientific and technical films or videodisks, importing additional 1,500 from abroad. They have also provided broadcasting for about seven million information users. All of these activities have produced tangible benefits for the Chinese economy and society.

***Serving the Countryside:*** The Chinese special libraries have also concentrated on providing information service to rural (agricultural) areas in China, including countryside enterprises which are mostly small industries set up by the rural governments or peasants. Their efforts have met with success among the peasants and countryside enterprises.

In China, agriculture is the predominant factor in the national economy, as eighty percent of the Chinese population lives in the countryside. Providing agricultural and countryside enterprises with suitable information services can not only promote the development of the rural economy but can also improve living conditions there. Chinese special libraries have provided the countryside with widespread and significant information services as they build the information network and set up information exchange centres to promote communication and information transmission from information agencies or cities to the countryside.

They also train the information centre staff, especially those who will concentrate on serving the peasants and the countryside. These librarians recommend improved plant breeds and agricultural techniques according to the information needs and characteristics and problems of countryside enterprises—specifically, their strong demands for information and information services and lack of search capacity.

***Emphasis on Gaining Profit:*** Chinese special libraries are concentrating on the creation of unique information products by making full use of their rich information resources and advanced information technology and equipment. They are now beginning to adopt the methods of management and administration of profit-oriented enterprises and to build the “information market” step by step. Today in China, information services are considered a sort of commodity which may sell in the “information market” and gain profit. But before 1985, prior to the reform and opening to the outside world, this was not the case. Since then, the Chinese government has actively encouraged these types of information services and has given them a lot of favourable conditions such as a preferential tax ratio. In 1988, Chinese special libraries generated a total revenue of about £4 million, which rose to £23 million in 1994.

### **Conclusion**

Relatively early on, the Chinese government had a clear and correct understanding of the value of information and special libraries. And in early 1986, the government began to develop the nation’s special libraries and information services. Since then, it has promulgated more than 40 decrees and orders about the special libraries, defining their roles, usage, obligation, and organization by law. At the same time, it has provided special libraries with budget and staff guaranteed by law. As a result, the establishment of China’s special libraries and their information services is rather advanced and successful. They have made a great contribution to the development of the national economy and society through their work.

After the national conference on scientific and technical information held in 1990, the Chinese government has placed such importance on the value of information and information services provided by special libraries to vitalize the economy and raise the living standards of people that it published the “National Development Policy of Scientific and Technical Information: Blue Paper of Science and Technology No. 6”, which was revised in 1994. The development of information has gradually been placed on the plan of national development. This is clearly an effort to enhance the roles of special libraries in the national economical development.

### **Resource Sharing Among West Texas Special Libraries**

Special libraries come in all shapes and sizes. Their purpose, collections, and patrons constitute unique blends of information services and resources. While the focus of this article is church libraries, the process and principles of resource sharing apply to any specialized collection of information sources. Yet, church libraries constitute the most common and widespread type of special library, thus they exemplify the potential for resource



sharing among special libraries. The range of resource sharing options described in this article is quite diverse, ranging from the donation of duplicates as “seed sources” for new collections in neighbouring churches to establishing an Internet accessible, Web-based catalogue available around the corner or around the world. This type of catalogue became operational on November 5, 1997, at First Baptist Church, Lubbock, Texas, and may be the first such online catalogue in a church library in Texas, the United States, or perhaps the world. The range in resource sharing activity in this project exhibits a broad yet simple concept of resource sharing. Academic libraries have been doing so for years. Now with the advent of relatively inexpensive personal computers and the efficient networking afforded by the World Wide Web, resource-sharing networks are now possible among the smallest and most specialized of libraries.

### **Taking the First Step**

Each journey begins with the first step. The history of First Baptist Church and its Media Library is relatively long and distinguished. It is well documented and available in electronic as well as print formats, and will not be repeated here. Suffice it to say that the present collection is the product of the diligent and faithful service of many dedicated volunteers.

As time marched on and the collection grew, it did so without the direction of written guidelines or the professional training commonly associated with a professional degree in library and information science. This is common in church libraries. Thus, the first step toward modernization involved writing collection development and circulation policies. We then set out to weed duplicates and titles that did not fit these written guidelines.

Without these written guidelines, it is quite difficult to express a vision for your library. Any vision that is well articulated is much more likely to be achieved. We simultaneously attempted to gain a better understanding of the collection by sampling the shelves to determine the material's age and use patterns. Use drastically dropped off in the late 1980s. A number of factors may have contributed to this, such as the health of the librarian, quality of the collection, and the general reading habits of the congregation.

Once we had taken stock of what was in the collection, we initiated the first step in resource sharing: donating items to other special libraries in the area. The local phone directory and the Lubbock Baptist Association served as the main reference points with which to contact potentially interested libraries. In some cases the donated items served as the seed to start a brand new library while in other cases they supplemented existing collections. In addition to church libraries, other religious support groups received materials to help with their educational mission. Buckner's

Children's Home was one such local ministry. Many of the weeded items were transferred to other ministries at First Baptist, such as the Children's Development Centre and Love in Action, a prison parolee ministry. Occasionally, books were moved out of the circulating collection into the Heritage Library, which is the historical archive of First Baptist Church. Between April 1996 and November 1997, 3,796 items were removed from the circulating collection. Some items were also sold to church members and local second-hand book stores. Approximately 25 items are added to the collection each month. Funds for the purchase of new items come from sales, fines, and a regular budget. The latter source is by far the largest. Gifts are also received and added if they do not duplicate items already in the collection and meet the written collection development guidelines.

In tracking usage patterns of our church library, we find that July is the most active month, probably due to our summer reading programme. It is less clear why April use drops off so much from the highly active month of March. Overall, average use is 292 transactions per month (the library is open 12 hours per week).

Evaluating use by material type or Dewey classification suggests that patrons are most interested in children's books, religious books, videos, and fiction. In spite of the fact that many of our heavily used items are not classified as "religious," they are characterized by Christian content. Another clarification regarding use involves videos. Most of our video use is with children's titles. This should ease some of the concern that has been expressed over the years about possible "competition" with the public library. In fact, the importance of church libraries may be growing as public libraries collect fewer Christian works and publishers of Christian books increase output to meet demand.

It might be expected that levels of use correspond with the amount of material available in any particular format or classification, but this is not necessarily the case. Based on available shelving, children's books do have similar levels of use and representation in the collection, nearly 24% each. Videos, on the other hand, occupy a relatively small part of the collection (5%), yet receive a significant level of use (21.2%). Fiction materials follow the same pattern but not to the same extent, 8% of the collection and 12% of the use. Religious works show the opposite pattern, with correspondingly less use (22.6%) for more material (44%). The level of use for religious titles is higher than any other group, except children's books, yet if size of the collection is any indication, higher use would be expected.

### ***What do others Say? Literature on Church Libraries***

Not a great deal of information has been reported in the professional literature regarding church libraries or church librarianship. Yet, there is no lack of material about the technical aspects of organizing and sharing

library resources. Thus, it is simply a matter of applying the available information regarding emerging technologies to any particular type of special library, church or otherwise. There will be no attempt here to present a comprehensive picture of what the literature has to offer on resource sharing among church or other special libraries. Rather, I will present a brief review of selected articles relevant to this topic.

While special libraries, especially church libraries, have a long track record of exemplary service, the historical record only weakly documents this fact. Yet, sufficient gems exist from which we may draw a wealth of insight. The professional library literature of the last twenty or thirty years is particularly weak in this regard and even reveals a significant attitude shift against church libraries.

Parochial libraries have been more fully studied. Authors such as John Day present the historical context in which many of these libraries functioned, how they were managed, and what one could expect to find on the shelves. Owens, on the other hand, makes stronger claims about the significance of these collections in the lives of church members and the role they played in the development of public libraries in this country. Although it may surprise many, she states, "It is not strange that Christianity was closely associated with modern book production and the establishment of libraries.

The library movement in the United States has its origins in the church library." In regard to book production, Fraser claims that the advent of the printing press, in at least some parts of the U.S., was directly the result of Christian missionary activity. The work of Thomas Bray offers perhaps one of the best pictures of how church libraries influenced early American culture with his parish and lending libraries at the turn of the seventeenth century. While not everyone agrees how extensive that influence was, many acknowledge that we owe most of our libraries to great churchmen.

While the origin of public libraries is intimately associated with the development of church libraries in the U.S., each has a distinctive role. A spirit of collaboration and cooperation should characterize the relationship between the two institutions: church libraries and public libraries are partners in meeting information needs. The manner in which special libraries fulfil their role in the coming years must adapt to changes in our culture. Just as academic and public libraries cooperate with like institutions in the development of resource-sharing networks, so can special libraries, such as those found in churches across the United States.

Many tools are available to support this work, such as those presented in the annual spring issue of *Library Systems*. It is largely a matter of having a "resource sharing" philosophy. Without this perspective, the

future viability of church libraries is in question. If church libraries and other special libraries are to fulfil their niche in meeting the unique information needs of tomorrow's generation, high-tech tools and networks must become the norm rather than the exception in our churches and synagogues.

### **Practical Steps**

The third step in resource sharing among special libraries involves automating the collection, then making the online catalogue available to the broadest possible audience with the most efficient interface—that of the World Wide Web. The Media Minister and others at First Baptist supported the development of an automated system for the Media Library, but I entered into a great debate: whether or not to automate. The primary concern was cost. One question loomed large: How many books could be purchased with the money spent on computers and the necessary software to mount an online catalogue? Other factors were involved, including my lack of expertise in the installation and maintenance of such a system.

First Baptist was in the process of gathering recommendations for renovating the church and upgrading the existing computer system. A task force was formed to recommend how the future media library should look and how it should function. Computers were an important element in their recommendations. Due to the high cost of this proposal and the renovation scheduled in other areas in the church, no action was taken at that time.

The general FBC computer upgrade did move forward, however, and the library received two Pentium PCs and one Bubble Jet colour printer. Eventually, a fully integrated system offering cataloguing, circulation, and search components was installed and catalogue records began to be added. Our use of EzCat, a bibliographic utility that enables the copying of catalogue records from various libraries such as the Library of Congress, the Ohio System, the University of California System, among many others, greatly increased the speed of adding our 10,000 items to the database. The final software component installed, Webrary, enabled anyone with Internet access and a Web browser to conduct simple or complex searches of our catalogue.

In addition to the components mentioned above, one must consider the operating system, such as Windows 95, Internet software such as Ws\_ftp, a modem, and an Internet connection, such as a static IP address, so patrons may connect to your library from anywhere in the world. Some level of familiarity with hypertext markup language (HTML) is essential and HTML editing software, while not absolutely required, may be helpful in creating the small number of Web pages used by a Web-based catalogue. Due to the rapidly changing software environment, especially as it relates to the Web, specific pricing information and software version availability

is not provided here. The supplier of the FBC system has a Web page and it should be consulted for details regarding these rapidly fluctuating factors.

The advantages to an automated system are substantial. Accurate reports, including inventories, are usually easy to produce and update with computerized library systems. Circulation statistics, fines, and overdue items are easy to track. The collection is also much easier to search for the up-and-coming generation of patrons that libraries are serving now and will continue to serve for many years. PC's in the church library also facilitate the use of many CD-ROM products that support teaching and the study of the Bible and related texts. Fun Christian games bring kids of all ages into to the library and bring them back to challenge the church librarian in a fast game of Bible-Baseball or similar activity.

Resource sharing among special libraries begins with an awareness of the inequity in the distribution of certain resources. Next, one must be willing to explore local options for extending access to some materials in cooperative ventures so as to form partnerships with other libraries having similar collections.

These collaborative arrangements enable patrons to find materials otherwise out of reach and require each participating institution to make an investment in the network of their extended special libraries "family." Resource sharing is a give-and-take operation.

The steps outlined here involve 1) Exploring local resource sharing options and identifying materials needed or available for distribution; 2) Establishing an efficient mechanism whereby information may be shared with the widest possible audience for the least cost, probably via the Web; and 3) Automating your library catalogue and installing a Web-based version of your online system.

While each library will need to proceed at a pace suitable to their size, budget, and expertise, it is simply a matter of taking the first step that will help build a resource sharing network in your city, state, or region. This network is now a long way from being complete. Yet, as electronic systems continue to drop in price and interest in these systems continues to increase in our culture, special libraries will enter into more and more networking partnerships to meet the information demands of individuals and groups neglected by the larger public and academic institutions.

As opportunities for collaboration and worldwide information dissemination grow, so do the challenges for maintaining system integrity and security. Yet, I am confident that special librarians will be better trained and more knowledgeable to meet these challenges and assume the risks, for greater risks imply greater rewards.

### **Library Studies Specialization**

Libraries exist to provide access to recorded information and knowledge in all of its formats. To accomplish this mission, librarians acquire materials—including books, audio and visual recordings, digital resources, and periodicals—and organize them for ease of access. They educate library users in strategies for finding needed information. Librarians encourage reading for pleasure, education, information, and inspiration; and they facilitate the creation of communities of readers. Librarians are strong advocates for all people's right to read and to inform themselves. A library can serve as an intellectual commons for a particular community, enabling people to come together around areas of mutual interest. In fact, libraries serve as the focal points for communities of many kinds—imagined communities as well as ones that are geographically determined (national, state and public library service areas) or institutionally based (in school, academic and corporate settings).

The library studies specialization at UCLA stresses the development of leaders for the profession and a commitment to the core values of the profession as articulated by the American Library Association:

- Access
- Confidentiality/Privacy
- Democracy
- Education and Lifelong Learning
- Intellectual Freedom
- Preservation
- The Public Good
- Professionalism
- Service
- Social Responsibility.

In addition to learning about values and ethics, this specialization also enables students to gain the competencies recommended by other professional associations, such as the Special Libraries Association and the California Library Association, and to begin to engage in activities of professional associations, emphasizing regional, ethnic, national and other concerns. UCLA supports strong student chapters of the American Library Association and the Special Libraries Association, and has its own Activist Librarians and Educators group and Diversity Recruitment and Mentoring Committee.

Within the library studies specialization, students learn the functional activities associated with the profession such as collection development,



public services, cataloguing and classification, service to children and young adults, and outreach to underserved populations. Students may also take classes that prepare them to work in a particular type of library, such as public, academic, or corporate. When they graduate they will have the basic professional skills expected of all beginning librarians as well as an understanding of the dynamic nature of the field and the challenges and opportunities it presents. Faculty research interests and information on their ongoing research projects relative to this area can be found on their respective websites. The following lists a broad array of student interests within this specialization:

- o Services to children and youth in multicultural communities
- o Information literacy instruction
- o Preservation of library materials in all formats
- o Digital reference services including the creation of electronic resources as well as email and chat reference
- o Design of library collections and services to meet intergenerational needs and the needs of specific communities including people with disabilities.
- o Ethical and legal issues, such as copyright, intellectual freedom, Implications of the USA PATRIOT Act
- o History of the book and bibliography
- o People's information needs and information-seeking behaviour
- o Library partnerships and collaborations
- o The libraries role in bridging the digital divide
- o Design of library buildings
- o Library partnerships and collaborations.

Students specializing in Library Studies complete a course of study which combines core courses, elective courses, and practical experiences such as internships, field work and research opportunities. Students are required to take a minimum of one research methods course such as systems analysis, historical methods, or social science research methods; students wishing to pursue more in-depth research may take independent study courses or write a thesis.

To better prepare themselves for positions of leadership, many students choose to culminate the programme by preparing a portfolio instead of writing a thesis.

Students are strongly encouraged to take advantage of the internship and field experience opportunities available at the more than 250 departmental approved sites in southern California including local academic

and public libraries and libraries in special settings such as law firms, the Henry E. Huntington Library in San Marino or the Ninth Circuit Court of Appeals in Pasadena. Other internships include national or international sites such as the Congressional Research Service (through the University of California in the District of Columbia) or St. Petersburg State University of Culture. These associations offer many opportunities for participation in the life of the Information Studies Department and the broader professional community. In addition, students are encouraged to take cognate courses outside the department in the humanities as well as the social and physical or life sciences, which will prepare them to serve particular communities, manage specific organizational settings or work with particular subject content.

The master's programme in library and information studies has held continuous accreditation from the American Library Association (ALA) since 1961. ALA accreditation assures the educational community, the general public, and other agencies or organizations that an institution or programme (a) has clearly defined and educationally appropriate objectives, (b) maintains conditions under which their achievement can reasonably be expected, (c) is in fact accomplishing them substantially, and (d) can be expected to continue to do so.

### **Archival Studies Specialization**

Archives play a critically important role in many aspects of society. As repositories of a culture's unique documents, records and other texts, archives serve as basic tools for social accountability, the preservation and dissemination of historical memory, and the development of a richer understanding of cultural, social and political forces in an increasingly digital and networked world.

In addition to covering traditional archives and manuscripts theory and practice, this area of specialization addresses the dramatic expansion of the archival field. It charts how accelerating technological developments have changed both the form of the record and methods for its dissemination and preservation. It responds to shifting social and political conditions as well as the increased codification of archival practice through local and international standards development. It actively engages debates about archival theory and societal roles in diverse archival and cultural jurisdictions.

The specialization comprises a range of courses, experiential components, and research opportunities. Courses explore the full spectrum of archival materials (*e.g.*, paper and electronic records, manuscripts, still and moving images, oral history); the theory that underlies recordkeeping, archival policy development and memory-making; and the historical roles

that recordkeeping, archives, and documentary evidence play in a pluralized and increasingly global society.

All students in Archival Studies are required to take IS 431 American Archives and Manuscripts as a foundation course for the specialization. Advanced seminars and an outstanding array of internship opportunities prepare students to play leadership roles in archives and manuscripts administration, records management, archival education and training, preservation, digital curatorship, recordkeeping policy development, archival systems design, electronic records management, and digital asset management. Students will also be expected to take research methods and statistics, and the core requirements for the M.L.I.S. degree. Students may select additional electives from Information Studies and/or from the following areas: American Law, Anthropology, History of Science, Moving Image Archival Studies, Management, Museum Studies, Sociology, History, and inter-disciplinary studies programmes that are offered in other UCLA departments and schools. Dual master's degrees are available with the Anderson School of Management, Latin American Studies and Asian American Studies (pending).

Students are strongly encouraged to avail themselves of internship and field experience opportunities available at over 250 approved sites in the southern California area. Internship sites include archives, museums, libraries, and information centres in such prestigious organizations as Cedars-Sinai Medical Centre, RAND Corp., the Getty Centre for the History of Art and the Humanities, the Ronald Reagan Presidential Library, the L.A. County Museum of Art, Dreamworks SKG, Walt Disney Imagineering, the Japanese American National Museum, the University of Southern California, and the Henry E. Huntington Library. Many internships are also available within UCLA, including UCLA Special Collections, Mayor Tom Bradley Collection, UCLA Film and Television Archive, the UCLA Ethnomusicology Archive, and the UCLA Oral History Programme. Students are also able to participate in additional internship programmes both nationally and internationally.

Archival students may also choose to complement their coursework with research experience. Information Studies faculty associated with the Archival Studies specialization have obtained funding from many prestigious research agencies including the National Endowment for the Humanities, the U.S. Department of Education, the National Historical Publications and Records Commission, the National Science Foundation, the Institute for Museum and Library Services, the Australian Research Council, the Centre national de la recherche scientifique (CNRS-France), the Commission on Library and Information Resources, and Intel Corporation for projects as diverse as curricular innovation in archival

education, use of primary sources in elementary and undergraduate science education, preservation of electronic records and digital music composition, new paradigms for educational access to archival resources, evaluation of online archives and museum resources, and the development of prototypes for digital retrieval of archival film. See: <http://is.gseis.ucla.edu/research/index.htm> as well as the Centre for Information as Evidence <http://gseis.ucla.edu/cie/index.htm> for further information on ongoing research initiatives relating to the Archival Studies specialization.

Examples of student emphases within the Archival Studies specialization include:

- Appraisal and collection-building
- Preservation of traditional and digital materials in a range of media
- Development of new methods for providing access based on the needs of diverse and non-traditional constituencies
- Design and development of automated records creation and recordkeeping systems
- Design and development of archival information systems, metadata including, inventories, finding aids and specialized indexes
- Curatorship of both site-specific and virtual exhibits
- Development, evaluation, and advocacy of archival and recordkeeping law and policy
- Scholarly research on comparative archival traditions
- Use of archival content in K-12 education
- Intellectual property management and digital licensing of primary sources
- Archival administration: from staff development to grant writing
- Providing reference and outreach services
- Management of special collections, archives, and manuscript repositories
- Design and supervision of digitization initiatives.

Graduates may work in both the private and public sectors in a number of roles, and are likely to work closely with others such as records creators, historical researchers, technologists, public officials, journalists, lawyers, and non-traditional users of archives. In addition to promoting the highest professional standards in archival activities, students are challenged to provide leadership within their own field and to advocate for archives and records concerns to the wider community. They will be challenged to investigate common orthodoxies in order to encourage

innovation and to re-think traditional models of archival organization and service to address the rapidly changing needs of the field and the increasingly diverse populations of records creators and users. UCLA also supports strong student chapters of the Society of American Archivists and the Association of Moving Image Archivists.

### **Informatics Specialization**

Informatics is the emerging discipline that envisions information technology design and use in terms that include its larger institutional, social, cultural, and cognitive dimensions. As information technology is applied to an ever-widening variety of contexts, including work, home, shopping, and public spaces, these new applications require a corresponding shift in the ability of information professionals to design, manage and evaluate information services.

Informatics is premised on the observation that successful design and integration of information technologies into society requires a sophisticated understanding of information seeking and use, metadata, user-centred design, electronic information genres, and how information technologies function as vehicles of power and social action. Students who complete the Informatics specialization will thus be well equipped to design modern information services, including digital libraries and repositories, metadata services, user training and relations, technical information retrieval, in a wide variety of institutional contexts, whether that be within libraries, archives, electronic media and publishing, cultural heritage institutions, standardization organizations, government, non-profits, or online businesses.

The Informatics specialization integrates educational offerings with both practical, in-the-field components and research opportunities. Courses explore theories of information-seeking behaviour and information use; theoretical foundations and diverse approaches (*e.g.*, ethnographic, participatory, user-centred) to information system design; human-computer interaction; design of metadata schemas for the provision of electronic services; database design and management; and information policy, including intellectual property, informational privacy and internet governance.

Some courses within the Informatics specialization may require that students have completed a computer programming course. Informatics students will be expected to take as their research methods requirement IS 282, "Principles of Information Systems Analysis and Design" as well as other core requirements and recommended electives in Library and Archival Studies. In addition, students will be encouraged to take cognate courses outside the Department, in Moving Image Archival Studies, Computer Science, Electrical Engineering, Law, Music, Biology, Geography,

Cybernetics, Economics, Psychology, Anthropology, Ethnic studies, Management and/or any programme which may usefully complement informatics training with a focus on particular communities, organizational settings, or subject content.

Students in the informatics specialization are strongly encouraged to avail themselves of departmentally approved internship and field experience opportunities available at over 250 internships in the Southern California area. Internship sites include high-tech firms, information service providers, libraries, archives, and information centres in a wide array of organizations including the Metropolitan Transportation Authority, the NASA Jet Propulsion Laboratory, Dreamworks SKG, Symantec, the Getty Research Institute, Amgen, Infotrieve, the Superior Court of Los Angeles County, the Centre for Nonprofit Management, and the Cedars-Sinai Information Centre. Several internships are also available within UCLA, including the Fowler Museum for Cultural History, the California Centre for Population Research, the Social Science Data Archive, and others. Students also are able to participate in other internship programmes, nationally and internationally.





## Library Development in Poor Countries

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### Introduction

Globalization is emerging as a major issue in the world today, affecting both “have” and “have-not” countries in many significant ways. In the library world, interactions between libraries in developing countries and organizations assisting libraries are not new: provision of information, resources, and expertise has been ongoing for much of the second half of the last century. Some of the issues raised by renewed concerns about globalization, however, stimulate inquiry into the efforts of developed countries assisting libraries in developing nations. Despite questions being raised in the literature of other disciplines about the impacts of globalization, it appears that very little research has appeared in the library literature that examines the impact of this phenomenon on the practice of library aid.

The concept of “globalization” carries considerable political baggage: whether one views the term positively or negatively depends on one’s social and economic view of the world. For Held and McGrew, globalization is a “re-articulation of international space, in which the notions of sovereignty and democracy are being prised away from the traditional rootedness in the national community and the territorially bounded nation-state.” North American information-related companies view this “re-articulation” as an opportunity to expand their customer base into developing countries with technology-driven products, and most articles on globalization reflect this commercially-oriented, North American focus. Peter Evans, in “Trends, Pressures, and Realities in the Library Systems Marketplace,” speaks of the need for LIS companies to develop a different “corporate, cultural, and design philosophy” so they can compete and survive in countries with different languages and cultures. David Dorman, in “Taking Library Services around the World,” reports on library service companies such as

OCLC, Blackwell, and EBSCO, whose globalization strategies are designed to increase their share of the international customer marketplace and place their products in developing countries. Some librarians note that globalization can be a “very positive force for cultural and social and economic development...provid[ing] the opportunity for a much greater understanding and interaction among the various peoples of the world.” But this view, also expressed by Dorman, relates primarily to the opportunities and advantages realized by North American libraries whose access to information becomes more global as national barriers fall.

David Korten, former faculty member at the Harvard Business School, expresses a more pessimistic view of globalization. He gives evidence of increasing social and environmental disintegration in developing countries, and documents the negative human and environmental consequences of the successful efforts of international corporations to reconstruct values and institutions in developing countries to serve the company’s own narrow ends. According to Korten, the convergence of ideological, political, and technological forces behind this process of economic globalization shifts power away from the local governments who should be responsible for the public good (including funding for libraries) and shifts that power toward a handful of corporations and financial institutions driven by the quest for short-term financial gain. A negative view of globalization is also voiced by Alan Scott, who notes that increasing cross-national flows of information tend to make “nations, nationality, and national boundaries less important to people’s lives,” resulting in a loss of local identity, control, and responsibility.

This review of literature pertaining to library aid and globalization was prompted by the authors’ vacation visits to libraries in various countries, conversations with librarians in developing countries about the “double-edged sword” of donations, and by the authors’ admiration for those librarians who continue to deliver very important services in developing countries despite limited resources. The review will focus on two questions: what are the major needs of libraries in the developing countries? And, what are some of the ways those needs are – or are not – being met? Despite anecdotal evidence gathered by the authors during visits to developing countries that globalization has affected the type of library aid now needed, no research could be found that linked these two phenomena. It is the contention of the authors, however, that lessons learned from the existing research about more traditional “book” aid remain very relevant to library aid relationships affected by globalization, and that these lessons should be used as the basis for further research that incorporates this new phenomenon of internationalization.

The phrases “Third World” and “developing countries” are essentially Western in origin and use; they are used to describe less affluent countries

in Latin America, the Caribbean, the Middle East, Africa, Asia, and the Pacific. These descriptions are considered to be ethnocentric by most outside the Western world who do not characterize themselves in this way, nor divide the world into two camps – developed and developing. However, in the context of the literature to be discussed, these terms will be used as they are in the literature.

“The phrases ‘Third World’ and ‘developing countries’ are essentially Western in origin and use; they are used to describe less affluent countries in Latin America, the Caribbean, the Middle East, Africa, Asia, and the Pacific.”

Because a wide diversity of political, economic, cultural, historical, and geographic factors affect libraries in different countries, it is impossible for a single document, or even a suite of documents describing specific needs, to serve as a detailed blueprint for all. As a result, the literature chosen for Part One of this review was selected for its ability to provide general overviews of library needs in developing countries. Essays and books are included that provide a philosophical overview of issues and attitudes for both “givers” and “receivers,” an understanding of which is essential in developing successful programmes. Although published in 1966, Lester Asheim’s classic, *Librarianship in Developing Countries*, remains an excellent explanation of the philosophical underpinnings of culture and libraries, knowledge of which is central to developing successful aid programmes. Asheim’s book will form the starting point for Part One of the review.

In Part Two, the focus is on articles that describe an array of different programmes that have assisted Third World countries with library development. There are many different past and present aid programmes to libraries all over the world; it is impossible to review all of them. Therefore, we have selected articles that represent both positive and negative examples of different types of projects, while also highlighting a variety of donor and recipient countries.

One further point regarding literature selected: not surprisingly, much of the literature written in recent years about both the needs of libraries in developing countries and the projects in place concerns technology. While not discounting the importance of technology in this field, we have chosen to focus our attention upon more traditional areas of need, such as collection development and preservation, literacy, indigenous book publishing, and staff training initiatives. Despite the attention being diverted to automating and connecting libraries in both developed and developing countries, traditional areas of need still exist and, perhaps, are in danger of being overshadowed. As Lucinda Zoe explains in her thesis on women’s information centres in developing countries:

While library scientists and information specialists praise the abilities of the new technologies developed for information management – computerized online catalogues, commercial online database services, CD-ROMs, laser printers, FAX machines, and electronic networking to name a few – the small information centres in the developing nations of Asia, Africa, and Latin America struggle with fugitive materials that do not fit neatly into traditional classification schemes. ... Furthermore, however impressive the new information technologies and communication systems appear, use is difficult, if not impossible in areas where the infrastructure is not solid: the telephone system is unreliable or erratic; power supplies are often interrupted or non-existent for days, if not weeks; equipment, maintenance costs and access to continued materials (disks, paper, ribbons, etc.) are beyond the financial resources of organizations; and privacy, confidentiality, and protection of information is difficult...

### **Library Needs in Developing Countries**

#### ***Asheim Still Relevant***

Lester Asheim wrote his brief but compelling book, quoted from below, after he spent five years (1961-1966) visiting libraries in Africa, Latin America and Asia as Director of the American Library Association International Relations Office. The quotation provides his basic premise for appropriately serving the cause of librarianship around the world. Although written nearly four decades ago, many of Asheim's observations about library operations in North America and developing countries still hold true, but his opinions must, of course, be taken in the context of the times – the early 1960s. You may remember that I began with a reference to Culture Shock, which I said occurred whenever the system of logic in which we believe is challenged by a logical system to which we do not yet possess the key. It is not the other system that must be corrected, but the absence of the key. There are usually reasons for what people do, even if they are not our reasons. Before we condemn out of hand a pattern of behaviour which happens not to fit our preconceptions, we should try to find out what the reasons were that led to it. We may still not accept the reasons as valid for us, but we may discover a different context of validity for evaluating the behaviour pattern and its use by others.

#### ***Lester Asheim, Librarianship in Developing Countries***

Closed shelves, lack of extensive reference or circulating services, differing or absence of classification schemes, limited children's service and, above all, an emphasis on the primacy of the book over the reader are characteristics of Third World libraries as observed by Asheim. These characteristics are still prevalent today. In his book, Asheim looks for the "key" he mentions above. He describes how economics, education, societal

structure, attitudes towards authority, the impact of colonization and its (supposed) overthrow, the predominance of the English language worldwide, religious beliefs, attitude towards work, low prestige assigned to librarianship, and even climate have affected the development of libraries in these countries, and have resulted in libraries which, to Western standards, may appear to be below the mark. Asheim urges us, however, to avoid making that evaluation because:

*... the difference between two concepts of a service, an objective, or a procedure can be measured by the gap that exists between what each faction sees as the essentials. The essentials are determined by the goals each side wishes to attain, whether overtly stated or not. And the goals reflect the system of values each party holds, determined by its history, its tradition, its culture. We are as much victims of our heredity and environment as they are of theirs...*

Despite the “chasm” between cultures Asheim describes, he believes librarians can establish bridges. According to Asheim, the first question to answer is the hardest: “Does anyone really want the help we offer?” To provide background for one’s decision, Asheim then discusses many of the negative ways that Americans and Europeans have used libraries as propaganda agencies for political reasons (for example, donating books reflecting an anti-communism ideology) that in some cases led to the retardation of local development, an opinion shared by others: “[In the past, ] ... the establishment, growth and decline of donation programmes were more closely related to changing American foreign policy objectives than to the success or failure of... [the programmes themselves].” Despite possible negative elements, Asheim concludes that six characteristics of American librarianship are worthy of export:

1. the conception of the library as an organization of books,
2. the evolution of a library profession,
3. the attitude of service,
4. the function of the library as an education institution,
5. the role of the library in the advancement of intellectual freedom, and
6. the conception of organized information as a public resource and responsibility.

Simply put, aid programmes that support one or more of these functions and have the support and cooperation of local authorities are desirable. Attitude is everything, according to Asheim: “...we must begin to see ourselves as an equal partner in an exchange rather than as a condescending Lady Bountiful. We must... develop an Ear of America as well as a Voice.

We must listen as well as tell, learn as well as teach, receive as well as give." To further this interactive rather than autocratic viewpoint, Asheim favours programmes that acknowledge the need "...to adapt rather than to adopt the methods and procedures that we happen to favour for our own purposes." Finally, quoting "an old India hand" [Ranganathan], Asheim encourages those wishing to advance librarianship in developing countries – "a daunting task" – to substitute the word "problem" with "opportunity." "Despite the 'chasm' between cultures Asheim describes, he believes librarians can establish bridges."

### **Donor Objectives**

A thorough search for reports or theses reporting research results focused specifically on library aid revealed little scholarship in this area. The research of Jesus Lau, however, provides excellent information necessary for understanding the economic and political complexity of well-intentioned but sometimes ill-advised donor objectives. His assessment of the relationship between information growth and social development in 31 countries from 1960 to 1977 revealed that the information gap between developing and highly developed countries is widening faster than the social gap (life expectancy, food consumption). His results also suggested that increased information development as shown through library indicators is associated with positive change in social development.

D.E.K. Wijasuriya, International Federation of Library Associations (IFLA) Representative for Asia and Oceania in the 1990s, echoes Asheim's and Lau's recommendations in a framework for development adopted by IFLA and described in "The Advancement of Librarianship (ALP): IFLA's Core Programme Orientation to the Third World." Much of this document concentrates on facts about developing countries, terms of reference, and time tables, but the author also outlines general objectives and programme areas: The main objectives of the ALP Core Programme are to contribute, within the framework of IFLA's programme structure, to the progressive improvement of library and information services within the developing countries so as to enable them to contribute significantly to national development. At the same time, programme objectives shall place special emphasis on the creation of conditions likely to contribute towards national initiatives and a systematic progression towards self-sufficiency.

Wijasuriya acknowledges that the advancement of librarianship (ALP) "can be conceived in the most infinite terms," but maintains that for practical purposes, the primary goals in 1990 were:

1. the establishment and development of public library systems with particular attention to the needs of rural and urban marginal areas,



2. greater identification of libraries with literacy programmes, and
3. greater attention to education and training.

According to Irene Norlund, Scandinavian aid agencies (SIDA, NORAD and DANIDA) have specified support of culture through library/archival aid as a primary objective since the early 1980s. In "Culture and Institution-building," Norlund outlines both the problems and benefits of aid programmes designed to support cultural heritage. Major obstacles include the reticence of aid organizations to support such programmes, combined with the ambiguous attitude to cultural aid funds held by governments in some recipient countries, who may favour programmes that show a direct economic benefit.

She promotes providing assistance to 1) set up new archives and libraries, 2) collect and organize documents, and 3) train librarians to maintain access to historical materials as the key components in preserving of indigenous cultures. "Support to culture will also lead to the building up of enriched and renewed institutions and by that means increased capacity," observes Norlund. The fragile nature of important cultural and religious documents in developing countries makes more compelling the need for collection and preservation. Many are held in private collections and religious temples or monasteries, where maintenance is not secure. "There is limited time to save these irreplaceable heritages, which are a key both to enlarging knowledge and self-confidence and to building institutions which can link up to the world at large," concludes Norlund.

Carolina L. Afan, Library Director-Cultural Centre of the Philippines, agrees with Norlund's point of view about the importance of preservation, but from the perspective of an aid recipient, not a donor. She sees a need for support beyond written forms of communication: "The librarian and other cultural workers should have the skills and knowledge in documenting prints, tapes, photographs, films, videos and others." Expertise in preservation regarding these different media is necessary as audiotape, video, film, etc. are more "natural" media for oral cultures to record their stories, history, etc., rather than in the Western tradition of print. Afan speaks strongly and persuasively in favour of repatriating rare historical and cultural materials that are in European and American archives since "colonizers had their share in looting and taking away the resources of their former colonies." In the same vein, she cautions her colleagues:

[Developing] countries should guard against the intellectual and cultural exploitation being done by some foreigners who in the guise of doing research are actually taking advantage of our natural and human resources for their own use and interest. Cultural agreements, donor contracts and exchanges should be carefully studied and analyzed before going into them. Any agreement should benefit both countries and must

not be a one-sided affair. Other librarians and educators have voiced the same concern – that aid to libraries not be a form of “neocolonialism...to perpetuate cultural and economic dependency” on donor countries. Mary Niles-Maack believes that donors’ goals must be examined closely: initiatives based on the aim of spreading Western culture have caused “intellectual consequences” for developing countries, as a dependence on foreign books prevents the promotion of local publishing initiatives. As well, donor objectives may be tied to larger global alliances – for political and strategic reasons the donor country may want to strengthen ties with the recipient country. Afan concludes her report by noting that the central government of the Philippines has embarked on a decentralization process for both cultural centres and libraries, which she describes as “the democratization of access to libraries and other learning centres, insuring the provinces and regions that their cultural treasures will be left to them to be utilized, conserved and appreciated.”

Rosario Gassol de Horowitz also writes about donor objectives from “a Third World perspective” (the sub-title of her book *Librarianship*). Like Asheim, she observes that library development has taken place from “the Anglo-Saxon tradition” and has been “propagated, consciously or unconsciously, by Western librarians travelling abroad on consultant missions and through library literature, much of which has been produced in the United States.” Paraphrasing Ivan Illich, she states that “the nations of the West are packaging their services to contain their views of the world.” Rather than rejecting the contributions of the West, Horowitz (in terms she herself identifies as more closely related to liberation than development), calls instead for innovative leadership from librarians in developed countries and an enhanced communication process to assist those countries in breaking free from their inherited mantle of dependency and oppression.

“The new orientations confirm the calls for a new type of professional and for a bold and non-traditional library service which cuts across the compartmentalization imposed by tradition and organizations, to meet the circumstances and conditions in which people find themselves.” She urges that isolated library workers in developing countries seek support through strengthened ties with other workers throughout the country—as well as the continent—by creating active and cohesive professional associations.

### Language Challenges

Language issues are problematic for many developing countries—as well as for donor agencies. In *The Bookseller* (11 April 1997), Caroline Horn notes that South Africa and Ethiopia each have eleven language groups, and she identifies language as a prominent concern for library/literacy projects in these countries and others. Her article also supports the fact,

often mentioned in the literature, that libraries are foreign to the way of life for many traditional, oral societies in Africa. As a consequence, governments may be unaware of the purpose and benefits of libraries and reluctant to support them financially. The issue of language and library development also surfaces in Asian countries where oral traditions have predominated.

From a Malaysian perspective, Diljit Singh notes that the "...reading habit is still not fully ingrained in the Malaysian public." He attributes this partially to the fact that Malaysians (East and West) speak many different dialects, creating difficulties for library clients seeking service and materials in their local language. This problem highlights the need for support of local publishing initiatives so people can have access to literacy programmes and to relevant materials in local libraries and bookstores-in their own language.

### **Need for a Cooperative Approach**

With its long history of apartheid, South Africa serves as an interesting example of "have" and "have-not" communities within one country. *The Use of Libraries for the Development of South Africa; Final Report on an Investigation for the South African Institute of Librarianship and Information Science* proposes a plan for development consistent with the views expressed by Asheim. The report states: "Librarians should familiarize themselves with the psychology and the sociology of the underdeveloped. In particular they should not expect persons bred in the culture of the subordinate to act according to the cultural and psychological patterns of the dominant."

The report is also reminiscent of Asheim's observations regarding assumptions about the "apathy of the underdeveloped," a phenomenon that Zaaïman describes as a psychological state induced by subordination and a dependence on "the dominant group" as well as the overwhelming battery of problems that disadvantaged individuals face. Skepticism on the part of recipients and frustration and discouragement on the part of librarians from donor countries can result. This report says that a cooperative approach to development is absolutely necessary to counteract creation of a cycle of apathy and donor disappointment:

Developing communities should always be fully involved in the planning, development and execution of development projects that concern them... Community involvement means exploring the people's basic needs with them, and designing and developing methods with them to fulfil those needs. It should be remembered that the underdeveloped cannot relate to a concept such as "libraries" of which they have had no experience... Key groups of opinion makers within the developing community should be identified and their views and approval sought at all stages of the

investigation, design and implementation of library services... Librarians, should, however, guard against the danger of accepting the views of elites in developing communities as representative of all the needs of that community.

One of the strongest supporters of this cooperative approach is Carol Mills, librarian from the University of the South Pacific in Fiji. In "Aid for Libraries: Should One Look the Proverbial Gift Horse in the Mouth?" she criticizes blanket donations given without prior collection management assessment work done by recipients, saying that this lack of joint responsibility institutionalizes aid and causes an "aid dependent mentality."

### **Special Needs of University/Research Libraries**

In her article "Filling Bare Shelves," Carolyn Sharples laments the fact that as aid organizations and governments of developing nations have focused on literacy and books for children, academic institutions have suffered. Cancellation of journal subscriptions has been common as prices have increased, mostly in the area of medicine. Specifically, she notes that books on "tropical medicine, primary health care, women in development, and intermediate technology are...priorities" for her agency, Book Aid International.

Sharples also discusses the difficulties that academic librarians in developing countries encounter when they try to obtain information about newly published material. It is a "Catch 22" situation if library staff are expected to indicate what they need when they do not know what is available. This situation makes bibliographic and selection tools high on the list of desirable materials.

These concerns are reinforced by Yogendra P. Dubey, Professor in Library and Information Science at Banaras Hindu University in India, who describes in his 1986 conference presentation the problems that Indian librarians encounter when they try to meet professors' and scientists' demands for scientific and technological information. Although widespread use of the Internet now makes some of Dubey's observations about information needs outdated, many of the problems he mentions still exist in academic libraries.

These include heavy reliance by developing countries on scientific books and journals from the West, in the absence of "home-grown" publishing; supply and currency problems; high prices for subscriptions; copyright restrictions that limit the free-flow of information; constraints of multiple indigenous languages; educational systems that foster rote learning and do not promote individual research; low demand for library services due in part to lack of awareness of their role; and passive attitudes of librarians.

Dubey confirms Asheim's observation that when resources are very scarce, service may not be a priority, and "the book" is more important than the person: "they [librarians] are more product than service oriented, *i.e.*, more toward production of bibliographies, catalogues, etc. than toward services directly oriented to users (such as question-answering)." He concludes with a recommended strategy to alleviate these problems that will result in the development of information distribution industries (publishing, libraries, scientific and technical services), knowledge production industries (research and development, education) and information technology industries.

### **Importance of Local Publishing**

Mills and Priestley both emphasize the key role played by aid or assistance to support indigenous publishing: they maintain that such help is essential if developing nations are to gain true autonomy and supply relevant materials to their citizens. Priestley breaks down the book needs of Third World African countries into six categories: capital funding; the need for textbooks to support education; distribution and marketing knowledge; paper; the need for local language translation, co-publishing, and licensing; and training.

Her support for local publishing is strong, but she cautions that poverty and inexperience may be the catalysts for corruption within projects: misappropriation of paper stock and "mismanagement by cumbersome, bureaucratic procedures and unqualified officials" are often significant issues to consider. She concludes that for local publishing to succeed, business management training in areas specific to publishing is crucial, to ensure that grant monies are better managed, overhead costs are considered, and marketing plans are developed. Donor countries need to shift from facilitating the dumping of unwanted materials, such as surplus print runs, to supporting indigenous publishing.

### **Specific Aid Projects**

#### **Research Reports**

Investigations on the efficacy of library aid projects in specific countries or to particular institutions appear to be very scarce: no research case studies or analyses were located. However, studies that focus generally on library services in one developing country or to one client group in such countries provide informative contextual background. The most relevant research projects that discuss some aspect of library aid are those of Al-Hanari, Bouri, Stander, Floren-Romero, and Zoe.

Abdulaziz Mohamed Al-Hanari's Ph.D. survey research revealed the important roles that national libraries play in developing countries, and



resulted in a list of recommended functions for a proposed Saudi Arabian national library. Elizabeth Bouri examined Egyptian public library development in her doctoral research, revealing the positive influence of international agencies such as UNESCO in the 1960s and subsequent public policy choices of the Egyptian government that led to the decline of public libraries.

How to formulate standards and guidelines for school libraries in developing countries was the central question in Cecilia Stander's research, based in South Africa. Stander concluded that basic school library principles can be applied, but that the diverse perspectives of users make adherence to universal standards problematic. Two theses focused on information needs/services of special groups within developing countries: Maria Floren-Romero examined the difficulties that pharmaceutical researchers in the Dominican Republic encounter when trying to obtain information, and their reliance on colleagues' resources outside the Republic, while Lucinda Zoe explored the growth of women's information centres in developing countries – their relationship with and reliance on the international library community.

### **Book Donations, Publishing and Distributing**

In many cases in the past hundred years, libraries and publishing companies shipped off surplus materials to well-intentioned organizations that “dumped” those items in developing countries, notably those in Africa. As described by Mills:

*First came the missionaries who propagated their faith by direct action, religious and social; their return being souls and the pacification of the area. In more recent times, governments have largely replaced the churches, aiming to spread the word of their friendly intentions. At times, aid to libraries has had little to distinguish it from the 19th century 'books for heathens' syndrome.*

Donors paid little attention to the language, currency, or context of the material, and the recipient countries were rarely, if ever, able to choose their own books. And even if the recipients could choose, they had little knowledge of what to request. In her article for *The Bookseller*, Seaton gives a list of “unhelpful books donated” to Book Aid International's Africa book drive, which includes the *AA Road Map of Bristol*, and *The Garth Brooks Scrapbook*. This problem of inappropriate giving is frequently noted in both research articles and opinion pieces on library aid, with poor communication between donor and recipient cited as the primary cause.

According to Margaret Bywater, libraries in Cambodia receive some material from overseas that is useful, but they have also received material



“which is totally irrelevant to [their] needs now or in the future.” Filling library shelves with this irrelevant material discourages rather than encourages use, thereby thwarting the donors’ intentions. As an alternative, Bywater recommends the donors consider giving monetary grants that allow staff in libraries to select their own books: this will ensure relevancy and support local publishing. Carolyn Sharples agrees with Bywater regarding “problem” donations and the need to support local publishers. She notes that since 1990, Book Aid International (BAI) has been “refining [their] work to become far more targeted and responsive to the needs of partners overseas.” This resulted in project development that specifically targets subject areas where materials are scarce. One project – BAI’s Africa Book Collective – purchases African books published locally and then distributes those materials throughout the region, thereby helping to establish a local book market. Sharples acknowledges, however, that despite the increasing output of small local publishers, sufficient “suitable” material is difficult to find, especially children’s books, which are in high demand.

“Bywater recommends the donors consider giving monetary grants that allow staff in libraries to select their own books; this will ensure relevancy and support local publishing.”

E.A. Mwinyimvua of the Tanzania Library Services Board also discusses the measures that Book Aid International has taken in his country to provide suitable books, promote local book production, and ease the administrative burden on recipients.

Three members representing recipient libraries now sit on the BAI Council, facilitating information flow and influencing policy regarding donations to Tanzania and other African nations. As well, all recipients fill out detailed evaluation forms each year, which enables BAI to select books according to library requirements. BAI also invites librarians from recipient countries to spend three months at BAI Headquarters in England selecting books. To stimulate local book production, BAI provides funds for Tanzanian librarians to purchase books published in other African countries. Mwinyimvua believes that Tanzania will continue to need book aid for many years as currency devaluations make purchase of expensive foreign books even more difficult and as rising literacy rates cause demand for books to outstrip the supply, even with increased local publishing efforts.

The IFLA/UNESCO “Books for All” initiative is another international library project. As project coordinator Lioba Betten explains in “Foreign Aid for Children’s Libraries: 25 Years,” its aim is to fight illiteracy through providing children in developing countries with books. Betten notes that Books for All seeks to provide long-term aid to libraries and to local

booksellers, authors, and publishers by purchasing books in local languages. Caroline Horn also is critical of those overseas publishers who donate irrelevant materials and encourage “librarians in developing nations to send their orders outside the country.” Speaking specifically of African aid projects, she reports that in Senegal “some 80% of books are imported, but are too expensive for the indigenous population. Once students leave school, they are unlikely to pick up a book again.” Local efforts are the best means to ensure literacy and relevancy. In her opinion, “book aid programmes can, where properly targeted, help to overcome some of the shortages [of materials], but while libraries remain dependent on aid they are not supporting local publishing initiatives.”

S.M. Made, speaking of African aid projects in the early 1980s and Zimbabwe in particular, notes that “low literacy and purchasing power and high unit costs necessitate small editions [of locally produced material], which in turn necessitate small markets and limited distribution.” Local printers in developing countries may lack the capital required to purchase paper stock, which often needs to be paid for in advance. Made adds that various local languages and dialects can pose challenges as they may not translate well into the Latin alphabet required for printing. Aid organizations may assist local publishers to solve these problems by encouraging and funding regional associations or consortia of publishers: combined purchasing power to buy bulk paper stock and combined expertise may help to overcome difficulties.

Carol Mills from Fiji is one of the few voices in the literature with a “recipient” perspective. She examines the reasons why developing countries in the South Pacific are not getting what they need from donors:

Donor agencies tend not to set explicit targets, fail to evaluate their donations, and do not properly manage their aid. Books sent at cost may simply sit there if they are not appropriate, making the uninformed donor feel good while creating a burden for the recipient. Sometimes the recipient accepts simply to avoid giving offence and to keep communications open, or else accepts donations with a peripheral value because they are better than nothing.

Mills’ comment is crucial to understanding the complexity of library aid in specific countries because her words concern the power relationship that exists with donor/recipient relationships. Many recipient libraries and information centres are reluctant to express their needs firmly for fear of being cut off entirely. This fear, in turn, is reflected in the collections, as it causes library staff in developing countries to be hesitant about weeding irrelevant material.

They do not wish to offend donors by throwing out “gifts” and they are anxious that little would remain in their library if they culled all

irrelevant material—collection “starvation rather than poverty.” As Margaret Bywater notes in her article on Cambodia: “[there is] a reluctance to dispose of anything... because people still feel strongly the loss of personal possessions during the Pol Pot period.” Peter Brush, a consultant at the National Polytechnic Institute in Laos, also writes about the reluctance to weed. He observed that many titles in the Laotian collection were in foreign languages—Russian, English, French and Vietnamese—which presented a cataloguing dilemma because no translation services were available.

The library could offer little material in Lao, as Laos has a small population and a very small publishing industry. The Institute had no collection development (or weeding) policy, and the Institute Director was reluctant to dispose of any books, even those outdated, irrelevant, and uncataloged because all had been donated.

Scandinavian countries have a laudable history of providing aid to libraries and other cultural institutions in developing countries. This support is documented in a 1995 issue of *Scandinavian Public Library Quarterly* that focused entirely on Nordic aid initiatives. The articles report on the purpose and progress of projects in Tanzania, Kenya, Uganda, Botswana, South Africa, Nicaragua, Vietnam, Laos, and Cuba. A typical project is one focused on Africa and funded by SIDA, the Swedish International Development Authority:

The SIDA project “Words-Books-Democracy” is one example of an attempt to get a holistic perspective within the literature area. The objective is to create and maintain a literate and reading environment and to protect freedom of expression. This requires access to books, newspapers, magazines and so on. The development cooperation shall strengthen the documentation of oral storytelling traditions, author organisations, independent indigenous publishing, the printing industry, distribution channels, libraries, and so on—all links in the complete chain.

An annotated list of current and recently completed library aid projects where Nordic funders are involved concludes the issue. Children’s books are in great demand in most developing countries, particularly in Africa, but the cost of a book, even one locally published, is beyond the price range for most people. Rebecca Knuth in an *IFLA Journal* article revealed how five international organizations are seeking to redress this situation.

An innovative joint project by the International Board on Books for Young People (IBBY) and UNESCO involved the production of 2000 kangas (Kenyan cloth pieces used as clothing or baby carriers) that were “imprinted with words and pictures as a child’s first text book.” In another project, the International Youth Library (IYL) supported “cross national publication and translation” of books from Africa and Europe, while the IASL

(International Association of School Librarianship) and UNESCO cooperated to provide books for school libraries that focus on “local needs” in their collections. Citing a UNESCO project in Croatia as an example, Knuth stresses the special need for children’s libraries in war-torn or famine-stricken countries as these libraries help refugee children who are “coping with stress and trauma.”

Carol Mills provides the best overall assessment of different aid programmes, based on her experience at the University of the South Pacific (Fiji) where donations form the basis of the collection. Her evaluation includes the book aid models of 1) clearinghouses, 2) twinning (mentor/sister-city programmes) relationships, 3) interest groups, and 4) unsolicited donations. She concludes that clearinghouses have varying degrees of success, providing “unbalanced donations of discarded surplus materials,” and indeed may impose a burden beyond useless books, as recipients may have to pay some or all of the freight costs in shipping materials. She is more supportive of twinning relationships because of the personal element involved, but cautions that these arrangements often cannot be sustained.

### **Academic Libraries and Archives**

Academic libraries and archives in developing countries have garnered less attention in the past decades as aid organizations focused on literacy and books for children; however, several important initiatives are mentioned in the literature. The International Campus Book Link Project (ICBL) was created in 1992 by Book Aid International to support African university libraries through donations of current and back issues of academic journals, particularly in the area of medicine where the shortage is acute. In describing this project, Sharples notes that journals are particularly difficult materials to supply because of sustainability problems: many aid programmes are short term—three years at the most—and are dependent on fluctuating donations from institutions, not an ideal way to build a journal collection.

The Overseas Library Committee at the University of Calgary, Alberta was very active in the 1980s and early 1990s coordinating shipments of donated materials. As detailed in the *Canadian Library Journal* by King and Matheson, volunteer librarians gathered, sorted, boxed, and shipped scholarly and professional books and journals to universities, colleges and research corporations in China, Central America, Yemen, Bhutan, the West Indies and Africa. These volunteers clearly recognized the importance of communication between donor and recipient institutions.

In this case, as in others identified in the literature, the motivating force for the volunteer librarians was a “feeling of professional solidarity, such as from one library to another.” Books were not sent “on spec” to libraries in developing countries. Instead, “inventory lists of donated materials [were] maintained and circulated to interested libraries, where

selections were made by librarians. Only those items selected from the inventory list were sent.” The project relied on the generosity of the Calgary corporate community, which provided free storage and sorting space, and arranged for free shipping of boxes. However, an economic downturn in the 1990s jeopardized corporate sponsorship, resulting in cancellation of the project.

Jan Lyall focuses on the preservation crisis in research archives and libraries in her *IFLA Journal* article. She cites the need for funding projects to preserve the audiotape and film that historians used to record the oral traditions of many South Pacific nations. Given the general lack of written cultures in this area, these media were very appropriate for information gathering, but their short life span in a tropical climate makes them an archival/library nightmare. Palm leaf manuscripts are another medium of concern in Southeast Asian countries: the leaves themselves are disintegrating, along with the disappearance of the skill to write and read the traditional script of most of the manuscripts. Lyall notes further that the political climate, as well as the physical, is an important factor in this crisis. Governments in many developing countries are coping with cash shortages, health emergencies, and political strife and instability. As a consequence, they allocate a very low or non-existent priority to libraries, making the largesse of donors to fill this gap crucial. An example of such assistance is the “Preservation of Lao Manuscripts” project, funded entirely by the German government through the “Memory of the World Programme” launched by UNESCO. Its purpose is “to focus world attention on the need to safeguard endangered and unique library and archives collections, and to improve their accessibility to people of the world.”

### **Expertise, Education, and Training**

The practice of importing of experts from afar is also discussed in the literature, with most authors stressing that this approach neglects to address the problem of self-sufficiency, and does not promote long-term commitment and sustainability. Kari Gulbraar in the *Scandinavian Library Quarterly* emphasizes the importance of high caliber and accessible library education programmes within developing countries as the alternative to the visiting expert.. She relates the story of the Grace Lema Foundation, started in Tanzania by the Norwegian Library Association, and named after an untrained but experienced library assistant who was unable to enrol at the University of Botswana because she lacked financial resources.

A member of the Norwegian Library Association International Committee supported her cause and through donations financed Lema’s two-year programme. Building on this initial success, the Association established a continuing fund to support library training within a developing country. This initiative was recognized as a model for library education



aid at a 1994 IFLA Conference. Gulbraar also explains the other methods by which Scandinavian library agencies support education: supporting in-service training courses in Asia and the Pacific, funding scholarships to African, Asian and Latin American librarians for short-term visits to Swedish libraries and cultural institutions, and subsidizing librarians from developing countries to attend international workshops and conferences.

Brush reiterates the importance of indigenous training programmes geared to specific situations and the use of locally relevant methodologies when he relates his experiences as a library consultant in Laos. He attributes most errors in the bibliographic records to cultural and language misinterpretations caused by the librarians' attempts to apply cataloguing systems that are rooted in American culture – Dewey Decimal Classification and Library of Congress Subject Headings – to radically different situations. Brush believes that “visiting experts” would be well advised to promote British librarian Ronald Bengé’s philosophy expressed in his *Cultural Crisis and Libraries in the Third World*: “Librarians in developing countries would be better advised to follow the spirit of our librarianship, rather than our cataloguing rules...”

### **Recommendations for Further Study**

This review has highlighted research reports and descriptive articles that address two questions: what are the major needs of libraries in developing countries and, how effectively are those needs being met?

It is apparent from these reports and articles that there are varying degrees of success regarding library aid projects: some address the problems and issues inherent within library aid initiatives and the general donor-recipient relationship, while the effectiveness of others is questionable. The literature indicates that when donors place a high priority on good communication; seek to understand and respect the indigenous culture, language and customs; and learn about the climatic, economic and political challenges that local librarians and publishers face, projects are more likely to succeed. Reports by those in the field show that when donor agencies follow Book Aid International’s new slogan: “Give us what we need, not what you don’t want” when providing demand-led services to developing countries, the match between donor largesse and library need is much closer.

Another recurring theme in the literature is the problem of short-term aid. Too often, financial and materials aid is “single-event,” with no prior communication, no follow-up, and no opportunity for the recipient librarian to do long-term (or even 2-year!) collection management. To ensure that developing countries really benefit from assistance, commitment for long-term support is necessary.



This literature review reveals that globalization of information has created a double-hook for developing countries: library clients are aware of cultural sources from around the world, but these resources are often less relevant than indigenous ones. Continuing reliance on donated international resources hampers creation of a local publishing industry and precipitates loss of the local culture. There appears to be a gap in the literature regarding the impact of burgeoning globalization on library aid – how has this phenomenon affected the relevance of donations? How has it affected communication between donors and recipients, a crucial factor in the success of library aid projects? How can the negative aspects of globalization be minimized and the positive aspects increased within the donor/recipient relationship?

What is most lacking in the literature, however, is a corpus of in-depth research on this topic. As evident from this review, a wealth of articles exists describing Third World library needs from the point of view of the recipient and the objectives. Many articles also detail individual projects and the fund-raising efforts behind them. Missing are the research surveys and case studies that evaluate library aid in terms of a set of identified needs, and research that examines the changing needs of libraries as cultural and economic globalization advances.

The forces of globalization that move us ever closer to a single world society – mass communications, increased ease of travel, commerce, the Internet, popular culture, and the increasingly widespread use of English as an international language – must be included as variables in future research projects. Without these projects, we will not move knowledge in this area beyond opinion pieces to the reliable research results that will better inform the relations of donors and recipients. According to Lester Asheim (whose words introduced this review), “foreign relations are, after all, only human relations complicated by some geographical and some psychological distances. I think, with patience and understanding, we are equal to the challenge – and the opportunity – they present.” Clearly, in order to develop effective programmes that make a difference within the new global economy and information world, further research on the challenges and opportunities of library aid is needed.

### **Professional Competencies among Librarians and Information Professionals in the Knowledge Era**

Past is an indication of future. Present connects the two. Given this, the 21st century is all set to be a ‘knowledge century’ where it will neither be the ‘labour’ (as in the agricultural era) nor the ‘capital’ (as in the industrial era) but ‘knowledge’ and ‘information’ that will act as a critical resource for socioeconomic development of a nation. This being so, generation (creation), processing and use/application of knowledge will be the hallmark

of the new century. Professionals engaged in all these three primary tasks of the 'knowledge cycle' will be required to play a more pro-active role (rather than passive one) as equal partners/collaborators with the scholars. A closer understanding of the available skills/competencies of the professionals engaged in the information sector reveals that they have miles to go if they have to discharge their roles as expected of them. Course curricula imparted at all levels in the discipline of Library & Information Science need to undergo a sea change to incorporate newer approaches/concepts. Existing professionals need to be provided with state-of-the-art exposure in art and science of the profession through various in-service (continuing education) programmes. All, existing as well as upcoming professionals, will need to be groomed to take on the role of 'knowledge managers'.

**Competencies of LIPs:** To take up such a role, Library and Information Professionals (LIPs) will be better off, if they pay serious attention towards developing and enhancing their core competencies. Core competencies in the case of LIPs are: (i) Personal; and (ii) Professional.

Competencies have been defined as the interplay of knowledge, understanding skills and attitudes required to do a job effectively from the point of view of both the performer and the observer. The unique competencies of the librarian include in-depth knowledge of print and electronic information resources in management of information services that meet the strategic information needs of the individual or group being served.

At the dawn of the 21st century, LIPs are experiencing the consequences of three major paradigm shifts. These are:

- The transition from paper to electronic media as the dominant form of information dissemination, storage and retrieval, is the first shift. Convergence of different media, such as text, graphics, and sound, into multimedia resources, has direct impact on this transition.
- Increasing demand for accountability, with focus on quality customer services, performance measurement, bench marking and continuous improvement, is the other shift. Shrinking financial resources for providing quality library and information support services have direct bearing on this shift.
- New forms of work organization such as end-user computing, work-teams, downsizing, re-engineering, outsourcing etc., is the result of the third shift.

Given this backdrop, LIPs can enhance the productivity of those engaged in knowledge creation and its dissemination by playing a more

“proactive” role rather than “passive” one. In this changed dimension, LIPs will have to assume the role of analyzers, synthesizers and interpreters of knowledge/information, rather than be content with acquiring, organising and providing information when asked for.

Further, the role of traditional librarianship is changing into cybrarianship to include the tasks of scanning, filtering, selecting, organizing and packaging the flood of information. In keeping with their changing role from ‘gatekeepers’ to gateways to ‘information,’ LIPs should be performing such tasks as information audits, training in information, literacy, information of best practices/competencies and helping their users to navigate through the world of information, more meaningfully.

### **Collection Development Skills**

Collection development is a highly challenging task for information professionals. The situation demands that professionals entrusted with this task respond to this situation in such a manner that collections developed by them not only meet the current needs of their clients but also the future ones. To do so, LIPs must be groomed on the following lines to devise ways and means to constantly update the collections:

- Develop proper knowledge of the organisation, its mission, goals and objectives;
- Develop proper assessment of users’ diverse needs;
- Have thorough knowledge of full range learning resources: documentary, non-documentary;
- Develop thorough knowledge about the library personnel: their job profiles, strengths / weaknesses, area of specialisation etc.;
- Develop thorough understanding of the vendor profile;
- Be thorough with Web browsing *i.e.* relevant search engines, meta search engines, methods to find web resources, appropriate list servers, databases, directories and other E-information resources;
- Have subject degree relevant to the field of work;
- Devise ways and means to constantly update the collections.

### **Collection Processing Skills**

Results of ‘Knowledge Capture’ will be effective if post capture steps are carried out as follows:

**Knowledge Analyses:** LIPs require information skills for analysing the quality of information. These skills comprise filtering out noise and focusing on special needs. Hence, LIPs should be able to:

- Understand that information differs in its level of quality;

- Apply evaluative criteria to both print and electronic resources, such as, author's credentials, peer review, and reputation of the publisher, to assess the authority of the source;
- Assess the relevancy of a source to an information need by examining publication date, purpose and intended audience;
- Recognize omission in the coverage of a topic;
- Recognize and evaluate documentation for the information source, such as research methodology, bibliography or footnotes;
- Distinguish between primary, secondary as well as tertiary sources (print & non-print) in the requisite discipline/s and evaluate their appropriateness to the information need.

**Knowledge Synthesis:** Having selected and acquired the material, the next task is to organise and synthesize it and make it accessible for the users. The recent developments in the Internet and World Wide Web have brought new challenges to information professionals and consequently a number of researchers are now engaged in organising web-based information. Machine readable (on-line as well as off-line) public access catalogue has totally eliminated the tedious task of making 5-10 cards per document, being too much concerned with punctuation marks and other such parameters, and so on. Although the availability of large catalogue databases on-line and several classification schemes on CDs has provided much needed relief to the professionals, yet to accommodate local requirements, systematic recording of all local additions/updates/variations etc., for use by others in the system will be in order. Here also, constant interaction with the users of the system helps the professional concerned to develop a rich (and practical) knowledge base on the users' information seeking behaviour. LIPs should be able to organise, synthesize, integrate and apply the information in the following ways:

- Use appropriate documentation style to cite sources used;
- Summarise the information retrieved (e.g. write an abstract or construct an outline);
- Recognize and accept the ambiguity of multiple points of view;
- Organize the information in a logical and useful manner;
- Synthesize the ideas and concepts from the information sources collected;
- Determine the extent to which the information can be applied to the information need;
- Integrate the new information into the existing body of knowledge;
- Create a logical argument based on information retrieved.

**Knowledge Repackaging:** Consolidators were filters who will make sense of the world for managers. Few managers have enough time to spend gathering, processing and interpreting all the information they need. The system has become more sophisticated, enabling people to process greater amounts of information. But the very process of development that enables the systems to become more sophisticated also has the effect of increasing the volume and complexity of the information available. For these reasons there will always be scope for division of labour and the creation of posts for information professionals to reduce the burden on managers.

They should be very vibrant at collecting information by way of searching databases and other secondary sources. Further consolidators should be able to see the patterns and make the connections in the information they process. They should be able to interpret the information in the light of the circumstances faced by the organisation for which they work. Also they should be able to develop specialised information products for use inside or outside the organisation or by individual clients. Hence, to locate and retrieve relevant sources in a variety of formats from the global information environment; the consolidator should be able to:

- Understand the organization of materials in libraries and use locally produced location guides;
- Understand how to use classification systems and rationale for their existence;
- Use location information in the bibliographic record to retrieve locally owned resources;
- Use local resources to locate information sources in the global information environment;
- Understand that libraries have developed methods for locating and sharing resources not owned locally and use the appropriate resource sharing system, such as interlibrary loan or document delivery, to retrieve information;
- Understand that the Internet may be a useful resource for locating, retrieving and transferring information electronically.

**Knowledge Retrieval:** Retrieval support means assisting users in the proper use of information technology to access the available knowledge. Examples of tasks covered in this area of responsibility include the following:

- Identification of new and emerging technologies to be assimilated and integrated into the organisation to impart competitiveness.
- Develop manageable technological skills, *i.e.*, know how to use available technology creatively in order to achieve the greatest benefit and pleasure from their work;

- Ability to train users to navigate the knowledge base competently themselves;
- Competency in search skills specifically for bibliographic databases, using various permutations and combinations of search terms with boolean operators;
- Competency in IT skills, which can be used for researching sources, accessing information, connecting to experts, communicating ideas and results and packaging the knowledge for reuse;
- Ability to develop user-focused/oriented service skills *i.e.*, linking catalogue searching and other databases to document delivery service.

**Collection Service Skills:** LIPs have been delivering a wide range of information products and services to meet the needs of their varying clientele. These range from simple issue/return services to most complex and value added information products and services, in both, on-line as well as off-line manner. What goes on in the planning and launch of these services is:

- Understanding the user *i.e.*, information-seeking behaviour and information needs of the clientele, which is based on survey;
- Understand the library system *i.e.*, resources, tools, techniques, service and people where resources include; Documentary and Non-documentary;
- Match between the two, *i.e.*, in discharging his duties an effective information professional has to be equipped with thorough understanding of users and strength and weakness of the library/system.

LIPs aim to provide the right information to the right user at the right time and at the right cost. Documenting each and every step in the planning as well as launch/implementation of each and every information product/service will go a long way towards not only standardizing and further improving upon these services, but preparing others concerned to shoulder such assignments, should an opportunity come their way. Hence, to deliver efficient, innovative and just-in-time services, LIPs will have to keep themselves updated in Internet and information technology skills.

### **User-education Skills**

User education aims to equip users with the needed skills to enable them to make use of libraries and their resources in a use-friendly manner. User education often includes library orientation, induction and information skills training. Hence LIPs should:



- Use wide variety of methods to help users in information skills through lectures, practical 'hands-on' sessions, workbooks, printed guides, videos, and demonstrations;
- Adopt approaches to user education which can reach non traditional students such as part-time and distance learners through information technology support via computer mediated communication;
- Use the web for teaching through linking to ready-made training packages or developing in-house products;
- Use computer-assisted learning (CAL) and hypertext in creating flexible learning packages for developing web library guides.

### **Education and Training of LIPs**

Clearly, an aspiring professional in LIS needs to know the basics of IT, particularly in the area of computer, communication and networking technologies.

The professional also needs to know the principles and techniques of how one structures and organizes information and knowledge so that the right information can be retrieved and so routed at the right time. This would include all the traditional core skills of library and information science, specifically indexing, cataloguing and authority control, and the creation of synthetic structures to reach the information.

The Internet, in particular, as an information service/system will have a multiple impact on several areas of LIS as an educational programme. Hence present curricula of LIS should specifically be updated with:

- The impact of the Internet on society and Libraries.
- The Internet as an information sources Channel of communication
- Organisation of information through Internet.
- Information retrieval through the Internet.
- Design of information services using the Internet
- Internet databases and interfacing
- Web page design and authoring
- Compilation of directories of subject documents on the Net.

### **Conclusion**

From the above, it may be summed-up that LIPs equipped with the competencies as outlined in this paper will be fully geared to discharge their role, not only as gatekeepers of knowledge, but managers of the same. Thorough revision of course curricula as suggested will no doubt be

instrumental in creating a breed of professionals with a positive mind-set in so far as their role in the knowledge cycle is concerned.

To take care of existing (in-service) professionals, a need is felt to expose them to newer concepts/dimensions/approaches through the organisation of multi-tier short-term/continuing education, teaching and training programmes.

Examples of such programme can be found in plenty in India. In particular, present as well as prospective professionals need to be given thorough exposure to various information literacy skills. Need-based and tailor-made short-term training programmes need to be developed for existing professionals, for honing their skills and developing their expertise.



## Curriculum of Library and Information Science

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### Introduction

***Techno-friendly Discipline:*** The influence of Information and Communication Technology (ICT) on every discourse of human knowledge is undisputed and is also considered all pervasive. But a profession which is in “search of identity” has imbibed a friendly internship with technology or mechanization as it was termed then, since the late nineteenth century.

The nineteenth century called the scholarly era saw seen the emergence of the two scientific disciplines from the genus of Librarianship–Classification and cataloguing, which today are the most wanton areas in knowledge processing and organization of the electronic era. However the field still suffer from such concepts as the ‘digital divide’, meaning the differences in the technological competencies of the countries. It is this fact today which makes education distinct in quality and skills vary among the developed and developing countries.

Though India is on the fore in ICT developments, its full complement of application and utilization is still at a distance. Take for example, the price, the developing countries have to pay for journal subscriptions and membership to consortia modes of journal acquisitions. Hence some of these issues have to be addressed to younger generation through education and training in Library and Information Science. For a sustainable development of a nation, today ICT has become essential knowledge to every nation and more so to the developing nations.

In this context a new model curriculum integrating the traditional and, modern knowledge and thought has to be devised and implemented. Despite overall progress achieved by developed nations in this context they are often undergoing brainstorming sessions to evolve new competencies

for the information professionals. For example the Special Libraries Association has published a revised edition of the "Competencies for the Information Professionals of the 21<sup>st</sup> Century".

***Scenario in the Developing Countries:*** The situation in some of the South-Asian countries is different. For instance "Poor information system has poor curriculum development in Sri Lanka" as stated by Pradeepa Wijetunge.

But the situation in Southeast Asian countries is somewhat different from this, as it was found that 'Fast developing countries of this region are requiring a core of qualified information professionals to meet the new demand of educators, politicians and private sector, as there is growing awareness about information, there is change in the way people communicate, learn, find and use information.' It was found from the recent research study by Pawinun that due to information overload, there is need for a credit course on Library Use and Information Literacy.

There are indications that in this region there is a shift in focus from recordable information and knowledge media to access to electronic media, especially the Internet, where the access to this facility is limited by non-existence. To the end of the 20th Century, the Southeast Asian countries have three main characteristics of developments related to information: (a) Information being considered as an economic resource (b) Increase in use of information by the common public, and (c) Growth of the information sector in the economic sector. To stress the second point, the growth of newspaper circulation and the content and size in India can be a good example. That is clear evidence of the information savvy general public in this country. It is often felt that many of the developing countries are following the West, and seek expert consultation from those coming from West, but this is not so compatible, and as Lester Asheim said, despite the parallels and contrasts of systems and services, there is a uniqueness about these countries, in the diversity of situations the countries hold in education, culture, economy, technology, and other conditions.

The situation in developing countries is therefore different as far as countries of different regions are considered. Though the developing countries are making efforts to adapt to changing situations, learning from within and from the experts of the West, the situation requires a gradual ascent from the base to the top, from learning the fundamentals to the specific applications.

***Converging Factors:*** Many convergent factors have influenced it over again and again. Some are from within yet many are from outside. Aristotle, Plato and Callimachus were all ancient legendaries and in the middle ages, Guttenberg, Francis Bacon, and Emanuel Kant were all outsiders. In the modern era, the names of J.C.Liklider, H.P.Luhn, Vannever

Bush and Gerald Salton have shown and influenced the profession to a very great extent. Hence today it has turned out to be a multi-convergent profession, yet its search for identity still pursues. In this context, to structure a truly dynamic curriculum for manpower development is truly a complex task. This has been a consistent concern of Library and Information schools. It is observed light of the above deliberations that all over the world, a serious exercise to review the status of Library and Information Science education is on the anvil for over last two decades due to the impact of Information Technology and with the emergence of Information Society.

***Changed Situation in India:*** The changing scenario from 1960-2000 and the influence of other disciplines on Library and Information Science education in India is well documented in the Status Report on Library and Information Science Education in India.

In India three factors, a) the enactment of library legislation by a number of states in the country, b) the UGC assistance to college and university libraries towards the development of an academic library system in the country, and c) documentation work and services, were responsible for the first phase of development. The first two factors emphasized was on public and academic libraries and the third focused on scientific and technological information systems and services.

These three factors have not only enhanced the professional status but also increased the employment opportunities for library science professionals in public, academic and special libraries in the country. They also brought out contrasting differences in the professional approach in Library Science from that which existed in its early years. The influence of these factors is also reflected in the curriculum of Library Science education and subsequently led to change in the course content and nomenclature. Many university departments of library science upgraded the P-G Diploma in Library Science to Bachelors Degree during this period. The Indian National Scientific Documentation Centre (INSDOC) and Documentation and Research Training Centre (DRTC) courses were also started in this decade, marketing the beginning of specialization in education too.

From the mid 1970s the emphasis was laid on information components and on the facets of information collection, storage and retrieval. The mechanization in these areas was also an added factor. The decade of 70s especially is very important in the context of Library Science as it brought the change in its nomenclature from Library Science to Library and Information Science. The professional status and education programmes started receiving global attention because of internationalization of information and also due to the involvement of inter governmental agencies

such as UNESCO, UNIDO, and FAO, in the information handling activities. The establishment of international cooperative information systems like, INIS, AGRIS and DEVSIS under the umbrella of UNISIST Philosophy was a clear indicator of this fact. This shifted the emphasis of the Library and Information profession from the national level to that of the international level. The status of the profession, as already indicated, also changed from its earlier concept of Librarianship to Library and Information Science. The induction of Information Science also set to include information related to an organization system offering specialized services. The establishment of data banks, information analysis centres, and translation centres and others marked the beginning of a new milestone in the global view of information activities.

In summary it implied that the Library Science manpower development programmes have to include the areas from traditional to modern subjects and the education programmes have to be remodelled to fit the contemporary requirements. Thus the importance of a Library and Information Science manpower development programme was looked at with much more significance and the status of the profession reached new heights during this period.

***Thinking on Course Structure and Contents:*** The preceding paragraphs provide an overview of the major changes and shifts that define the changing landscape and competencies expected of the Library and Information professionals of the future. This has brought into focus the question of the continued relevance and adequacy of the present educational programmes.

There can be no two opinions about the fact that the demand for information professionals will continue to exist and even grow. But what will be the knowledge and skills expected of them? A recent UNESCO document sees the emergence of four complementary groups of information professionals, *viz.*, Creators, Collectors, Communicators, and Consolidators. While it is difficult to foresee the emergence of such distinct specialties in India in the near future, this classification does provide a useful approach and basis for defining the skills expected of information professionals and thus in the design of course contents.

It is not the objective here to provide detailed contents. It is however important to agree about the premises on the basis of which educational programmes could be restructured. In view of the emerging network environment, the fundamental shift in the goals of the library, and the changes in information storage and delivery mechanisms, the educational programmes should cater to the needs of these changed settings by including in their course contents the knowledge and skills required to function effectively in such an environment. Even within the traditional library the



nature of operations and activities will be significantly different from what they were.

Though there are parallels in the developing and developed countries on this count with the name change and designing and adopting a heterogeneous course content, since as the situation in information systems and services, was not improved as indicated in the case of Sri Lanka, the curriculum could not be made more effective. The adoption of technology was also very slow in developing countries until the end of the 1980s with microcomputers which became cheaper and more affordable.

The situation in India is different but the conditions of the systems and services have not changed markedly during the last one or two decades, particularly after the adoption of the Information and Communication Technologies. The efficient, effective distribution of information involves collection, processing, storage and dissemination of information. These functions are normally in the realm of library and information work. For a sustainable development of developing countries, the effective utilization of information is essential and the effective use of information communication technologies is also desirable.

Today despite, the availability of desirable and international level of expertise in the information and communication technologies adaptable to library and information work, there still exists a gap in its adoption in many countries including India, due to the suitability of the curriculum. There is a need for its remodelling akin to the conditions and situations prevailing in developing countries, where it can be easily adopted commensurate to their infrastructure and the situational factors. Such a course content should have affordability, adoptability and flexibility for sustainable growth and development of the profession and the professionals.

In India, a countrywide exercise was made to articulate the knowledge (theory, skills, and practicals), which could be packed in the Library and Information Science Education and Training Curriculum with the help of experts. The well defined modules prepared by the expert committee (subject panel and Curriculum Development Committee) were presented before the forum of chairpersons of the Board of Studies (Library and Information Science) in different universities. This has facilitated the debate and enabled them to develop a viable curriculum finding a balance between the traditional and modern practices, skills and techniques.

### **Guiding Factors Considered in the Curriculum Design**

***Dominance of Practice:*** The issue of the relationship between theory and practice is not properly addressed in the Indian context. An expert once stated that we are drowning in theory at library schools and not giving enough exposure to practice. The dilemma lies in the choice between

teaching students the knowledge and skills needed in their first posts to which meet the immediate needs of employers or instilling principles from which they can expand their skills and knowledge base as their career develops.

It is also seen that during the challenge of managing the complex and diverse new environment, some of the schools have been merged with different disciplines like information management and technology, information studies and mass communications. Given the pace of change in the nature of library and information services, there is a need to instill not only in building library professionals but also in established practitioners, a commitment to life long learning because the circumstances are demanding greater professional and technical awareness.

As professional obsolescence becomes a real and ever present danger, only a systematic continuing education provides a method of combating such obsolescence. In the western countries many schools have made a thorough revision and development of course programmes and also introduced new courses to meet the needs of employers in industries, and the public and private sectors. The introduction of new programmes should therefore be seen to some extent as reflecting the '*Pull-Push Effect*' of recognizing the increasing need for the professional workforce to match the growth and significance of information industry and the expanding higher education system to provide the appropriate workforce.

Across the world, it is seen that a wide range of courses are beginning to map on broad paradigms. Several schools have begun to diversify their portfolio of courses with programmes intended to serve the needs of the publishing and communication industries. And other schools have established programmes focused on the operation and management of telecommunications and computer networks.

***Interfacing Tradition with Technology:*** A proposal to blend the traditional activities with the new roles in the technological environment has been spelt earlier. It is very clear that the scenario of Library and Information Centres and the services provided by them is undergoing a transformation primarily due to emergence of new media. The information needs the user community the overall changes that have taken place due to need based adoption of IT, and the work in the libraries have also necessitated the making of appropriate changes in the Library and Information Science syllabus for various levels of courses.

These factors invite serious attention of our Departments of LIS, which produce manpower for managing Library and Information Centres. It is a common feeling that the departments of LIS have continued to lay more emphasis on the teaching of traditional subjects, philosophical aspects and historical topics to their students, and that teaching focused on

information technology and the practical aspects of library automation has been receiving meager share in the syllabus. This situation has caught the attention of Library and Information Scientists and has generated discussion on the need for a change in the LIS curriculum.

***Impact of Other Subjects:*** Library and Information Science has developed its own professional techniques and methods. It has shown its affinity towards the application of other fields to improve professional performance. In the early 1960s, Library Science invited the theoretical and philosophical approaches of other disciplines and implanted them in its core. It was Ranganathan who infused scientific method in the field and that marked the first change, from Librarianship to Library Science. He is also responsible for introducing the concept of documentation as slanted to library science, with emphasis on pinpointed service to specialist readers. One of the earliest disciplines that has had a strong influence on Library Science is the management science. In the later years the statistical techniques and methods of research were gradually implanted in the Library Science curriculum as the research in Library Science gained momentum.

The impact of statistics on Library and Information Science need not be over emphasized here. Library and Information Science is one of the earliest fields to adopt statistical techniques in administration, in the study of users and their information needs and behaviour and in research methodology. The use of statistics is responsible for the emergence of new areas like Bibliometrics, Informetrics, Scientometrics, and so on. Another discipline that has outwardly influenced Library and Information Science is psychology. The study of users which began in late 1940's was rather quantitative but the mode of study changed considerably in 50's and 60's in the present, there is a paradigm change in its application, oriented to information technology environment and to study the behavioural aspect of the user.

It may be particularly noted here that the present studies include very specific areas such as cognitive processes, information seeking behaviour of users in the information technology environment and so on. The emergence of Information Society has extended the horizon of the information science field to the study of sociopolitical and economic aspects of information. Similarly, the influence of socio-politico-economic aspects has extended the study of trans border information flow. In summary, it can be stated that the major disciplines that have become the part of LIS curriculum are: Management Science, Information Technology, Statistics, Linguistics and Psychology.

***Future Demands for Information Skills:*** A transition shift from agriculture to an industrial economy, based on Information technology

also influenced governmental policies and programmes, and is directed to production and distribution of information.

All these factors have contributed to the emergence of new areas termed as: Information Science, Information Society, and Information Technology, with the common denominator of 'Information' which has the reckoning of an economic power. Genesis of all these manifested transformation should be attributed to Library Science and Information Science which has traditionally carried out the task of collection, and distribution of information held in by the printed documents. The times have changed and the emergence of electronic media has opened up new avenues, and made people to rethink on manpower development programmes in this and selected other selected fields. The time is therefore ripe to consider all of these aspects in framing a curriculum for LIS discipline. The new requirements are viewed also in the context of the development of library networks and the World Wide Web, which means that information professionals should turn their attention to what the Information Technology Task Force of the Government of India have referred to as 'Content Creation and Development'.

The ability to design and develop information products for the network environment including the web, will be an essential requirement expected of the information professionals of the future. There has emerged in recent years, a broader environment – which includes the library but is not limited to it – that offers tremendous opportunities for the application of information accessing and handling skills. In this context, to view the library as the institution for which professionals are being trained is to taken extremely restricted view of the scope for the application of information organizing and handling skills.

The findings of the European Commission on the growth of the information industry classified it into three broad areas, *viz.*, Information Content Industry, Information Delivery Industry and Information Processing Industry. It is also necessary to work out similar strategies in Indian context. The Information Content Industry is primarily concerned with developing products for the web and on-line environment. This segment is in its early stages of development in India, and offers plenty of room for growth. The Information Delivery Industry consists of the creation and management of telecommunication networks through which information is transferred and delivered. This segment has received considerable attention in India in recent years and is in a position to enable the growth of the Information Content Industry. The Information Processing Industry consists of producers of hardware and software. According to the European Commission, the Information Content Sector accounts for nearly half the information industry and is growing. The message for India with its vast manpower resources is clear.

***New Applications:*** The profession which began with an objective of preserving the recorded knowledge of human civilization adopted a philosophical motto that the knowledge (Books) is for use, and then provided global access to that information. During the course of this three fold transformation, it has adopted the contemporary societal, economic, technological and educational changes in its application. These efforts have enabled it to acquire the capabilities of adopting them in the courses of teaching due to their imminent application in practice. The management of Library and Information Centres has assumed a new dimension due to the adoption of different services directed to different kinds of Information needs and different kinds of users. This can be considered a direct impact of economic development and the growing dependency of information on the national economy. As stated in the report “Library and Information entering into new phase,” in the modern economy the importance of information has increased and which calls for better use of existing, services, and continuous improvement of information serves to meet explicit and implicit needs.

The impact of Management Science has been a significant achievement in the profession of Librarianship. Apart from the application of principles and functions of management, the areas of human resource management, financial management and the aspects of information resource management have been considered as important areas in Library and Information Science in recent years. As observed in the context of industrial and production management the application of quality standards is also now being applied to the library services.

There are also high expectations of “Quality” in the library services. The first impact of Information Technology on Library and Information Science begins with computerization of libraries. The computers were successful in processing and retrieving of information, but restricted their work to “In-house”. The major change was brought in by the application of Communications and Storage Technology. The impact of Information Technology and its varied changes in application cannot be expressed in these few pages but can be envisaged by the services available today through the Internet. The impact of Internet on Library and Information services and the concept of a digital or virtual library should be reckoned as the nascent fields of study in recent years.

The background knowledge presented in the earlier sections provides a picture of the total transformation in the profession. It may also seem to be unpredictable what course of future developments or direction in which the Library and Information Science profession is going to take. In light of these developments it is necessary to examine the adequacy and appropriateness of the present curricula. In the first place, it is necessary to restructure and remodel the curricula to suit the present times.



**Modular Approach To the Curriculum:** After going through a process of deliberation on the subject and on observing the needs of the departments, the task of structuring the curriculum was so suited to the adoption by different departments of LIS with varying levels of infrastructure facilities prevailing in the country. Hence it was seriously considered to devise an approach that would help the departments to adopt the curriculum suitably.

The crux of this paper revolves around a modular approach in the formulation of the Model Syllabi. Basic objectives, detailed contents and outcome of each module and entire course structure has been coherently stipulated in this approach. Besides the modules, break-up of study, marks pattern, and optimum hours of teaching programme have also been suggested to be included.

As early as in 1982 Lang in the UNESCO report proposed a modular approach to the curriculum for Information Studies. A similar approach was also advocated in the Asia-Pacific report on "A Curriculum for an Information Society" (1998). Dr. Vasanth Gowariker has expressed a view to changes in the approach in the higher education and suggested a "Cafeteria" model for the courses offered by the universities.

Accordingly in this paper a proposal of a modular approach is made for LIS with 6 core modules and 1 Elective module. The worked out modules are;

MODULE – 1: Foundations of Library and Information Science

MODULE – 2: Knowledge Organisation, Information Processing and Retrieval.

MODULE – 3: Information Sources, Products and Services

MODULE – 4: Management of Library and Information Centres/Institutions

MODULE – 5: Information Technology: Basics and Applications

MODULE – 6: Research Methods and Statistical Techniques

MODULE – 7: Electives: Information Systems.

For each of the modules, the following concepts can also be added to enhance the effectiveness, thorough teaching, practice and evaluation.

Course objectives Unit-wise course content Special note on practical component Learning outcome of each module. It is implied that the modules might be adapted to any one of the education patterns; *viz.*, Two years integrated MLIS, one year each of BLIS and MLIS, or two-year integrated MLIS (Semester scheme).

The last 50 years of Library and Information Science education since the dawn of independence have seen many transitions, contrasts, and



contradictions. The transition is one of the most welcome and significant development. As of today, Library and Information Science education is on the threshold of facing new challenges of the new century. Great expectations however are in store to establish its durability and survival in the next millennium.

If the departments of Library and Information Science in India are to sustain the challenges they have to set global standards in Library and Information Science education at least for the Asian region. The task is stupendous and involves drastic and progressive changes in the curriculum and building adequate and appropriate infrastructure facilities. There is a need for rejuvenating the LIS courses in India in light of the happenings in the International arena, the adoption of modular approach is a way of meeting the present and future needs of a dynamic curriculum.

Thus, the education and training programmes in Library and Information Science must make a provision to prepare the professionals to assume the pro-active role in coping with new technology and the information explosion. In brief the designed course contents should concentrate in developing knowledge, skills and tools corresponding to the four basic identified areas creation, collection, communication and consolidation. It is hoped that this approach will would serve as a guideline to the future curriculum designing activities in the developing countries.

### **Enhancement of the Library Profession: An Asian Perspective**

**Scope of Paper:** Daunted by the vastness and variety of the ASIA listed in the World Geographical Encyclopaedia and hampered by the lack of information on the library profession in the component countries, this paper will not provide details of any one country unless they are relevant to the issues raised in the discussion of the topic. The focus of this paper is the library profession, particularly the enhancement of its image and status. The topic will be discussed in the following manner: (i) Scope of paper (ii) The Asian Background (iii) Defining the Library Profession (iv) Enhancement of the Library Profession (v) The Library Profession in the Virtual Library environment.

**The Asian Background:** In many countries in Asia, libraries have existed for thousands of years although very little has been written about them. Even in India “a nation known for its ancient and medieval, as well as more modern library establishment”-accounts of libraries in the Vedic, Buddhist, Medieval and Muslim periods of Indian history have yet to be accomplished.

In China, the earliest libraries existed in the form of “an aggregate of documents” or book collections in the keep of royal families, temples and scholarly institutions. In Southeast Asia, libraries in most of the countries

are the product of the 20th century, with the exception of Philippines where the National Library owes its roots to “the fewer than 100 volumes of books gathered in the Museo Biblioteca de Filipinas established on 12 August 1889”.

But modern library movement in Asia really took root in the 1970’s with greater impetus in the 1980’s, followed by a growth in professional literature.

A survey of the literature reveals great diversity in the library development among Asian countries, reflecting the vastness and variety of Asia itself. However, underlying this diversity are some common features that characterise library development in Asian countries:

- Inequitable distribution of libraries. Libraries are not well distributed throughout the country, with some parts being more well endowed than others.
- The earliest libraries are scholarly libraries or religious collections.
- Most of the modern libraries are dependant on Government resources.
- University and special libraries are more developed and privileged than public libraries.
- Libraries operate under decentralised management systems.
- There is often lack of cooperation, coordination among libraries, giving rise to duplication of materials as well as incompatibility of operating systems.
- Library development is spurred by economic growth, especially in cases of agricultural countries that need to industrialise quickly.
- Tendency to liberalise library use whereby closed access collections are subsequently open to public.
- Libraries become direct victims of wars or political upheavals in countries that suffered such tragedies.
- Library development is seen in connection with other aspects of national development social, cultural, economic, etc.
- Greater awareness of importance of libraries among governments in recent years.
- There is access to library education, with some more established than others.

Although as a whole, library development in Asia is impressive, enhancing the image and status of the library profession has been a matter of concern to most librarians over the last two decades. It has been discussed and written about in seminars and conferences in most parts

of Asia since the 1970's. And so it should be—because the process of professionalisation should be continuous. Professional literature on professionalism has shown that no profession can be completely professionalised it can only be more professionalised as the profession treads along the path of professionalism. The process of professionalisation can also be applied to various aspects of the profession at different levels and pace so that at any one time certain aspects of the profession can be more professionalised than others.

The need to enhance the library profession has assumed greater urgency in the 1980's because of:

- greater competition posed by the proliferation of information services that are not library based.
- acceleration of IT use in library functions.
- increased professional awareness of issues related to librarianship because of greater networking among librarians.
- increase of library schools resulting in better educated librarians who opt for a career in librarianship by choice.

Altogether the 1980's saw some immediate reaction, manifested in the change in nomenclature. "Librarians" became "information professionals" or "information specialists", "library science" became "information science" and "Department of Library Science" became "Department of Library & Information Science" or "Department of Information Science". The only term that has not suffered a name change seems to be "library profession" as we witness today. Seen from a positive viewpoint however — these changes reflect the ability of the librarians to react to change and adapt to changes.

But the enhancement of the library profession entails more than just a change in nomenclature. It entails having a deep understanding of what constitutes the library profession, what aspects of the profession should and can be enhanced and how they can be enhanced, bearing in mind that the goal of enhancement is increased professionalism. Professionalism in turn breeds excellence.

***Defining the Library Profession:*** What exactly is the library profession? Is librarianship a profession? Can we call the work we do—acquisitions, cataloguing/classification, indexing, abstracting, information retrieval (with or without technology), user education, reference — professional? Is library work "nothing more than the application of sets of skills and techniques" or just "a study of systems"?

It cannot be denied that the term "profession" is difficult to define. It has been given various definitions by various people at various times. It is an elusive term and various people have attempted to define it using

their occupations as a basis, result in definitions that are coloured by occupational bias and vested interest. When Melvil Dewey stated that:

“The time has at last come when a librarian may, without assumption, speak of his occupation as a profession” little did he realise the struggle for professionalism that he had begun would continue today.

Contemporary understanding and usage of the term can be said to date from 1915 when Abraham Flexner suggested some criteria as the basis for determining whether or not social work could qualify as a profession. He suggested that a profession is:

- Intellectual and carried with it personal responsibility for the exercise of choice and judgement.
- Learned because its exercise was based on a substantial body of knowledge which could be passed on from generation to generation from practitioners to students.
- Practical in that its corpus of knowledge is put to a practical use of benefit to others.
- Organised into associations of practitioners.
- Characterised by an idealism which in theory, if not in practice, puts the aims and practice of the profession above mere money making.

Since then, Flexner was followed by several other exponents of the “traits” or “attributes” method of defining a profession, such as Carr Saunders & Wilson (1933), Morris L. Logan (1953), T. Parsons (1959), G. Millerson (1964), etc.

Together the attributes that they had put forward as worthy of a profession themselves could fill a thesis but the recurring attributes could be summarised as below:

1. Possessing a corpus of professional knowledge comprising theories and techniques/skills, preferably of a multidisciplinary nature.
2. Formal system of education and training, sufficiently long to enable the mastery of theories and techniques. This system should incorporate continuing education programmes and emphasise research and publication.
3. Possess a service principle that places the welfare of society above personal gains.
4. Be governed/regulated by a Code of Ethics, to ensure accountability in the performance of duty.
5. Maintain standards in all aspects of professional activity, such as work standards, educational standards, personal integrity, etc.

6. Be represented by a professional association.
7. Possessing legal and public recognition of professional status.

These attributes of course are not listed in order of priority and one is not more important than the other. A profession may have all or some of the attributes, depending on the level of professionalisation.

The 'attributes' above correspond to a large extent to the attributes of other professions, and in general have been accepted as a popular means of assessing the level of professionalisation that a profession has undergone.

In the same manner, these attributes will serve as a basis for the discussion of the topic — enhancement of the library profession. On the assumption that these are the attributes of the library profession, how could they be used to enhance the profession? In the language of management today, these attributes can be said to be the Critical Success Factors (CSF's) of professional development.

### ***Enhancement of the Library Profession***

***Expanding and Developing the Corpus of Knowledge:*** Every profession needs its own body of knowledge (theoretical foundation and specialised skills) to be exclusive, such that it sets it apart from other professions and establishes its identity as a profession. Medicine, Law, Engineering, Education, etc. have their own core of knowledge and mastery of their specialised core set them apart from each other and from the para professional group within their own category.

This core makes them so exclusive that, as an example, even if the doctor were to sit under the coconut tree with his stethoscope, he can still practise his profession. Can we say the same for the librarian? Can a fresh graduate without library qualifications undertake cataloguing and classification, indexing, abstracting after being trained for a week? I say yes! All he needs is intelligence, subject knowledge, general knowledge and the ability to look up AACR II and LCSH. Now with OCLC and Bibliofile CD ROM databases, why does one need the librarian? And if the fresh graduate can do what any librarian is trained to do, what then, is so special about librarianship?

The lack of the intellectual foundation has long been the weakness of the library profession. This has to be rectified if the library profession is to be enhanced. If we were to scrutinise the intellectual core of other professions, we will realise that they are generally multidisciplinary in nature and that they comprise theories and skills. In education for example, the theoretical basis is very broad encompassing psychology, sociology, management and administration, development, history, while at the same time pedagogy provides teachers with specific skills in teaching.

What about librarianship? Would it not be sensible for us to broaden our intellectual base to include Psychology (to study user behaviour, educational psychology, research psychology), Sociology (to understand the cultural/social environment/framework within which the library operates) Philosophy, Local History, Fine Arts, Communications, Languages, Law, Management, Computer Science/IT (including programming) while Research Methodology, PR, Indexing, Classification, Information Retrieval are examples of the professional/technical skills that could be taught.

The intellectual core in any profession does not merely provide facts but trains the person to reason, rationalise, solve problems — in other words, to think. Independent thinking is one dimension that, for now at least, the computer has not been able to substitute. Taking for example, the study of History, it is not the facts that are so important but the lessons learnt from the past. One learns to reason out the causes and events, understands how people think and behave at that particular moment in time and evaluate, with the wisdom of hindsight, whether or not certain events could have been avoided.

Expanding and developing the corpus of professional knowledge would place the library profession competitively with other professions. Mastery of it would provide librarians with identity, authority and autonomy — no one else could encroach into their domain. The lack of recognition that librarians in Asian countries suffer from is partly because they are constantly being compared with the more prestigious professions, such as medicine and law and engineering. In most parts of Asia, the status of librarians suffer vis a vis doctors, lawyers, engineers. Even at universities, librarians have not been granted parity vis a vis the academic staff although India has been somewhat fortunate albeit not without a struggle. In Philippines, the status of librarians is safeguarded by legislation but these are only two out of the numerous others. In Japan, although libraries have had a long history, “librarianship has never been viewed as a professional in the European sense. Such is the case even now.”

Enhancing the profession through the expansion and development of the corpus of professional knowledge is tedious but if medicine can survive the years of development, why can't librarianship? The fastest way of developing the corpus would probably be through the educational system, particularly through research and publication.

***Upgrading Library Education and Training:*** If librarianship is to be accepted at par with other professions, library education must be undertaken at tertiary level. Advocating librarianship as a university discipline, at least in Asia, is not for snob appeal. It is a pragmatic and logical step to take because in most Asian countries, the salary scale is



tagged to the qualifications obtained. Another reason why librarianship should be taught at universities is because research and publication activities are part of the lecturer's contractual obligations. Through research and publication the profession will be developed and enhanced. Yet another reason is the opportunities provided for continuing education at universities, such as postgraduate programmes (Masters, Ph.D.), seminars and conferences, study leave, etc.

University education could enhance the profession by controlling the entry qualification and providing the accreditation so crucial to maintaining standards within the profession. Library education in India, China, Japan and the ASEAN countries has developed tremendously over the last decade. Mainly conducted at universities, they undertake curricular reform to keep up with the latest developments. As example is China, where "traditional subjects [were] being deleted and new ones such as Information Theory, Library Automation and Cybernetics [are] being introduced".

If developing the corpus could enhance the profession, upgrading library education and training would provide librarians with the means to propel the profession to greater heights.

***Review the Service Principle:*** The altruistic "no profit" service ideal that has governed library services for far too long is obsolete. It will be replaced by another the "cost effective" principle. For the idealists, it will be the end of a scholarly tradition for the pragmatists, it is not too soon.

In countries where libraries are heavily dependent on the Government Treasury for every cent, it would seem logical to not only find alternative funding but to introduce fee based services as one alternative. While to the purists or idealists levying charges for library services is tantamount to blasphemy, most library managers must realise that the exorbitant cost of maintaining good collections and service for free cannot be justified.

***Enforcing the Code of Ethics:*** Most professions are regulated by the Code of Ethics but unless enforced, the Code of Ethics will not achieve its objectives. Will the Code of Ethics enhance the library profession? If it succeeds in helping the profession to gain the respect and confidence of the public at large and its clients in particular, then the Code of Ethics will help to enhance the profession. But the difficulty with the library profession is that information work does not have the same "clout" as medicine or law.

It is logical to assume that, using medicine and law as role models, accountability hinges on the protection of life and property. We do not protect life or property and who bothers about wrong information? Especially if given free! However, in the event users are charged for services/information rendered, then library clients would presumably demand value for his money. Librarians would then have to be accountable.

**Setting and Maintaining Standards:** Standards are crucial in the process of professionalisation because they represent quality and excellence. Like in other professions, standards for the library profession should not be static but should be upgraded as the profession becomes more professionalised. Standards are expressed in various ways. The mission statement of any institution itself is a standard. Standards can be set for work, behaviour, services, productivity, management, education, etc. Standards breed excellence, trust and respect and eventually earn librarians public recognition and confidence.

**Professionalizing the Professional Association:** The role of the professional association in promoting the profession is well documented in the professional literature. It serves as the mouth piece of the profession, its representative and depending on its strength, provides leadership. However, whether or not the association can effectively undertake its role depends on several factors — level of professional awareness and support among its members, legal and public acknowledgement of its role, its political clout and most important — its ability to influence members of the profession as well as the public of its authority and ability to control matters of professional interest. One way of assuming control and authority is to establish systems of control such as accreditation or qualifying board. In most countries in Asia however, the professional associations do not have the ability or capability to assume a leadership role and this renders the association incapable of enforcing the standards it may want to impose. Another weakness is the inability to command loyalty from its members because the institution employing librarians usually expect and do get their loyalty from their employees.

If the association is not in the position to command loyalty and assume leadership, can it be effective in the enhancement of the profession? In Asia, the strength of professional associations lies in its promotional role. They have been very successful in promoting continuing education (courses, seminars, talks, training) as well as producing publications. In some countries, despite the dynamism of the associations, they are not able to provide leadership.

The Malaysian Library Association is one such example. Dynamic though it is, registered as a society, under the purview of the Registrar of Societies, it has to function as a society unlike the Malaysian Medical Association, the Malaysian Bar Council or the Malaysian Institute of Accountants.

**Attaining Legal and Social Recognition of Professional Status:** Attaining legal and social recognition of its professional status would definitely enhance the library profession. However, except for Philippines, thus far the only country in Asia that has achieved legislative status, it

has remained elusive for the others. While legal recognition is clear cut, social recognition depends on how society views the contribution of librarians and library work. In this aspect a lot would depend on how librarians project their role.

Currently, librarians call themselves “information professionals”. To get society to recognise this role, librarians will have to prove that they actually undertake information work. The onus is thus on the librarians to show what they are capable of. This is where librarians must use whatever tactics they have to project themselves, based on ability and quality. There is evidence of the librarians’ willingness to change and adapt to the challenges posed by developments. Many have adopted new concepts from other professions and applied them to librarianship. “Strategic Planning” is one, “Performance Measurement” is another. Both have currently become part and parcel of library management.

### ***The Library Profession in the Virtual Library Environment***

The electronic library is a reality in Asia and to what extent they can be networked to form the virtual library with the rest of the world depends on will and wealth. In many of the countries, the electronic library network is already in existence. Through Internet the whole of Asia will be networked.

Would global networking however enhance the library profession? To those who believe in the power of technology they believe the future of the library profession lies with technology. To those who believe computers are just means to an end (meeting user needs) they fear that the library profession would die a natural death when libraries are replaced by professionals who, via computers, can do the librarians’ work faster and more effectively. To the latter, technology is something that they fear. Ironically, doctors welcome laser surgery and computerised diagnosis/prognosis as new methods that would advance and refine their skills. But librarians view computerised indexing and cataloguing as new methods that would gradually replace their conventional skills and displace them. In a way they are correct if librarians believe that indexing and cataloguing are all that is librarianship.

In the final analysis, whether libraries are digitised or not, the image and status of the library profession depend on what librarians perceive the library profession to be. The future of the library profession rests with us librarians.

## **South Asia in the Global Electronic Village: Issues and Implications**

### ***The Internet and its Impact***

The Internet is an amazing development of our times based on the convergence of the computer and the communication technologies. The

traditional constraints of space and time are no more there and the whole world is almost becoming a global electronic village. The developments in computer and communication technologies have made a significant impact on libraries and scholarly communication. Now it is possible to communicate from a networked workstation with anyone across the globe as well as have real time access to digital documents. Hypermedia and multimedia are other significant developments of our times. International collaboration is now possible in teaching, learning, publishing, and resource sharing via various networks. The Internet-based resources and services, such as e-mail, ftp, http, bulletin boards, mailing lists, scholarly discussion lists, computer conferences, electronic journals, digital databases, various browsers and search engines have a strong potential to provide massive access to one and all. In fact, the interactivity and interoperability of many of these networks and services must be integrated into our professional education and practice for value addition at every level.

### ***Paradigm Shift and Globalization***

There is a shift away from stand alone libraries to library and information networks. More and more people are talking of 'hybrid library'. 'Balance' between the print-based publications and digital documents has become a buzzword. There is a paradigm shift from ownership to access; just-in-case to just-in-time; print-based publications to digital documents; stand alone libraries to networked systems; intermediary model to end-user model, command-based systems to menu-based systems; linear to non-linear mode of access; hierarchical to non-hierarchical systems; one-way dissemination of information to interactive communication; bundling of scholarly journal to its unbundling; stability to instability; physical format to formless data; top-down to bottom-up systems. Information has become fluid and transcendental. It is now separated from the containers in the process of digitization. Otherwise also, information has become fourth need and strategic input for the emerging information society. There is a paradigm shift in education also. Now-a-days, there is a trend towards individual exploration, apprenticeship, team learning, diverse and fast changing curricula. Above all now teacher is required to serve as a councillor and facilitator. This shift calls for the use of networked PCs, information access, skill development simulations, collaborative tools, email, networks, and a variety of publishing and access tools. As such, it is high time that we take cognizance of these changes and make our professional education and practice responsive to the needs of the emerging information society.

### ***Existing Gap and Inequality***

There are wide variations between and within the developed and the developing countries. Though the position of the elite institutions in the

developing countries is relatively better, yet there is a perceptible inequality of access to the networked resources and services between and within the developed and developing countries on the one hand, and the elite and the ordinary institutions on the other hand. The developed countries and institutions are better positioned to reap the benefits of enabling technologies. But in spite of these technological developments, the existing gap between the developed countries and institutions and the less developed countries and institutions is increasing day by day, whereas the enabling technologies have a strong potential for bridging the existing gap between them.

Not to talk of India alone, the picture is not rosy in other South Asian countries also. In fact, we cannot call this world a global electronic village till the less developed countries and institutions are provided with networked workstations and training facilities. Nepal, Bhutan, Bangladesh, and the Maldives are four countries in South Asia where the position of library and information networking is far from satisfactory. India, Pakistan, and Sri Lanka are relatively in a better position. It would be appropriate to point out here that it is very easy to retrieve quality information from the developed countries and institutions, but it is very difficult even to know what is available in one's area of interest in the South Asian countries. Very little information about librarianship and information work in these countries is available to the interested researchers. Therefore, the SAARC Documentation Centre (SDC), New Delhi must play a leadership role in this regard.

### ***South Asia and its Problems***

South Asia is characterized by asymmetry, in size, population, economic and military power. India is larger than all other countries put together. South Asia is a split spectrum of a once monolithic political entity consolidated and welded into Indian sub-continent by the British, mainly in the 19th and early 20th centuries. The breakup of this entity into seven independent states has given rise to centripetal as well as centrifugal forces. That is why SAARC (South Asian Association for Regional Cooperation) has emerged as a weak political organization, born of otherwise strong geographical cohesive expansion.

The geographical hub of south Asia consists of the great plains formed by the coalescing basins of the Indus, the Ganga, and the Brahmaputra. They contain the nuclei of Pakistan, India and Bangladesh in their basins. South Asia's mountainous peripheral states are Nepal and Bhutan, nesting in the Himalayas on the north. In the south, Sri Lanka is a loose maritime adjunct to the Indian peninsula while Maldives represents the tapering end of the coral leg of this sub-continent, disappearing in the Indian Ocean. India has been so placed in south Asia that she has common



borders with all her south Asian neighbours, while none of her neighbours share borders with each other. Such a geographical position creates a peculiar situation with regard to socioeconomic and political as well as geopolitical relations amongst the natives of this region.

There is no denying the fact that diversity present in the earlier conflicts of south Asia remained the major factor that stood as a great impediment to Asian unity. India and Pakistan need to play a key role in this direction, but they have their historic tension over the Kashmir issue. Despite the linguistic and religious diversities and differences in milieu in different parts in south Asian region, there does exist a unique cultural unity in the sub-continent. Unfortunately the nations of south Asia have not had good relations with each other.

The entire region is economically backward. The continued existence of problems like unemployment, poverty, inflation, balance of payment difficulties, regional inequality, etc. and continued demographic pressures have forced these countries to resort to massive foreign aid leading to heavy foreign debt burden. This has created a serious problem of debt, which eats away a significant proportion of export earnings of these countries. There is, therefore, an urgent need for these countries to develop self-reliant economies for their sustained economic growth and solution to the other problems. It is ironical that while this region accounts for nearly one fourth of world's population, its growth rate is only 2%, and even the inter-SAARC trade is only 3.4 % of the total global trade of these seven countries. India is easily identified as the giant in south Asia. It occupies 73.2 % of the total area of south Asia, four times larger than Pakistan and eleven thousand times larger than the smallest member Maldives.

The growing regional consciousness and trends towards unification of hitherto divided nations are trends which may help to think more seriously about their own regional identity and the need for greater unity among themselves. This unity is now imperative in the context of increasing international pressures both in economical and political terms on the region as a whole. The south Asian nations being in the process of socioeconomic development have to be on guard against any attempt to undermine their sovereign status, be it in the name of human rights, environment, intellectual property rights or security.

The south Asian region has been relatively instable, politically speaking. The countries of this region can be categorized into two categories. The first group consisting of India, Pakistan, Bangladesh, and Sri Lanka, which covers the major part of the region, in terms of area, population, economic development etc. As would be clear in this chapter much of the development in librarianship has also been in the countries of this category,



particularly in India. The other group consists of three smaller states of Nepal, Bhutan, and the Maldives. Except for Maldives which has the highest literacy rate (93%) and the highest per capita income (\$726) in the region, Nepal and Bhutan are among the least developed countries in the world with per capita incomes \$180 and \$190, and literacy rates being 27% and 40% respectively. As far as development of librarianship and information work is concerned, these nations have not much to speak of. Nepal, however has made some progress in the field, but the Maldives, in spite of being the most literate of the seven countries, has not made progress in this field parallel to its achievements in its economy.

SAARC (South Asian Association for Regional Cooperation) and SAPTA (SAARC Preferential Trading Arrangement) are good steps in the direction of regional cooperation and socioeconomic development of the countries of this region. The south Asian countries have decided to move towards building a SAFTA (South Asian Free Trade Area) before 2005, preferably by 2000 AD. SAARC, which came into being in December 1985, reflects the growing trend among regions to accelerate the process of their economic and social development through joint action-encompassing key areas of regional cooperation-arranging from exchange of trade preferences to agriculture and rural development; science and technology to health and population activities; and from telecommunications to infrastructure.

In the long run regional cooperation must lead to removal of artificial barriers without in any way damaging the individuality and identity of people. SAARC has made some palpable, if not spectacular, progress in this field. The idea of establishing a SAARC Documentation Centre (SDC) at New Delhi was approved in principle by the Heads of State Governments at the second SAARC meeting held in Bangalore in November 1986. It was decided unanimously in this meeting that for the SAARC Documentation Centre (SDC), the INSDOC should be a focal point in India to look after the documentation activities.

The work of the SDC will be based on published materials available with focal points, information about which would be compiled into a SAARC Bibliography. SDC conducts human resource programmes in information management in the SAARC region. It includes short-term courses, seminars, workshops, etc. every year. Participants are drawn from all SAARC nations and the target groups include work professionals engaged in library and information activities. The SDC should facilitate access to all information about Integrated Programme of Action (IPA) for interested scholars and other users. Possibility may be explored for disseminating such information through cyberspace, including the Internet. Establishment of the SAARC Net-The Online Computerized data Information System, headquartered in FICCI BISNET-makes a good beginning.

### **Conclusion and Suggestions**

The countries in the south Asian region display a wide range of disparities, which add to their socioeconomic problems. Unemployment, poverty, illiteracy, inflation, regional inequality etc. are the lingering problems of south Asian countries, which cast their shadows on the growth and development of library and information infrastructure in these countries. Not to speak of other countries in this region, even India has not so far adopted any national policy on library and information systems. Even the National Library of India has not fully internalized the concept of library automation and networking, whereas India is required to provide leadership in resource sharing via networking being the largest country in this region. There are wide variations between and within the countries and institutions in this region. There is perceptible gap between rural and urban settings as far as the provision of library & information resources and services is concerned. Whereas, the number of library schools in India is far more than required, in Bangladesh the situation is totally the reverse. Nepal, Bhutan, and the Maldives have no library schools to make the trained manpower available to cater to their information needs.

The position of academic and special libraries is much better than that of school, public and government libraries. The lack of resources and political will are the main hindrances in the establishment, development and maintenance of public libraries under the clear mandate of law in these countries. Even in India, so far, only ten states out of 26 have enacted library legislation to provide comprehensive public library service to the urban and rural folks.

The concept of library automation and networking is being adopted by the academic, particularly university libraries and special libraries in India. There is an immediate need to coordinate and consolidate the resources and services of different types of libraries in south Asia to enhance people's access to quality information in this region. INFLIBNET is an ambitious programme in India to materialize the concept of resource sharing via networking. ERNET, VSNL, and NIC are the three main service providers in India. In fact, there is a clear trend towards library automation and networking in India, Pakistan, Sri Lanka, and Bangladesh.

The bye-products of information technology are now visible in the form of indigenous databases and there is also a trend towards electronic publishing. NISSAT (National Information System for Science and Technology), INSDOC (Indian National Scientific Documentation Centre), and DESIDOC (Defence Scientific Information and Documentation Centre) in India have really made perceptible progress in developing their resources and services. Similar work is being done by PANSDOC (Pakistan National Scientific and Technical Documentation Centre) and BANSDOC

(Bangladesh National Scientific and Technological Documentation Centre) in Pakistan and Bangladesh respectively. Though in Sri Lanka, a modern technological information system has yet to be realized, even then the planning, coordination and formation of an effective library and information system for the country are the mandatory functions of The Sri Lanka National Library Services Board.

The position of library and information infrastructure in Pakistan, Sri Lanka, and Bangladesh is perceptibly better than in Nepal, Bhutan and the Maldives. Lack of trained manpower, insufficient funds, and inadequate materials are the basic hindrances in the expected development in library and information services in all the south Asian countries. In fact, globalization is a complex phenomena which has resulted in a complicated interaction between “globalism” and “localism”, where huge corporations are selling products across national boundaries and creating a globally homogeneous culture of consumption.

In this context the slogan given by the ALA, is very significant. All the developing countries in general, and the South Asian countries in particular must formulate their library and information policies and develop adequate infrastructure to provide real time access to their citizens in a cost-effective manner. Efforts must be made to strengthen the SAARC Documentation Centre (SDC) New Delhi and develop connections with the East Asian countries. The international bodies, such as IFLA, FID, Unesco, IDRC, and World Bank must expand their activities in the South Asian region. At the first instance, the Internet connectivity must be ensured in all the countries in this region, and then the local by-products must be mounted on the main servers of the host institutions in a planned manner.

Education and training, and resources consolidation and sharing via various networks is a pre-condition for enhancing users' access to global information resources and services. Otherwise, the so called globalization and the global electronic village will be lip service to the South Asian countries. The real benefit of this process will remain restricted to the industrial countries and the developing countries will continue to be used as consumers only. Real globalization can play a central role in our collective future by its potential to enhance individual freedom, widen opportunities for countries in the South, and increase democratic participation. In fact, the real global electronic village is that where there is equity in resources and equality of access for one and all. For this, there is an immediate need to change the mind-set of the 'haves' and 'have nots'.

### **Information Literacy and Librarian's Role**

The library and information services are responsible for supporting promoting and enhancing teaching, learning and research programme of

universities and colleges by providing varieties of information materials in different format, in house and in remote location and providing training to use in house materials as well as access to information available at different location.

**Information Age/Society:** The most recent revolution in human civilization is information revolution. This is also known as name information explosion/information age/society. According to Eugene Garfield information society is “characterized by the fact that the rapid and convenient delivery of needed information is the ordinary state of information society”. In the information society the economy is driven by information where as in the industrial age/society the economy is driven by industries. In an information society more people are engaged in collecting, storing, retrieving, amending and dissemination information. Former Prime Minister of Japan Mr. Nakasone said in 1984 “Japan’s major industries would be the one that deal with the information handling after 20 years.”

The information society is now upon us, if we address it properly and take it as an opportunity we can reap the several benefit from the information society. If we do not give proper attention it will pass by and others will take the benefit and current digital divide will enlarged.

When large number of population is engaged in total gamut of information, it is obvious that there will be too much of information available in several formats at different location.

Effective utilization of too much information requires a special literacy then functional or basic literacy. To function effectively in particular aspects people must be literate in that aspect. Literally following illiteracies are identified:

- Functional literacy/Basic literacy
- Cultural literacy
- Scientific literacy
- Computer literacy
- Technical literacy.

Business literacy, and to be competent in the competitive world, to survive in the information age/information society the essential literacy is “Information Literacy” Peter Drucker say’s information society require that its member learn how to learn.

**Information Literacy:** First time the concept of information literacy was introduced by Mr. Paul Zurkowski President of Information Industry Association, when he submitted a proposal to the National Commission on Libraries and Information Science (NCLIS), USA in 1974.

According to him “People trained in the application of information resources to their work can be called information literate. They have learned techniques and skill for utilizing the wide range of information tools as well as primary sources in molding information solutions to their problems”.

ALA Presidential Committee on Information Literacy recognized the importance of Information Literacy to a democratic society and provided a definition on Information Literacy skills as follow.

“To be an information literate, a person must be able to locate, evaluate and use effectly the needed information.” Since then, several authors’, study report, and institution have provided the definition of information literacy.

**Component of Information Literacy:** Several definitions conceive that information may be presented in several formates and may include documentary sources, (Books, Journals, reports, thesis, patents grey literature), photo graphics, charts, graphs, multimedia, sound recordings, and computer graphics. In the future, there may be other formate presenting information beyond our imagination at present. Considering these possibilities varieties of formats require literacies beyond basic literacy. Other components of information literacy are:

Library Literacy:

- i. Knowing about types of libraries and their functions
- ii. Making use of catalogues, collection development and any special collections.
- iii. Understanding the use of reference tools for different purposes.
- iv. Use of secondary information sources, such as indexes, abstracts, reviews, bibliographies and biographies
- v. Familiarization with library rules, do’s and don’t do’s to maintain library environment
- vi. Familiarization with the library services and facilities
- vii. Familiarization with the floor plan and organizational structure
- viii. Familiarization with information sources, such as documentary resources, audiovisual resources, electronic resources and multimedia maps and photographs; an expert in a subject also is an information sources.
- ix. Knowledge of the Online Public Access Catalogue system.

These elements of literacy help one to become an independent user of the library, and enable to identify, locate, access and retrieve information from the library.

**Visual Literacy:** Is defined as the ability to understand and use images, including the ability to think, learn and express oneself in terms of images.

- i. Visual learning is the acquisition and construction of knowledge gained through intersection.
- ii. Visual thinking is the ability to organize mental images into shapes, lines and colours.
- iii. Visual expression is the ability to use visual symbols to express ideas and convey meaning.

**Media Literacy:** Is defined as the ability to access, analyze and produces information for specific outcomes.

The Media Literate person:

1. Is aware of his/her daily contact with the media and their influence on lifestyles.
2. Effectively interprets media message to derive insight into their meaning.
3. Is well informed about media coverage issues
4. Develops sensitivity to media content trends as a means of learning about his/her culture.
5. Remains abreast of ownership financial and regulatory issues impacting the media industries.

**Computer Literacy:** Is generally thought of a familiarity with personal computers and the ability to create and manipulate documents, and also familiarity with email and the Internet.

**Network Literacy:** Is the ability to locates access and use information in networked environments at the national, regional and international levels.

**Information Literacy Standards:** There is no textbook for life, and school can no longer define success of student learning of a pre determine set of facts. School need to educate students to cope with a future of constantly changing need and information. The information literacy standards provide a mechanism for helping students become responsible users of information for everyday life, for the business world and for democracy.

Information literacy standards for different level of education are developed. The common standards include three categories:

- Information Literacy
- Independent Learning
- Social Responsibility.



Under the above three category there are three standards under each category and altogether there are twenty-nine indicators. Indicators are the characteristics of an information literate person.

To summarise the indicators, information literate students are:

- i. Competent, independent learner
- ii. They know their information need,
- iii. They display confidence in their ability to solve problem at hand.
- iv. They manage technology to access information and to communicate information
- v. They hold high standards for their work and create quality product
- vi. They are flexible, can adopted change
- vii. They are able to function independently and in-group.

Ultimately information literate people are those who have learned how to learn. They know how knowledge is organized. They know how to find information and how to use information. They are people prepared for life long learning. Because, they can always find information need for their task or decision.

***Information Literacy and Librarians:*** The most vigorous proponents of information literacy have been librarians, other information professionals and scholars, in these areas. Wherever they work, librarians know all too well that most of us are not savvy information seekers and users. The role of librarians is to ensure that students and staff are effective users of information. The library supports the curriculum by providing adequate resources, personnel and training so that both students and teachers become independent users of information.

To foster information literacy the librarian's:

1. Work with the classroom teachers as a partner to plan, design, deliver and evaluate instruction using a variety of information resources.
2. Serves as a teacher and consultant in the transition from textbook centred classroom to resource based classroom.
3. Provides leadership, expertise and advocacy in the use of technology.
4. Manages a programme in which student receive instruction and practice in the use of information.
5. Students learn from the librarian to use multisources of information, locate, select evaluate and present information.
6. Librarians can help teacher in developing alternative assignment to use multimedia in demonstrating proficiencies.

7. Librarian can help student before and after the class in their academic activities
8. Librarians can help student in the use of databases, online searching, and additional current information.
9. Librarians provide instruction for the entire class and small group about the function and service provided by the library.
10. Librarian provide non-competitive environment to the students.
11. Librarian frequently works with the individual student in cooperative learning situation.
12. Librarian work collaborates with the teachers to develop and implement curriculum on using wide variety of materials and approaches to meet students learning needs.

Librarians working as information specialist, teachers, and instructional consultant help students develop lifelong learning skills, thinking skills and the ability to sue information effectively.

***State of Information Literacy in South Asia:*** Information is considered as an important weapon to fight against poverty. Information literacy imparts the skill to determine the need of information, provide skill to access relevant information helps to evaluate information critically, provide skill to incorporate the information into one's knowledge, helps to understand the economic, legal, and social conditions laid to use of information. The person who has acquired these skills is known as information literate persons. If a person has these skills, he is a life long learner. His all activities are enhanced, that will help him to improve his life standard.

Therefore, the skill to access to quality information will help to reduce the poverty, which is a strongest enemy of humanity. The need, importance and discussion on information literacy is increasing world wide. Mission or Forum for the promotion of information literacy in Australia, Canada, UK, USA is discussed in (3). In Nepal, perhaps in South Asia, TU Central Library organized a national Seminar on Information Literacy for the first time on February 2002.

Second National Seminar on Information Literacy was organized by TU Central Library on March 2004.

Both the seminar helped to increase the awareness on need and importance of Information Literacy in Nepal. The seminar made a strong recommendation to integrate the information literacy topics in the curriculum of Master in Library and Information Science (M. Lib. Sc.). The study on Information Literacy in M. Lib. Sc was begun in 2004. Second important recommendation of the seminar was, introduction of assessment

of the information literacy skill in all the national commission like: a. Public Service Commission, b. TU Service Commission, c. Teacher's Service Commission where large number of human resource are selected for various purpose. The reason of the recommendation is that the selected human resource have some skill of information literacy, whose application in the job will enhanced their performance.

One-day National Seminar on the role of Information Literacy for quality education at school level was organized by National Association of School Library(NASL) on February 2005.

In India, Indian Library Association in its 51<sup>st</sup> Allual conference on Dec. 2005 has included information literacy one of the theme of the conference.

In Patialia, India, International Workshop on Information Skill for learning "Empowering 8" was organized on October 2005.

Empowering 8 is a new model of information literacy skill recommended to the participating countries. The model includes:

1. Defining
  - Understanding the need and formulating the quarry.
2. Strategizing
  - Identifying possible information sources, chose keywords, formulate search strategies
3. Finding
  - Locating and accessing sources
4. Selecting
  - Choosing
5. Getting
  - Collecting, obtaining, retrieving
6. Organizing
  - Arranging, Synthesizing
7. Evaluating
  - Determining relevance and judging the quality
8. Using
  - Communicating, Reporting, Applying and representing.

The fundamentals of information literacy are the resource based learning. A library with rich collection of printed as well as facility to access electronic resources is a laboratory. To acquire information literacy skills Librarians can play a vital role to import information literacy skills working together with the faculties, researchers and students.

Over the last decade many countries have paid increasing attention to dementia related diseases, primarily due to the rapid growth of the elderly population. Although dementia is generally considered as an age-related disease, younger people may also suffer from dementia.

A person with dementia will gradually lose his/her memory, the personality may undergo profound changes, physical limitations develop, and the patient will require help with many or most of daily activities. In spite of such mental and physical limitations, a person with dementia can benefit greatly from many types of library services.

The purpose of this guidelines publication is to raise awareness in libraries, among library professionals, care givers, public policy makers, as well as among families and friends of persons suffering from dementia, that many types of library services and materials can help stimulate the memory while providing pleasure and entertainment. Experience shows that even persons with a middle-stage dementia can benefit from reading literature and obtaining information. These guidelines give practical recommendations on how to provide mental stimulation with books and other library materials. The publication also includes suggestions for library staff on how to tailor such services to the target population. The examples included are mostly taken from public libraries in Denmark.

This publication is part of a series of guidelines publications from the IFLA Standing Committee Libraries Serving Disadvantaged Persons (LSDP) focusing on persons with specific disabilities or special needs. A full list of the LSDP guidelines can be found at the end of this publication.

The authors of "Library Services to Persons with Dementia" will be pleased to answer questions from international colleagues. Please find their contact information at the end of this document.

### **What is Dementia?**

According to the World Health Organization dementia is the result of a disease process. When a person is diagnosed with a form of dementia, *e.g.*, Alzheimer's disease or a related disorder, he/she exhibits clear symptoms of impaired memory, thinking processes, and behaviour. Early signs include problems in remembering recent events and difficulty performing routine and familiar tasks.

The person may also experience confusion, personality change, behaviour change, impaired judgement, difficulties finding words, finishing thoughts, or following directions. Dementia is not a normal part of ageing. It knows no social, economic, ethnic or geographical boundaries. Although each person will experience dementia in his or her own way, eventually those affected are unable to care for themselves and need help with all aspects of daily life. There is currently no cure for dementia, but medical

treatment may postpone the progression of the disease. Dementia is irreversible when caused by disease or injury. It may be reversible if caused by drugs, alcohol, hormonal or vitamin imbalances, or by depression.

### **The most Common Dementia Diseases Alzheimer's Disease (AD)**

Alzheimer's disease is the most common cause of dementia. It is estimated that about 60 % of all cases of dementia are related to AD. Alzheimer's disease attacks the parts of the brain that control thought, memory and language. During the course of AD, nerve cells die in particular regions of the brain and the brain shrinks. This affects people's ability to remember, speak, think and make decisions. The onset of the disease is gradual and the person's decline is usually slow. Currently, the cause of the disease is unknown. AD affects all groups in society and is not related to social class, gender, ethnic group or geographical location. Although AD is more common among elderly persons, younger persons can also be affected.

Alzheimer's Disease affects each person in a different way. Its impact depends largely on what the person was like before the onset of the disease, *i.e.*, personality, physical condition and life style. The symptoms of AD can be best understood in the context of three stages of its development – early, middle and late. As stated before, not all persons with AD will display all these symptoms and the symptoms vary from individual to individual.

### **Vascular Dementia**

Vascular dementia accounts for about 20% of all cases of dementia. Vascular disease occurs where blood vessels are damaged and the supply of oxygen is at risk. If oxygen supply fails in the brain, brain cells are likely to die, leading to a series of mini strokes (infarcts) and possible vascular dementia. Cited from: Alzheimer's Disease International (ADI)

Some people with vascular dementia find that symptoms remain steady for a time and then suddenly decline as the result of another stroke. This contrasts with the gradual decline many people with Alzheimer's disease experience. It is sometimes difficult to determine whether people have Alzheimer's or vascular dementia. It is also possible to be affected by both.

Cited from: Alzheimers Disease: help for caregivers. WHO Dementia with Lewy Bodies.

Dementia with Lewy bodies is the third most common cause of dementia and occurs in up to 20% of cases. Dementia with Lewy bodies is similar to Alzheimer's disease in that it is caused by the degeneration and death of nerve cells in the brain. It takes its name from the abnormal collections

of protein, known as Lewy bodies, which occur in the nerve cells of the brain. Half or more of people with Lewy body disease also develop symptoms of Parkinson's disease. Cited from: Alzheimer's Disease International (ADI)

The stages of dementia:

*In the early stage the person may*  
*show difficulties with language*  
*experience significant memory loss – especially short-term*  
*be disoriented in time*  
*become lost in familiar places*  
*display difficulty in making decisions*  
*lack initiative and motivation*  
*show signs of depression and aggression*  
*show a loss of interest in hobbies and activities*

In the middle stage the person may:

*get very forgetful-especially of recent events and people's names.*  
*can no longer manage to live alone without assistance*  
*be unable to cook, clean and shop*  
*become extremely dependent*  
*need assistance with personal hygiene*  
*have increased difficulty with speech*  
*show problems with wandering and other behavioural abnormalities*  
*become lost at home and in the community*  
*experience hallucinations*

In the late stage the person may:

*have difficulty eating*  
*do not recognize relatives, friends, and familiar objects*  
*have difficulties understanding and interpreting events*  
*be unable to find their way around in the home*  
*have difficulties walking*  
*display inappropriate behaviour in public*  
*be confined to a wheel chair or bed*



***A Short History of Dementia:*** Dementia, derived from the Latin word *de* = out from + *mens* = the mind means loss or impairment of mental powers due to a disease. The Egyptians and Greeks of the period 2000-1000 BC were well aware that advancing years and old age were associated with disorders of the memory.

The Chinese used the words *Zhi Dai Zheng* for dementia and *Lao Ren Zhi Dai Zheng* for senile dementia, which was described basically as a disease of old people characterized by muteness, lack of response and craziness. The Romans, *i.e.* Aulus Cornelius Celsus and Claudius Galen of the first and second centuries AD, referred to chronic mental disorders known to produce an irreversible impairment of higher intellectual functions. Cited from: WHO. What is dementia? What is Alzheimer's disease?

Dr. Philippe Pinel (1745-1826), the French founder of modern psychiatry, first used the word "dementia" in 1797. In 1906 Dr. Alois Alzheimer (1864-1915), a famous German pathologist, described a 55-year old woman who had died from an unusual mental illness causing memory loss, disorientation and hallucinations.

Since Dr. Alzheimer first described the characteristic abnormal brain changes, the disease has been known as "Alzheimer's Disease". A challenge for public libraries.

The world's population is ageing. Currently there are an estimated 24 million people worldwide with dementia. Two thirds of these live in developing countries. This figure is set to increase to more than 81 million people by 2040. Much of this increase will be in rapidly developing and heavily populated regions such as China, India, and their south Asian and western pacific neighbours.

***Cited from: Alzheimer's Disease International***

In spite of this large number of persons with dementia, it does not appear that public, health, and social services in most countries are sufficiently prioritized to meet their growing needs. With the rate of dementia related diseases growing, it would benefit all segments of society to respond in a more responsible manner to the needs of persons with dementia.

Until now, librarians have not generally been included in the circle of professionals caring for persons with dementia. Frequently, the treatment focuses more on physical care than on mental stimulation.

Most public libraries do not have special services for persons with dementia, although their services are supposed to meet the informational and recreational needs of all population groups. In a democratic society,

the right of access to culture, literature and information extends to all, including persons with disabilities. Quality of life is an important factor, and everybody is entitled to participate fully in society as long as possible. Different cultures have different ways of accepting and dealing with persons with dementia, whether these persons live at home or in an institution. Regardless of cultural differences, public libraries can lead the way in tailoring certain services and collections to those with dementia.

In the Scandinavian and other Western countries there is a growing understanding and acceptance of this challenge. Reading materials and music can help stimulate memory, as well as provide enjoyment and entertainment. Reading and listening to music, in particular, stimulate several brain functions. The popular saying “*if you don't use it, you lose it*” has been found to be true. Calm music and meditative chants have also been shown to decrease nervousness and anxiety.

It is important to emphasize that common sense and a warm heart alone cannot cope with dementia – professional insight and expertise are also important parts of the solution. In other words, a solid knowledge of dementia is essential. The following sections will show how appropriately tailored library services and specific materials can have positive effects on persons with dementia.

### **Serving Persons with Dementia**

Library staff providing services to persons with dementia must be knowledgeable of dementia related diseases and how these patrons may react. There is a large amount of literature available, and it is strongly recommended that library staff consult with professionals in the field, participate in relevant courses and conferences and, if possible, spend some time with a mentor observing dementia patients in a care facility. If the service project is to be successful, multi-professional cooperation is important.

Patience and caring are also required for a successful outcome, as well as close cooperation with the family and caregivers of the patient.

Communicating with persons with dementia:

- Make eye contact so the person knows you are talking *to* and not *about* him/her
- Make sure to get the person's attention before speaking
- Speak clearly and slowly. Make eye contact
- Pay attention to the body language of the person with dementia as well as your own, since non-verbal communication is very important for persons with language impairments

- Use simple language, short sentences, and avoid foreign words
- Use repetitions and consistent phrasing to avoid confusion
- Be a creative listener and show understanding, tolerance, and respect
- Give the person with dementia enough time to answer and ask questions that can be answered with a simple “yes” or “no.” Avoid open-ended questions.
- Include everyday topics in your conversation, *e.g.*, the weather, and references to familiar objects that may trigger the memory
- Be calm and supportive and use comforting gestures.

### **Library Materials for Persons with Dementia**

Books and audiovisual materials can contribute to the quality of institutional life. By evoking pleasant memories you help the patrons regain their feeling of identity. These persons may have had specific hobbies and interests during their lifetime. Books and music may remind the patrons of these interests and stir memories of childhood, youth, working life and family.

**Illustrated Books:** Persons with dementia usually like books with big and clear illustrations, particularly photos. Popular subjects are animals, flowers, fashion, children, countries, old cars, etc. Children’s picture books with big and clear illustrations are appropriate.

**Books for Reading Aloud:** Persons with dementia usually enjoy hearing somebody read aloud. The text, however, should be short and have a simple story line. Easy-to-read books for persons with reading difficulties are also appropriate as they are written in short sentences and have an uncomplicated plot.

Essays, fairytales and short stories are recommended. Books with jokes, rhymes and jingles from old times and very easy quizzes have also proven popular. Some persons with dementia enjoy listening to familiar poems and songs. They often join the singing and show an amazing ability in remembering the text. Children’s materials may also be incorporated into these activities as they can be finished in a single sitting.

**Thematic Books for the Staff:** Certain books can be helpful for care staff in their daily contact with the person with dementia. In connection with holiday celebrations, *e.g.* Christmas and Easter, theme books may be used as conversation starters about old traditions, holiday meals, decorations, etc. It can be very rewarding to experiment with various subjects, using illustrated “coffee table books” from different countries.

Local history is popular and so are biographies of famous persons written in an easy-to-understand language. Books about the past are very suitable for reminiscing and for conversation groups.

Audio books for persons with aphasia are read at a slow speed and can also be used for persons with dementia.

Music is an important medium in the interaction with persons with dementia. Verbal communication is often difficult, but singing, dancing and listening to music are good alternatives. Music gives the person with dementia an opportunity to:

- express feelings
- interact with other persons
- remember the past
- express his/her personality
- reduce anxiety and restlessness.

Music can be used in small groups or with individuals. The music should be popular and familiar. Examples:

*Calm classical music – e.g., special editions for persons with dementia.*

Music for the Mozart Effect. Spring Hill Music:

*Music and songs with a special theme – e.g., the seasons, flowers, love or loss*

*Meditative music-for relaxation*

*Video and DVDs*

Everybody likes to watch a good movie. Persons with dementia enjoy watching old movies in their native language and from their own country. These movies bring back memories from “the good old days”. Films about local history and nature are also popular.

**Other Media :** Other new electronic media, e.g., computer games, will be of interest to the new generation of persons with dementia. Many elderly are already familiar with computers. They may enjoy searching on the Internet with help from caregivers, relatives or library staff. The pictures on the computer screen may be used to stimulate conversation and illustrate certain subjects. Library staff can introduce relevant sites to care givers.

**“Reminiscence Kits” :** Reminiscence kits are very helpful in stimulating memories. In Denmark, libraries and institutions for the elderly can borrow or buy these kits from the Danish Reminiscence Centre.

The kits are theme defined and may contain old cooking utensils, old toilet articles for ladies or gentlemen, schools books and supplies, craft items and tools, gardening items, etc.

Open the kit and the conversation will start immediately! In some countries, such reminiscence kits are sold by publishers, *e.g.*, Bi-Folkal Productions in the United States, and Winslow in the UK. In the Nordic countries there is a growing trend for libraries to develop their own reminiscence kits, sometimes in cooperation with caregivers and local historical societies.

***Materials on Dementia for Staff and Caregivers :*** A selection of books and other information materials about dementia should also be available to library staff and patient care givers. It is recommended that public libraries offer a broad selection of books and other materials on dementia as part of their general collection.

### ***Library Services to the Homebound***

Persons with dementia living in their own homes can be served through the library's home delivery service or via Books-by-Mail. Persons with dementia should be an obvious target population for these library outreach services.

It is important to visit a new patron at home in order to identify the specific needs of that person. Many homebound persons in the early stage of dementia live with a spouse or relatives.

It is important that these caregivers are present at the initial visit by library staff and that a family member acts as a contact person for continuing services. Outreach services to homebound dementia patients require understanding of the patient's individual situation. It is difficult to cope with the daily care and needs of a person with dementia, but providing the right book, music, or information can add vastly to the quality of life for both patient and caregiver. Homecare aides and other outside support staff should also be familiar with the services from the library and should be encouraged to contact the library on behalf of their client.

### ***Library Services to Persons in Long-term Care Facilities and Day Care Centres***

***Long-term Care Facilities :*** In long-term care facilities an increasing number of the residents suffer from dementia related diseases. In some countries, special facilities for persons with dementia are now being established. These facilities will have some staff members with special education in dementia.

**Day Care Centres:** In some countries, community day care centres for persons with dementia have been established. Here the visitors spend half or whole days occupied with various hobbies, excursions and other entertaining activities. Books and other materials from the library are much appreciated by the users of the day care centres.

Cooperation with staff Offering library services to persons with dementia has turned out to be very successful. It is important that the library staff that makes regular visits to the care facilities, interacts closely with the facility staff. If possible, library staff should participate in facility staff meetings.

As persons with dementia cope better when certain routines are incorporated into their daily life, it is preferable that the visiting library staff remain the same over a period of time. Ask questions and involve the facility staff in the planning of library services. Keep in mind that it may take some time for the care staff to realize how much your services can contribute to the quality of life of the residents.

### **The Important Dialogue**

Before delivering library materials, let your designated contact person know what materials you intend to bring. Ask that person to recommend topics of interest. Take care to nurture your contact with both residents and staff each time you visit. Offer to bring books to the staff for their professional and private use. If the institution has a group for relatives and friends of the residents, you can attend a group meeting and discuss your library services.

### **Models for Library Services**

Library services can be provided in different ways, including:

1. Library services by a librarian on a regular basis (*e.g.* once a month) The librarian visits all departments of the institution bringing books, music, and other materials for those residents who are interested. This service should be supplemented by a small collection of books and music in the living or activities room. This collection should be changed at each visit.
2. A selection of books, music recordings, and other materials at various locations in the institution Replace the collection every three months. When exchanging collections, ask staff and residents for suggestions and recommendations.
3. Visitors to day care centres persons with dementia coming to day care centres should be given the opportunity to join the library's home delivery service.



### **Special Programmes and Events in the Institution**

Some librarians serving persons with dementia have very positive experiences with arranging special programmes and events in the institutions. These arrangements can be reading aloud, showing movies or playing music. Arrangements can be made in cooperation with institution staff or perhaps a music therapist. Book talks by the librarian can be an enjoyable activity and may lead to a joint discussion.

### **Reading Representatives**

Some years ago the Swedish Centre for Easy-to-Read started a new project: "Läs Ombud" (Reading Representatives). The representatives are primarily recruited among the staff in long-term care-facilities and day care centres.

Similar services could be provided for persons with dementia. The purpose of the Reading Representatives is to stimulate interest in reading and to arrange read aloud sessions (primarily with easy-to-read books, short essays, and news stories) and visits to libraries. The Reading Representatives are trained by and maintain close contact with the local public library.

### **Ethnic and Cultural Minority Groups**

Libraries should make sure that the needs and interests of all ethnic and cultural minority groups in the community are considered when planning services to persons with dementia.

This means selecting library materials that reflect the history and experience of these groups.

Some members of these groups may be illiterate or weak readers and for these individuals videos and music from their native country will be popular. Many bilingual persons with dementia may at some point forget their "new" language. In such cases, library staff may have to rely on family members or other staff speaking the language in question to establish a cooperation.

### **Marketing the Library Services**

The library should produce a brochure about the services offered to persons with dementia. The brochure should inform about services to homebound persons with dementia, as well as services to institutions. The brochure should be displayed in the library and should also be distributed to doctors, nurses, social workers, public information centres and other places where the elderly and their relatives meet. Equally important is the electronic marketing of the library services and the brochure content should also be posted on the library's webpage.

**Conclusion**

The authors hope that this publication will inspire colleagues around the world to meet the challenge of serving persons with dementia. The ultimate goal should be to make library services to this population group a part of the library's basic services. Persons with dementia have just as diverse tastes and preferences as other library patrons but have additional needs, which the library is in a unique position to meet jointly with other service providers. Working with persons with dementia is certainly challenging and requires special insight and knowledge. The rewards, however, are gratifying when the patient clearly exhibits signs of both physical and mental stimulation as the result of such efforts.

These guidelines provide basic information on different dementia related diseases, suggest various ways to establish library services to persons with dementia, and recommend appropriate materials and resources for such services. Library staff in countries around the world may adapt these guidelines to their local circumstances and may want to add additional elements.



## Manual of E-journal for Librarians

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Librarianship, information management, knowledge management... whatever on call, are all related to one activity *i.e.* organization and dissemination of information /knowledge. However, one can say that librarianship deals more with traditional sources such as books etc. While information science or documentation deals with more with articles in periodicals, reports etc. Knowledge management is much more comprehensive comprising each and each and everything under the large information spectrum.

Library is changing its traditional concepts rapidly. It is going to wall-less library of free collection. Question is WHY CHANGING? Increasing awareness among users, new resources, new way of accessing information, new and advanced communication technologies. Users will have the most priority to access or to easiest retrieval process without boundary and reaching the whole world.

So information professional also will have vast and active role in the information environment. But one thing I want to mentioned here, US Bureau of Library Statistics in its 1997 occupational outlook Handbook noted that Computer Scientists and System Analysts will be among the faster growing occupation through the year 2005, while Librarian will expected to grow more slowly than average of all occupations over the same time frame. At the same time, scope opening for Librarian from traditional to nontraditional sectors like Information Broker, Private Corporation and Constancy firms etc. very widely.

**Meaning for Future Librarian:** Many people raised the question that as Internet and web can deliver vast quantities of information to user communities ranging from the scholar to the average person. But it is interesting that predictions of the demise of the library coincide with an increase in the use of libraries. This seeming paradox can be explained

partially be the lack of understanding of what a library is and what value-add is provided by the qualified librarian.

**Changing Role of Librarian:** A librarian have to be sufficient knowledge at least two things---1. Knowledge of the users they serve. 2. Knowledge of the recorded knowledge items. These two primary facts of knowledge, librarian's role will not change, although they become more specialized in web environments simply to cope with volume.

Librarians will increasingly be dedicated SUBJECT SPECIALIST in users and collection development. If he has depth knowledge of his user's interest and need than he can serve his best by building collection and access those collection by navigating those collection.

### **Collection Development**

**Collection Builder to Knowledge Prospector:** Collection development in the complexity of database selection will be one of the most important tasks of future librarian. In a web environment when anyone can publish the librarian, have to sift through vast quantities of web-published materials to those nuggets, which contributes to particular knowledge domain. The creation of validated collection of new digital materials and their relationship with validated non-digital collection will offer a significant value add to the serious information seeker while allowing hyperlinkage.

### **Technical Processing Work**

**Future Librarian will Evolve form Classifier, Cataloguers, Indexers to Metadata Developers and Publishers:** It will become increasingly important to provide tools that contain intellectual content, structural and procedural information that will facilitate the identification and selection for relevant information item and objects and a much great level of desegregation and discrimination than previously available. For example, it may be necessary to be able to identify a data table or chart in a published report and link it to a database and a mathematical model that was used to manipulate the data. Librarians will uniquely qualified to perform this enhanced role. He will be mounted unique local materials and adding pointer to specific related materials contributed a resource that saves students and researchers searching time, specially given the limitation of current WWW search engines.

### **Information Retrieval**

**Librarians will Evolve from Information Retieval Specialists to Knowledge Navigators and Expedition Guides:** Due to the multiplicity of recording formats and retrieval tools the information retrieval process will be changed. To fulfil the role of knowledge navigator in the

currently expanding environment the librarian must be knowledgeable about the fullest range of finding tools and have honed skills in their effective use thus save of the time of the searcher *i.e.* user.

### **Reference Librarian**

***Librarian will Change His Role from Reference Librarian to Information Analysts or Knowledge Interpreters:*** In an web environment where information content available is expanding so rapidly that users need help to extract the information they need and to interpret it in the context of the immediate need. So librarian will help the user to find out the most relevant answer of his queries. Because in the net environment user may not depend upon the traditional type Reference librarians as he can just put his direct queries to any search engine and will get the result.

But my question is how much relevant that result for a quires? Ok some search result provides the rank of relevance still it is confusing whether the answer is relevant which he want. For this future librarian will play his knowledge interpreters or information analyst role and help user to find the exact result which he want. The concept is more or less same as reference librarian but style and environment will be different.

### **Management Skill**

***Librarian will Need to become an Effective Manager as well as Collaborators:*** Librarian should have different types of management skill because he will deal with face to face encounters and optimum utilization of budget. He is the leader among his organization so he should develop closer collaboration with the users as well as his other profession colleagues.

In addition, they will gain capability to deal the familiar people but also unfamiliar people, remote users, and those people about whom he has no knowledge at all. Future librarian will be more like WILLOWS than OAKS, as he must be flexible to able design, use and handle different situations.

***Consultant:*** Extending the traditional role the future librarian should play the role of a consultant and instructor. Bibliographic instruction will take a new importance and complexity changing electronic product.

***Teaching:*** Teaching and providing one to one assistance to users have become truly demanding and unending task of a future librarian. Also librarians are going to have to learn how to collaborate with this new people in very short period. He will also need to continue to develop their traditional role of teachers, especially in assisting others to learn the skills needed to find and evaluate appropriate sources.

### **Other Important Role: Information Manager**

**Librarian will Shifted from Information Manager to Knowledge Manager:** Though librarians deal with documents and hence with information. Information management is not wholly a librarian's work. To become an information manager he should cover 7 stages like Reading, Recognition, Re-interpretation, Review, Release, Restructure, and Retrieval. But many have started realizing that librarian will become a knowledge manager from information manager.

Knowledge manager in the sense is the management of the organization towards the continuous renewal of the organizational structures, facilitation of organizational members, putting information technology instruments with emphasis on teamwork and diffusion of knowledge into place.

### **Library and Information Networks**

The explosion in the amount of literature that is available, increases among the number of users and their different needs, and the application of electronic media are forcing libraries to construct and participate in networks. Magnetic tapes, floppy disks, and CD-ROMs provide enough data storage capacity. Retrieval through telecommunications networks and access to international databases are available for searching for information on various subjects. With the advent of networks, remote transmission of texts and graphics, video clips and animated clips are also possible.

#### Definitions:

- o A library network is broadly described as a group of libraries coming together with some agreement of understanding to help each other with a view to satisfying the information needs of their clientele.
- o UNISIST II working document defines Information Network as a set of interrelated information systems associated with communication facilities, which are cooperating through more or less formal agreements in order to implement information handling operations to offer better services to the users.
- o The National Commission on Libraries & Information Science in its National Programme Document (1975) defines a network as Two or more libraries engaged in a common pattern of information exchange, through communications for some functional purpose.

#### Objectives:

- o To promote and support adoption of standards in library operations.



- o To create databases for projects, specialists and institutions to provide online information services
  - o To improve the efficiency of housekeeping operations
  - o To coordinate with other regional, national & international network for exchange of information and documents
  - o To generate new services and to improve the efficiency of existing ones
- Network Development in India:

Some factors that are responsible for the development of library and information networks in India are:

- o The report of the working group of the planning commission on modernization of library services and informatics for the seventh five year plan, 1985-90
- o The National Policy on Library & Information systems document (1986) accepted by the ministry of HRD, Government of India.
- o The report on national policy on university libraries prepared by the Association of Indian Universities (1987)
- o The UGC report on information systems for science and technology under the Department of Science & Industrial Research (DSIR) Government of India has been vigorously promoting an integrated approach to library automation and networking.

### **Limitations in Network Development**

A network may fail in the early stages if there is not proper planning or if adequate funds are not available. Moreover, a common memorandum of agreement signed by the participating libraries at the institutional level is essential for the success of a network venture. On a more practical level, catalogue data must be in a standard, machine readable form for it to be shared and exchanged. And, finally, a continuous flow of external assistance is crucial for the network's survival.

### **Types of Networks**

Presently, there are three types of computer networks:

- o LAN
- o MAN
- o WAN.

**Local Area Network (LAN):** A LAN is a number of related computers and electronic devices that share information over a transmission media.

A typical use of LAN is to tie together personal computers in an office so that they can all use a single printer and a file server. The LAN can be within a building or a campus wide network.

**Metropolitan Area Network (MAN):** Attempts are being made to develop this type of network in metropolitan areas such Delhi, Calcutta, Bangalore, Madras, etc.

**Wide Area Network (WAN):** A large-scale network, involving offices in different cities and countries is referred to as WAN, which is specially designed to interconnect data transmission devices over wide geographical areas.

### Categories of Network

Library networks have been divided into two categories: general network and specialized network. The latter can further be divided into metropolitan network and countrywide network.

#### General Networks NICNET

**Title:** National Information Centre Network.

**Sponsor:** Planning Commission, Govt. of India.

**Membership:** Four national and regional nodes, 32 state and union territory nodes; seventy cities and towns.

**Services:** Bulk file transfer; teleconferencing; full text and bibliographic retrieval services.

**Application:** ICMRNIC Centre; MEDLARS in India; Chemical Abstracts database.

INDONET:

**Title:** INDONET data Network.

**Sponsor:** CMC Ltd (1986) = Informatics India Ltd (1989).

**Membership:** Commercial computer network.

**Services:** Database services such as DIALOG, COMPUSERVE; IP; SHARP.

**Applications:** ACME; file transfer; international gateway.

I-NET (VIKRAM):

**Title:** I-NET.

**Sponsor:** Dept. of Telecommunications, Govt. of India.

**Connectivity:** Packet switched public data network covering nine cities.

**Services:** Information exchange through e-mail / FTP; Bibliographic databases.

### Specialized Networks

Metropolitan Networks:

CALIBNET:

**Title:** Calcutta Libraries Network.

**Sponsor:** NISSAT-Govt. of India.

**Applications:** Cataloguing; serials control; acquisitions; circulation.

**Services:** CAS; SDI; union catalogue; partial database; editing and retrieval of records; global information; search; full-text document delivery; library automation; CALIBNET INFO Services.

BONET:

**Title:** Bombay Library Network.

**Sponsor:** NISSAT & NCST (1994).

**Objective:** To promote cooperation among libraries in Bombay.

**Services:** online catalogue; online document delivery; IRS; interlibrary loan; dissemination of information.

DELNET:

**Title:** Developing Library Network.

**Sponsor:** NISSAT & NIC (1988).

**Objective:** To promote resource sharing; develop a network of libraries; collect, store, disseminate information.

**Members:** 165 Institutions, 600 Libraries, 15 States in India, 5 from outside India.

**Services:** resource sharing; free Software; ICE online facility; books database; thesis database; Indian specialists; database.

ADINET:

**Title:** Ahmedabad Library Network.

**Sponsor:** NISSAT, DSIR (1994) & INFLIBNET.

**Objective:** To bring cooperation among its regional libraries; to develop databases; to integrate scientific and technical information systems.

**Members:** nine libraries.

**Services:** library automation; library holdings; database in progress.

MYLIBNET:

**Title:** Mysore Library Network.

**Sponsor:** NISSAT (1994).

**Objective:** Developing software tools; conducting seminar; workshops/ training programmes; conduct surveys.

**Host Site:** CFTRI, Mysore.

**Members:** 116 Institutions.

**Services:** MYLIB Database; E-journals; food patents; CFTRI Library Bulletin; public services.

Countrywide Area Network:

DESINET:

**Title:** Defence Science Information Network.

**Sponsor:** DESIDOC, Delhi.

**Activity:** Focus on scientific, research and defense communities.

ERNET:

**Title:** Educational and Research Network.

**Sponsor:** Dept. of Electronics, Govt. of India; UNESCO (Financial assistance from UNDP).

**Members:** eight institutions (5 IITs, IISc., National Centre for Software Technology-Bombay, CCI wing of Dept. of Electronics).

**Services:** Communication services such as e-mail, file transfer, remote log on, database access, bulletin board etc.,

SIRNET:

**Title:** Scientific and Industrial Research Network.

**Sponsor:** CSIR (Commissioned Agency-NCST, Bombay).

**Members:** 40 labs and R&D Institutions.

**Applications:** scientific communication; leather technology; natural products; food technology; medicinal Plants.

VIDYANET:

**Title:** VIDYANET (Dedicated Communication Computer Net).

**Sponsor:** TATA Institute of Fundamental Research, Bombay.

**Objectives:** To provide rapid means of communications by linking computers at various institutions in India to similar networks outside the country; to stimulate corporate research, the day-to-day exchange of research information and the execution of joint projects and publications.

**Services:** File transfer facility; sharing of computer resources and access to remote applications, databases, libraries, etc.

BTISNET:

**Title:** BTISNET (Specialized Information Network).

**Sponsor:** Dept. of Biotechnology, Govt. of India..

**Connectivity:** 10 Specialized Information Centres in genetic engineering, plant tissue culture; photosynthesis and plant molecular biology; cell transformation; bio-process engineering.

**Services:** Data processing using applications software; online communication access; facsimile facility.

INFLIBNET:

**Title:** Information Library Network.

**Sponsor:** UGC (1991).

**Connectivity:** computer communication network of universities and R&D; libraries and bibliographic information centres throughout the country.

**Members:** 200 Universities; 400 College libraries; 200 R&D libraries.

**Services:** catalogue service; database Services; document supply services; e-mail; BBS: audio and video conferencing, etc.

BALNET:

**Title:** Bangalore Library Network.

**Sponsor:** JRD;. Tata Memorial Library (1995).

**Members:** 100 Libraries.

MALIBNET:

**Title:** Madras Library Network.

**Sponsor:** INSDOC & NISSAT (1993).

**Members:** 15 Libraries.

**Activity:** Two important databases, a directory database of current serials in Madras and a contents database covering articles published in 300 journals available in Madras libraries.

**Conclusion:** During the recent period quite a large number of libraries and information centres are forming networks. The advent of computer networking as an accepted part of the library and information infrastructure has had a very significant impact on the way in which library and information systems are perceived.

India is thus on the threshold to a new era of computer communication networks both for general purposes and for library and information purposes.

### **Deterring Plagiarism: A New Role for Librarians**

The proliferation of student plagiarism on university campuses is paralleled by the increasing number of articles appearing in academic journals presenting varying opinions on the topic. Opinions run the gamut from outrage at the student offenders to pointing fingers at faculty members who fail to create plagiarism-proof assignments. One also reads about controversial new methods for deterring and detecting plagiarism, most notably, online plagiarism detection systems.

In surveying the literature, one can construct valid arguments for each point of view. This paper will explore the plagiarism dilemma from a librarian's vantage point, and will outline the strong support that has been offered to teaching faculty with plagiarism problems by the Joan and Donald E. Axinn Library of Hofstra University. It will also examine how Hofstra University decided to subscribe to Turnitin.com, a popular but controversial online plagiarism detection system.

As librarians, we know that detection is not the main objective in a campaign against plagiarism. Rather, universities should concentrate on educating students as to what constitutes plagiarism and how to avoid it. Consequently, as our last point we will summarize how Hofstra librarians are reaching out to both faculty and students in order to inform them about this fundamental concern. This paper will not necessarily offer the definitive philosophical answer to solving the plagiarism dilemma, but will attempt to convey a "reality" account of how we have dealt with student plagiarism at Hofstra University.

#### **Overview of the Plagiarism Problem**

Hofstra University is a mid-sized liberal arts university on Long Island with approximately 10,000 full-and part-time undergraduate students and about 3,700 graduate students. In addition, the Hofstra University School of Law has an enrollment of 1,700.

In recent years, Hofstra, like other universities, has watched as students became adept at cutting and pasting from the Web, or purchasing papers from paper mills. Part of the dilemma is that many students are unfamiliar with what determines plagiarism and they stumble into it unawares, not only because they have never learned how to use sources, but sometimes because they have been taught that research means plagiarism (White 205).

This sense of vagueness is exacerbated by the fact that, with the advent of the Internet, students have unlimited access to information. Additionally, the need for high GPAs to gain entrance to prestigious graduate schools creates an atmosphere of "anything goes" when it comes to completing research assignments.



Even a school such as the University of Virginia, long noted for its honour system, has fallen victim to cheating scandals. When confronted with the possibility that some of his students might have plagiarized, Professor Louis Bloomfield of UVA devised a computer programme that detected students who had used "recycled" papers from his previous classes. He discovered that 158 of the 500 students in his Physics 105-106 class had cheated (Cullen 2002). This discouraging incident highlights the extent of the plagiarism problem and it also underscores the fact that students' thirst for knowledge has been replaced by a quest for good grades.

The problem is so huge that the popular media is now focussing attention to it. The CBS television news programme 60 Minutes devoted a segment to cheaters and Professor Donald L. McCabe, founder of the Centre for Academic Integrity, told Morley Safer that pressure has turned competitive schools like UVA into academic rat races. In addition to academic pressure, there is the general slackening of ethical codes in society that seems to give the students the go-ahead to succeed at any cost.

Students hear of noted historians who have plagiarized, corporate accountants who have cooked the books, and alleged plagiarized material from the Internet being presented recently at a critical United Nations session on Iraq; sadly, they see no harm in a little cheating on their part. This generation has grown up with cell phones, palm pilots, and downloaded music and they are more comfortable with cutting and pasting information from the Web than visiting the library in order to retrieve books or journal articles.

### ***Role of the Library in Detecting Plagiarism***

Considering the fact that the library is, at least theoretically, the central location for conducting research in the university, it makes sense that a librarian would be involved in dealing with unraveling the mysteries contained within some problematic student papers. Auer and Krupar (2001) state that librarians with liaison responsibilities or those who have good rapport with academic departments should begin a dialogue with faculty in order to provide information about websites and software. At the Axinn Library, we have reached out to the faculty by offering our help in detecting plagiarism.

About five years ago, a reference librarian offered his services to faculty to help them solve some of their plagiarism problems. He held the formidable-sounding title of "plagiarism officer," which I inherited four years ago when he left the university. Over the past four years, my role as a reference librarian who helps to combat and detect plagiarism has changed. When I first took on the responsibility, faculty members would come to me with questionable papers and I would enter a few unusual phrases from the papers into a search engine, and, if I was lucky, I would

find portions, or sometimes entire papers, that had been cut and pasted from the Web.

This process would take anywhere from a few minutes to several hours. When I first began this task in April 1999, I received three to four requests a month. Requests for assistance from faculty began to accelerate, however. In December of 2000, I received approximately 25 requests for help with suspicious papers. Hofstra was not the only school facing this escalating problem. Professor. McCabe, who in addition to being the head of the Centre for Academic Integrity, is also a professor of organization management at Rutgers University-Newark, where his area of expertise is ethical decision-making, centering particularly on student cheating. He recently completed a survey of 4,471 students at 25 high schools around the country. When asked if they ever submit papers downloaded in whole or in large part from the Internet, 15 percent answered, "Yes." (Roach 2001).

Early in the Spring 2001 semester, I began to read about Turnitin.com, a digital plagiarism detection system begun in 1999 by John Barrie, a biophysics graduate from the University of California. Turnitin.com offered a free two-month trial and the Axinn library signed up for the trial. We publicized the service via e-mail to faculty and offered demonstrations in the library to those who were interested. During the two-month period, twenty-nine faculty members took advantage of the trial. To submit a paper to Turnitin the faculty member must have a digital copy of a student's paper, or they can ask individual students, or entire classes, to submit their own papers to the site. The latter method can prove to be an excellent deterrent to online plagiarism since students are aware that their papers are routinely being checked.

At Hofstra we have asked that faculty members inform students that their papers may be submitted to Turnitin so that there will be no problems of students claiming that their rights have been infringed upon. The Turnitin software scans the Internet for any matching material and then returns an Originality Report. This report is a copy of the submitted paper that has been scanned for matching material from the Web, paper mills and Turnitin's own database. Any matches are underlined and colour-coded to the original online source and returned within an hour. In order to determine if the faculty was pleased with the Turnitin results, I developed and implemented a survey after the two-month trial was completed and received replies from about half of those who used the service.

### ***Intellectual Property Rights***

The comments above echo a common sense of desperation concerning the mushrooming problem of plagiarism. On the other hand, one faculty

member from the English Dept. brought up the very prickly issue of intellectual property rights. He wrote:

*"I am somewhat concerned with the intellectual property rights of the individual students. Turnitin.com maintains a database of all the papers that are turned in to the site. Are we infringing on the students' intellectual rights by forcing them to donate papers to Turnitin's database?"*

This question was certainly serious and it caused us to rethink our decision about signing on to the service. We immediately contacted Paul Wedlake of Turnitin and he assured us that student papers simply reside in their database and, since the database is not searchable, no one can access students' work. As he explained, Turnitin can act as a deterrent against collusion and can actually protect student papers from being plagiarized by other students since their work will show up as a match in the Turnitin database at the time of submission.

Other schools have also been wrestling with this question of property rights. At Indiana University-Purdue University at Indianapolis, officials considering a deal with Turnitin.com are mindful of students' privacy and copyrights. (Foster 2002) In an e-mail exchange I had with Bartow Culp, (Personal communication. January 8, 2003) a librarian at Purdue University, he stated, "I feel there are serious intellectual property questions about Turnitin's policy of putting students' work into their database without consent. Until the company changes this policy, I don't think we should sign on." Those concerns contributed to the decision by officials at the University of California at Berkeley not to subscribe to Turnitin.com, says Mike R. Smith, Assistant Chancellor for Legal Affairs. "We take student intellectual property rights serious, and that became one of the trouble spots for us in moving ahead with the proposal" (Foster 2002). This is particularly significant since John M. Barrie began developing this software while he was a graduate student at Berkeley.

Knowing that this was a serious issue, and not wanting to embroil Hofstra in anything that might infringe on our students' rights, the Dean of the Library took the question to the University's legal department who, after studying the contract, assured us that we could subscribe to the service. In addition, we presented the question to both the Graduate and Undergraduate Academic Affairs Committee of the University Senate and, after this collaboration, it was decided that Turnitin.com does not appear to be a threat to students' intellectual property rights and that the benefits derived from the service far outweighed the argument that students' rights might be jeopardized. Hofstra University is not alone in this decision.

Four hundred universities in the United States and 700 higher-education institutions in Britain have subscribed to the service. Among

the American universities that have subscribed is Duke University's College of Liberal Arts and Sciences. Like Hofstra, Duke decided to subscribe after being assured that it was not an infringement of students' rights since nothing goes out of the database without students' express permission (Foster 2002).

Recently, Hofstra's Provost declared that the university is heading toward a zero tolerance for plagiarism and he encourages the faculty to report all instances of plagiarism. Nonetheless, Hofstra's faculty, like that of so many other schools, prefers not to be involved in the arduous red tape and emotional trauma stemming from a case of plagiarism. At the same time, they feel frustrated when they know that a student has blatantly plagiarized.

That is why the plagiarism service that the library provides has taken on such importance. Obviously, faculty members feel more comfortable pressing charges against an offender when they have tangible evidence. Consequently, that is where the Axinn Library has played a vital role. Often Turnitin.com has provided the Hofstra faculty with the physical proof they needed to pursue their case. But, most importantly, we have found that the service has proven to be a powerful deterrent against plagiarism.

The following chart provided by Turnitin.com proves that the incidence of online plagiarism at Hofstra University is decreasing. The highest percentage of matching material from the Internet peaked at about 34% at the end of December 2001, the first year that we subscribed to their service. By the end of our second year, the amount of matching material had declined to about 12%. Material submitted by students at Hofstra University to Turnitin.com-December 2001-December 2002. Of course we are pleased with this decline and we feel that it is the consequence of our using Turnitin coupled with the more active stance assumed by Axinn Library librarians.

### ***Role of the Librarian as Instructor***

Librarians now have the chance to become trailblazers in educating students on the proper methods for conducting research in the current electronic environment. At Hofstra we subscribe to over 100 online databases, many of them full-text, and yet often students still turn to the Internet as their primary research tool. This is not necessarily their fault.

The truth is that students, and many faculty members, are not aware that these rich sources of information are at their fingertips. Students do not understand the difference between these proprietary, authoritative research databases and the free-wheeling information found on the Internet. For that reason, more than ever, it is important for librarians to work with

teaching faculty to strongly urge that they bring their classes to the library for instruction. How do we get this point across to faculty members?

In an effort to keep faculty up-to-date on all of our electronic databases and services, library liaisons have offered "brown bag" sessions. Since it is not always convenient for the faculty to come to the library, library liaisons have gone to the departments, equipped with a laptop, to demonstrate how to access our databases. These brown bag sessions have proven to be very successful. Once a faculty member becomes aware of the fact that these databases are available and that they are easy to access, they become missionaries and pass the word on to their colleagues. Subsequently many faculty members arrange to bring their classes to the library for bibliographic instruction.

If we judge by the bibliographic instruction statistics, it appears that faculty/library liaison is working. As seen in the following numbers, Axinn Library classes have risen significantly over the last four years:

<i>Year</i>	<i>Classes</i>
1998-1999	149
1999-2000	158
2000-2001	168
2001-2002	298

These figures indicate that Axinn librarians have been successful in their liaison work with the teaching faculty and there is no doubt that librarians will continue in their efforts to bring more students to the library for instruction. The Axinn Library at Hofstra University is dedicated to helping students master the steps in the research process. In addition to the subject-specific classes that we offer, over the last two years we have introduced an elective one-credit class that introduces students to library information and technology. In these classes, librarians explain the research process, demonstrate how and when to cite sources, and we offer a detailed explanation of what constitutes plagiarism. We also describe how Turnitin.com functions.

Librarians must take the initiative if we want students to view the library as a viable, user-friendly, authentic alternative to the Internet. At Axinn Library we are not trying to send a "Big Brother is watching" message to our students. At the same time, we do not want to be perceived as having our heads in the sand or the clouds. Technology has changed the learning environment and to ignore that fact would be foolhardy. As Morley Safer reported on 60 Minutes, "The Web is like an arms race--a constantly escalating contest of technology." If librarians let down their guard, in the end, students will be the losers of this race.



**Library 2.0 Theory : Web 2.0 and its Implications**

While the term is widely defined and interpreted, “Web 2.0” was reportedly first conceptualized and made popular by Tim O’Reilly and Dale Dougherty of O’Reilly Media in 2004 to describe the trends and business models that survived the technology sector market crash of the 1990s (O’Reilly, 2005).

The companies, services and technologies that survived, they argued, all had certain characteristics in common; they were collaborative in nature, interactive, dynamic, and the line between the creation and consumption of content in these environments was blurred (users created the content in these sites as much as they consumed it).

The term is now widely used and interpreted, but Web 2.0, essentially, is not a web of textual publication, but a web of multisensory communication. It is a matrix of dialogues, not a collection of monologues. It is a user-centred Web in ways it has not been thus far.

This characterization of the current state of the Web is at times contended, and though the clear delineation between the first and second Webs is here admitted to be rather arbitrary, it still must be recognized that the Web is indeed evolving into a more interactive, multimedia driven technological space, and this understanding of the term is used in this paper. As O’Reilly (2005) observes in what is often cited as the seminal work on Web 2.0, personal web-pages are evolving into blogs, encyclopedias into Wikipedia, text-based tutorials into streaming media applications, taxonomies into “folksonomies,” and question-answer/email customer support infrastructures into instant massaging (IM) services.

The implications of this revolution in the Web are enormous. Librarians are only beginning to acknowledge and write about it, primarily in the “biblioblogosphere” (weblogs written by librarians). Journals and other more traditional literatures have yet to fully address the concept, but the application of Web 2.0 thinking and technologies to library services and collections has been widely framed as “Library 2.0”.

Most writers on Library 2.0 would agree that much of what libraries adopted in the first Web revolution are static. For example, online public access catalogs (OPACs) require users to search for information, and though many are beginning to incorporate Web 2.0 techniques by gathering data regarding a user (checked-out items, preferred searches, search alerts), they do not respond with recommendations, as does Amazon.com, a more dynamic, Web 2.0 service. Similarly, the first generation of online library instruction was provided via text-based tutorials that are static and do not respond to users’ needs nor allow users to interact with one another. These, however, have begun evolving into more interactive, media-rich



tutorials, using animation programming and more sophisticated database quizzes. Libraries are already moving into Web 2.0, but the move has only just begun.

## **Library 2.0**

According to Miller (2005a), “Library 2.0” is a term coined by Michael Casey on his LibrayCrunch blog. Though his writings on Library 2.0 are groundbreaking and in many ways authoritative, Casey (2006a) defines the term very broadly, arguing it applies beyond technological innovation and service. In addition to Casey, other blogging librarians have begun conceptually exploring what Library 2.0 might mean, and because of this disparate discussion with very wide parameters, there is some controversy over the definition and relative importance of the term. The nature of this controversy Lawson (2006), Peek (2005), and Tebbutt (2006) explore and begin to adequately rectify, and Crawford (2006) provides a very thorough account of the ambiguity and confusion surrounding the term, partially suggesting that there is nothing inherently novel about the idea.

This paper attempts to resolve some of this controversy by suggesting a definition and theory for Library 2.0, as well as providing examples of its substantial implications for librarianship. A more exact definition and theory for Library 2.0 is necessary to focus discussion and experimentation within the community, and will be valuable in the implementation of new web-based services in the next several years (it is at this point important to note, as Breeding (2006) does, that many libraries are still struggling to adopt simple, static web-based services; interestingly, there are Web 2.0 services, such as the Public Library Interface Kit, or “Plinkit”, that could assist in this struggle).

This paper defines “Library 2.0” as “the application of interactive, collaborative, and multimedia web-based technologies to web-based library services and collections,” and suggests this definition be adopted by the library science community. Limiting the definition to web-based services, and not library services more generally, avoids potential confusion and sufficiently allows the term to be researched, further theorized, and renders it more useful in professional discourse. The application of Library 2.0 theory to aspects of librarianship reaching beyond Web 2.0 technology is welcome, of course, but should very likely be framed by a different vocabulary.

Indeed, Casey (2006a) recognizes the recurrence of similar ideas throughout library history, and Hale (1991) provides a landmark discussion of this user-centred philosophy external to web-services. There is simply no need to use the term “Library 2.0” in these environments. It is a much more useful theory if it is focused on web-services, much as Abrams (2005)

has defined it. A theory for Library 2.0 could be understood to have these four essential elements:

- It is user-centred. Users participate in the creation of the content and services they view within the library's web-presence, OPAC, etc. The consumption and creation of content is dynamic, and thus the roles of librarian and user are not always clear.
- It provides a multimedia experience. Both the collections and services of Library 2.0 contain video and audio components. While this is not often cited as a function of Library 2.0, it is here suggested that it should be.
- It is socially rich. The library's web-presence includes users' presences. There are both synchronous (*e.g.* IM) and asynchronous (*e.g.* wikis) ways for users to communicate with one another and with librarians.
- It is communally innovative. This is perhaps the single most important aspect of Library 2.0. It rests on the foundation of libraries as a community service, but understands that as communities change, libraries must not only change with them, they must allow users to change the library. It seeks to continually change its services, to find new ways to allow communities, not just individuals to seek, find, and utilize information.

Library 2.0 is a user-centred virtual community. It is a socially rich, often egalitarian electronic space. While Librarian 2.0 might act as a facilitator and provide support, he or she is not necessarily primarily responsible for the creation of the content. Users interact with and create resources with one another and with librarians. In some ways, it is a virtual reality for libraries, a Web manifestation of the library as place. A library's presence on the Web in Library 2.0 includes the presence of that library's constituency and utilizes the same applications and technologies as its community, a concept Habib (2006) recognizes in a very useful model for Library 2.0 in regards to academic libraries.

While these conceptual tenets of Library 2.0 might be rather dependable, envisioning the technological specifics of the next generation of electronic library services is at once both fraught with inevitable error and absolutely necessary. The details of how the applications so common to Web 2.0 will continue to evolve, and how libraries might utilize and leverage them for their patrons, are inherently hidden—they are wholly about innovation.

But the conceptual underpinning of a library's web-presence and how it must evolve into a multimedia presence that allows users to be present as well, both with the library or librarian and with one another, are clearly

in need of development. The following prognostications are, then, more speculative than predictive. They are meant to conceptually explore and provide context to the relationship between the evolving Web and the evolving library, as outlined above, as a means to facilitate innovation and experimentation in library electronic services, and this list is by no means comprehensive.

### **Synchronous Massaging**

This technology has already been embraced quite rapidly by the library community. More widely known as instant massaging (IM), it allows real-time text communication between individuals. Libraries have begun employing it to provide “chat reference” services, where patrons can synchronously communicate with librarians much as they would in a face-to-face reference context.

Many might consider IM a Web 1.0 technology, as its inception predates the technology market crash and it often requires the downloading of software, whereas most 2.0 applications are wholly web-based. It is here considered 2.0 as it is consistent with the tenets of Library 2.0: it allows a user presence within the library web-presence; it allows collaboration between patrons and librarians; and it allows a more dynamic experience than the fundamentally static, created-then-consume nature of 1.0 services. It is also considered 2.0 as it is becoming a more web-based application, and the software used by chat reference services is usually much more robust than the simplistic IM applications that are so popular (they often allow co-browsing, file-sharing, screen-capturing, and data sharing and mining of previous transcripts).

The future of these technologies in the library arena is interesting. By providing this interactive Web service, libraries have positioned themselves to adopt its successors quickly and expertly. Already the text-based nature of IM applications is changing into a more multimedia experience, where audio and video massaging is becoming more common.

Even as they provide more multisensory experiences, they will become ubiquitous, available throughout the library’s web-presence. Already libraries are placing links to their chat reference services within resources themselves, such as at the article level in subscription databases. Much as a patron in a physical library is almost by definition never far from a librarian, chat reference becoming more pervasive could provide a similar circumstance in the world of the Web. The time is perhaps not far away when chat reference can take place within the framework of the library network, providing a more seamless experience.

Further, it is conceivable that should a user allow such a service, these chat reference services can be prompted when certain user seeking

behaviours are detected. For instance, as a user browses through certain resources, repeating steps and moving cyclically through a classification scheme or series of resources, a synchronous massaging service could be prompted to offer assistance. The physical counterpart to this is of course a patron wandering in book stacks, and a librarian, sensing their aimlessness, offering help. Library 2.0 will know when users are lost, and will offer immediate, real-time assistance.

Libraries may do well to continue adopting this technology as it evolves, as it allows reference services in an online media to closely approximate the more traditional services of the physical library. The time will almost certainly soon come when Web reference is nearly indistinguishable from face-to-face reference; librarians and patrons will see and hear each other, and will share screens and files. In addition, the transcripts these sessions already provide will serve library science in ways that face-to-face reference never did. For the first time in the history of libraries, there will be a continuously collected transcription of the reference transaction, always awaiting evaluation, analysis, cataloguing, and retrieval for future reference.

### **Streaming Media**

The streaming of video and audio media is another application that many might consider Web 1.0, as it also predates Web 2.0 thinking and was widely employed before many of the following technologies had even been invented. But for reasons similar to synchronous massaging, it is here considered 2.0. Certainly, for libraries to begin maximizing streaming media's usefulness for their patrons, 2.0 thinking will be necessary.

As mentioned, library instruction delivered online has begun incorporating more interactive, media-rich facets. The static, text-based explanation coupled with a handout to be downloaded is being supplanted by more experiential tutorials. The Association of College and Research Libraries' Instruction Section provides a database of tutorials, many of which are Web 2.0 in their nature, called Peer Reviewed Instructional Materials Online (PRIMO).

Many of these tutorials use Flash programming, screen-cast software, or streaming audio or video, and couple the media presentation with interactive quizzing; users respond to questions and the system responds in kind. These tutorials are perhaps the first of library services to migrate into more the more socially rich Web 2.0. Most, if not all, however, do not generally provide a means by which users can interact with one another, nor directly with librarians. This fact marks a possible potential for the continued development of these tutorials. These could take the form of multimedia chat rooms or wikis, and users will interact with one another

and the learning object at hand, much as they would in a classroom or instruction lab.

Another implication of streaming media for libraries is more along the lines of collections instead of services. As media is created, libraries will inevitably be the institutions responsible for archiving and providing access to them. It will not be enough to simply create “hard-copies” of these objects and allow users to access them within the confines of the library’s physical space, however. Media created by the Web on the Web belongs on the Web, and libraries are already beginning to explore providing such through digital repository applications and digital asset management technologies. Yet these applications are generally separate from the library’s catalogue, and this fracture will need to be mended. Library 2.0 will show no distinction between or among formats and the points at which they may be accessed.

### **Blogs and Wikis**

Blogs and wikis are fundamentally 2.0, and their global proliferation has enormous implications for libraries. Blogs may indeed be an even greater milestone in the history of publishing than web-pages. They enable the rapid production and consumption of Web-based publications. In some ways, the copying of printed material is to web-pages as the printing press is to blogs. Blogs are HTML for the masses.

The most obvious implication of blogs for libraries is that they are another form of publication and need to be treated as such. They lack editorial governance and the security this provides, but many are nonetheless integral productions in a body of knowledge, and the absence of them in a library collection could soon become unthinkable. This will, of course, greatly complicate collection development processes, and the librarian will need to exercise a great deal of expertise and fastidiousness when adding a blog to a collection (or, perhaps, an automated blog-collection development system). Or, perhaps the very notions of “reliable” and “authoritative”, so important to collection development, will need to be rethought in the wake of this innovation.

Wikis are essentially open web-pages, where anyone registered with the wiki can publish to it, amend it, and change it. Much as blogs, they are not of the same reliability as traditional resources, as the frequent discussions of Wikipedia (an online encyclopedia where any registered user can write, amend or otherwise edit articles) in the library world well note; but this of course does not eliminate their value, it merely changes librarianship, complicates collection development and information literacy instruction. The lack of peer review and editorship is a challenge to librarians, not in that users should avoid wikis, but only in that they

should understand and be critical in depending on them. Wikis as items in a collection, and the associated instruction of users in the evaluation of them, are almost certainly part of the future of libraries.

In addition, a library wiki as a service can enable social interaction among librarians and patrons, essentially moving the study group room online. As users share information and ask questions, answer questions, and librarians do the same within a wiki, a record of these transactions is archived perhaps for perpetuity. And these transcripts are in turn resources for the library to provide as reference. Furthermore, wikis and blogs will almost certainly evolve into a more multimedia environment as well, where both synchronous and asynchronous audio and video collaborations will take place. Blogs are new forms of publication, and wikis are new forms of group study rooms.

Ultimately, blogs and wikis are relatively quick solutions for moving library collections and services into Web 2.0. This beginning of Library 2.0 makes collections and services more interactive and user-centred, enable information consumers to contact information producers and become co-producers themselves. It could be that Library 2.0 blurs the line between librarian and patron, creator and consumer, authority and novice. The potential for this dramatic change is very real and immediate, a fact that places an incredible amount of importance on information literacy. In a world where no information is inherently authoritative and valid, the critical thinking skills of information literacy are paramount to all other forms of learning.

### **Social Networks**

Social networks are perhaps the most promising and embracing technology discussed here. They enable massaging, blogging, streaming media, and tagging, discussed later. MySpace, FaceBook, Delicious, Frappr, and Flickr are networks that have enjoyed massive popularity in Web 2.0. While MySpace and FaceBook enable users to share themselves with one another (detailed profiles of users' lives and personalities), Delicious enables users to share Web resources and Flickr enables the sharing of pictures. Frappr is a bit of a blended network, using maps, chat rooms, and pictures to connect individuals.

Other social networks are noteworthy as well. LibraryThing enables users to catalogue their books and view what other users share those books. The implications of this site on how librarians recommend reading to users are apparent. LibraryThing enables users, thousands of them potentially, to recommend books to one another simply by viewing one another's collections. It also enables them to communicate asynchronously, blog, and "tag" their books.



It does not require much imagination to begin seeing a library as a social network itself. In fact, much of libraries' role throughout history has been as a communal gathering place, one of shared identity, communication, and action. Social networking could enable librarians and patrons not only to interact, but to share and change resources dynamically in an electronic medium.

Users can create accounts with the library network, see what other users have in common to their information needs, recommend resources to one another, and the network recommends resources to users, based on similar profiles, demographics, previously-accessed sources, and a host of data that users provide. And, of course, these networks would enable users to choose what is public and what is not, a notion that could help circumvent the privacy issues Library 2.0 raises and which Litwin (2006) well enumerates.

Of all the social aspects of Web 2.0, it could be that the social network and its successors most greatly mirror that of the traditional library. Social networks, in some sense, are Library 2.0. The face of the library's web-presence in the future may look very much like a social network interface.

### **Tagging**

Tagging essentially enables users to create subject headings for the object at hand. As Shanhi (2006) describes, tagging is essentially Web 2.0 because it allows users to add and change not only content (data), but content describing content (metadata). In Flickr, users tag pictures. In LibraryThing, they tag books. In Library 2.0, users could tag the library's collection and thereby participate in the cataloguing process. Tagging simply makes lateral searching easier. The often-cited example of the U.S. Library of Congress's Subject Heading "cookery," which no English speaker would use when referring to "cookbooks," illustrates the problem of standardized classification. Tagging would turn the useless "cookery" to the useful "cookbooks" instantaneously, and lateral searching would be greatly facilitated.

Of course, tags and standardized subjects are not mutually exclusive. The catalogue of Library 2.0 would enable users to follow both standardized and user-tagged subjects; whichever makes most sense to them. In turn, they can add tags to resources. The user responds to the system, the system to the user. This tagged catalogue is an open catalogue, a customized, user-centred catalogue. It is library science at its best.

### **RSS Feeds**

RSS feeds and other related technologies provide users a way to syndicate and republish content on the Web. Users republish content from

other sites or blogs on their sites or blogs, aggregate content on other sites in a single place, and ostensibly distill the Web for their personal use. Such syndication of content is another Web 2.0 application that is already having an impact on libraries, and could continue to do so in remarkable ways.

Already libraries are creating RSS feeds for users to subscribe to, including updates on new items in a collection, new services, and new content in subscription databases. They are also republishing content on their sites. Varnum (2006) provides a blog that details how libraries use RSS feeds for patron use.

But libraries have yet to explore ways of using RSS more pervasively. A new product from a company called BlogBridge, BlogBridge: Library (BBL), "is a piece of software that you can install on your own server, inside your firewall. It's not the content of the library (the books), it's the software to organize the library (the building)." While BBL's potential for libraries has yet to be determined due to its being brand new, it is conceivable that this syndication will replace browsing and searching through library websites for content. BBL and similar RSS aggregator applications, installed in a library's system and coupled with the social network of the library, will enable users to have a single, customized, personal library page that syndicates all the library content of interest to them and their research, eliminating irrelevant information. And users will, of course, control that page and that content.

### **Mashups**

Mashups are perhaps the single conceptual underpinning to all the technologies discussed in this article. They are ostensibly hybrid applications, where two or more technologies or services are conflated into a completely new, novel service. Retrivr, for example, conflates Flickr's image database and an experimental information architecture algorithm to enable users to search images not by metadata, but by the data itself. Users search for images by sketching images. In some ways, many of the technologies discussed above are mashups in their very nature. Another example is WikiBios, a site where users create online biographies of one another, essentially blending blogs with social networks.

Library 2.0 is a mashup. It is a hybrid of blogs, wikis, streaming media, content aggregators, instant messaging, and social networks. Library 2.0 remembers a user when they log in. It allows the user to edit OPAC data and metadata, saves the user's tags, IM conversations with librarians, wiki entries with other users (and catalogs all of these for others to use), and the user is able to make all or part of their profile public; users can see what other users have similar items checked-out, borrow and lend tags,

and a giant user-driven catalogue is created and mashed with the traditional catalogue.

Library 2.0 is completely user-centred and user-driven. It is a mashup of traditional library services and innovative Web 2.0 services. It is a library for the 21st century, rich in content, interactivity, and social activity.

### **Conclusion**

All together, the use of these Web 2.0 technologies and applications, along with others not here mentioned and others not yet invented, will constitute a meaningful and substantive change in the history of libraries. The library's collection will change, becoming more interactive and fully accessible. The library's services will change, focusing more on the facilitation of information transfer and information literacy rather than providing controlled access to it. This paper posits four conceptual underpinnings to Library 2.0: it is user-centred; a multimedia experience; socially rich; and communally innovative. It also espouses a focused definition for the term: "The application of interactive, collaborative, and multimedia web-based technologies to web-based library services and collections."

The best conception of Library 2.0 at this point in time would be a social network interface that the user designs. It is a personalized OPAC that includes access to IM, RSS feeds, blogs, wikis, tags, and public and private profiles within the library's network. It is virtual reality of the library, a place where one can not only search for books and journals, but interact with a community, a librarian, and share knowledge and understanding with them. Library 1.0 moved collections and sparse services into the online environment, and Library 2.0 will move the full suite of library services into this electronic medium. The library has had a web-presence for many years, and with Library 2.0, its patrons will be joining it.

While Library 2.0 is a change, it is of a nature close to the tradition and mission of libraries. It enables the access to information across society, the sharing of that information, and the utilization of it for the progress of the society. Library 2.0, really, is merely a description of the latest instance of a long-standing and time-tested institution in a democratic society. Web 2.0 and libraries are well suited for marriage, and many librarians have recognized so.

Despite this change fitting so well with the history of libraries and their mission, it is still a major paradigmatic shift for librarianship to open not just access to their catalogs and collections, but access to their control. Library 2.0 demands libraries focus less on secured inventory systems and

more on collaborative discovery systems. There is perhaps a great synchronicity between librarianship and Web 2.0, but viewed holistically, Library 2.0 will revolutionize the profession. Rather than creating systems and services for patrons, librarians will enable users to create them for themselves.

A profession steeped in decades of a culture of control and predictability will need to continue moving toward embracing facilitation and ambiguity. This shift corresponds to similar changes in library history, including the opening of book stacks and the inclusion of fiction and paperbacks in the early 20<sup>th</sup> century.

Library 2.0 is not about searching, but finding; not about access, but sharing. Library 2.0 recognizes that human beings do not seek and utilize information as individuals, but as communities. Some examples of the move from Library 1.0 to Library 2.0 include:

- Email reference/Q&A pages—> Chat reference
- Text-based tutorials—> Streaming media tutorials with interactive databases
- Email mailing lists, webmasters—> Blogs, wikis, RSS feeds
- Controlled classification schemes—> Tagging coupled with controlled schemes
- OPAC—> Personalized social network interface
- Catalogue of largely reliable print and electronic holdings—> Catalogue of reliable and suspect holdings, web-pages, blogs, wikis, etc.

It is, finally, also necessary to consider that the Web will continue to change rapidly for some time. Web 2.0 is an early one of many. Libraries must adapt to it, much as they did the Web originally, and must continually adapt for the foreseeable future. In this “perpetual beta” (O’Reilly, 2005), any stability other than the acceptance of instability is insufficient.

### **Intranets and Special Libraries**

What is an intranet? Why should libraries, particularly special libraries have an interest in intranets and intranet communication? How are intranets useful in a library setting? What is required to implement an intranet in a special library setting? Who should be in charge of managing an intranet in a special library setting? What features should be included? How does the library website fit into the intranet?

All of these questions will be addressed in the following document. There is no one way to design and implement an intranet. However, the special library or information centre should be a prominent part of a

corporate intranet because Library and Information Science professionals understand information and information communication.

### ***Intranet Definition***

An intranet is a network inside an organization that uses Internet technologies (such as web browsers and servers, TCP/IP protocols, HTML hypermedia document publishing and databases, and so on) to provide an Internet-like environment within the enterprise for information sharing, communications, collaboration, and the support of business processes (O'Brien, 252).

The intranet is used by members of the organization and access is limited by the use of one or more security techniques. The security measures typically used are...passwords, encryption, and fire walls (Ibid, 253).

This definition is only part of describing an intranet. Intranets brought to fruition the concept of knowledge management (Srikantaiah & Koenig, 26). The creation, collection, dissemination, and processing of information can now be done with much greater ease and has brought about many changes in the way organizations do business (Ibid, 27). Information is the key element and who understands information better than a Library and Information Science specialist.

### ***The Special Library Connection***

Librarians can play a major role in developing the content of successful Intranets (Saunders, 18). Library and Information Science (LIS) professionals have the experience, knowledge and ability to handle the information needs of organizations. They collect, classify, organize, index, distribute, store, and otherwise manipulate information. They can create and publish information. All of these skills are needed by organizations/corporations that recognize that the information held by their employees and residing in their computers is of immense value. That information is most valuable if it can be easily retrieved when needed. LIS professionals perform all the tasks that make this possible.

Corporate libraries and information centres as well as law, medical, and subject specific libraries are natural users and or creators of intranets because an intranet allows LIS professionals to market information and library services to everyone in the intranet. According to Darlene Fichter, Intranets provide an unprecedented opportunity for establishing the library's presence on every desktop in the corporation and providing time-sensitive and audience specific content (Fichter, 1999).

Using commonly available technology, intranets allow libraries to survey their audience and collect the results electronically. The special

librarian can then use this information to meet the needs of users in the intranet. The information professional may then use the intranet to provide information access, online training, and information dissemination, the basics of knowledge management.

### **Value Added: Special Librarians and Intranets**

LIS professionals bring key core competencies into the use and management of intranets. These core competencies are:

1. ability to identify critical information (critical evaluation),
2. ability to organize information for access (indexing),
3. ability to package information (abstracting and publishing), and
4. knowledge and skill in information dissemination (document delivery). (SLA)

The LIS professional brings other valuable skills and abilities to the operation of an intranet. The LIS professional can provide technology, project management, people management, budgeting, political, and technical skills to the creation and use of an intranet (Griffiths, 19-21). Creating an intranet in conjunction with the information technology staff or improving the special library presence on an existing intranet is a worthy and achievable goal. The following steps are a path to implementing an intranet.

## **Planning the Intranet**

### **Formulate Goals**

What specifically does the organization want the intranet to accomplish? Existential expectations will focus on developing individuals and the organization. Technical expectations will focus on better, faster, cheaper with hardware implementation and application. Do you want the widest possible use of the intranet throughout the organization? The more people using the intranet the more empowered the users feel (Telleen, 1). These decisions are important and determine future decisions about the intranet and the organization.

### **Determine Leadership**

Decide who will be in charge and to whom they will report. Will the leadership be shared, but divided on content and technology lines? The LIS professional should move toward content management, if not being the overall leader.

### **Hardware Decisions**

There is much information available on choosing equipment, and pricing is competitive. The intranet will require at least one client server



(computer), router, and possibly one or more hubs and a multiplexer. The individual design will depend on the number of computers that will be connected and their distance from the intranet client server. A broadband/fast connection to the Internet is recommended. The client server will need a fast processor and a lot of RAM in order to manage content, graphics, and numbers of users. No central server is required for relatively small LAN (local area network) systems operating on a peer-to-peer basis. Larger LANs and WANs (wide area networks) will require a central server.

### **Software Decisions**

The central server will need a network operating system (NOS) to coordinate the intranet. Microsoft, Novell, Sun Microsystems, and Apple all produce software capable of running an intranet (O'Brien, 153-154). The choice of software at this level will depend largely on what systems are already present and how well the current systems can be integrated into a new intranet network. Operating systems for peer-to-peer networks include LANtastic, Windows for Workgroups, and Personal Netware (Saunders, 150).

Application software may also be needed on the remote desktops to make them equally operable on the intranet. Office suite software is available from several providers. The primary connection tool from one computer to another is the web browser and there are a number of browser applications that allow the relatively inexperienced to create documents that will be web accessible. HTML, XML, and Java are all being used for web applications. Web application software is under constant development and research should be done during planning in order to make the best choice. One choice available is to let people use whichever browser (Win. Explorer or Netscape) they prefer and put the responsibility on the document creator to make the document work on either browser.

Security software will also be needed for the network server, a firewall. A firewall should protect the server and the intranet from outside attack.

### **Participation Issues**

The planning group should make decisions that encourage wide use and ease of access for all members of the organization. The group should establish some brief guidelines for quality and quantity, but otherwise set no barriers that serve to restrict interested users from publishing and communicating on the intranet (Telleen, 10).

### **Basic Rules**

Rules about use should be kept to a minimum and designed to help everyone perform well and achieve appropriate goals. All corporate

regulations about harassment, good taste, and confidentiality should apply (Telleen, 11). With that said the following rules ought to be required. First, every page should have the author's name on it. Second, every page should have the date of last revision posted. Third, a means of contacting the author should be posted on every page (Ibid). It is also a good idea to label each page with the level of confidentiality (Ibid).

Documents that are officially produced by the organization should be clearly marked, identified, and have a confidentiality label. Those documents could also be identified with some unique formatting (Ibid).

### **Adoption and Awareness**

Finally, issues related to adopting this communication standard should be discussed in seminars/training sessions and workshops. All employees should have access to e-mail and company communication through the intranet. Employees may need to be taught some computer skills in order to facilitate their access to organization communication, e-mail, and intranet resources (Ibid).

Training workshops for document writers, editors, and publishers should be offered in the beginning and periodically. Organization members will have a wide variety of experience with computers, and some will need much more training and practice to increase their ability and confidence with using the intranet (Telleen, 12-14).

### **The Information Centre Website**

The information centre needs a good website. There are many good books and articles out there on website design. If money allows, website design can be contracted to a web design firm. However, if you are elected to design the page, remember you can do it, and as you gain experience you can make it better. A good starting place is finding and studying the designs of award winning websites. A quick look at a search engine should locate some sites.

There are some key elements to good design. First, is the three click rule. Most users will not continue to search for information if it is further than three clicks from the home page. Organize the site to make it no further than three clicks deep. Second, keep graphics to a minimum in order to keep download time short. Images can be shrunk to sizes that work well with homepage. Warn users about large files, then they can choose whether they want the information or not.

Third, remember small is beautiful. The homepage should be no more than two screens in length, because some users may not scroll down enough (or at all) and will miss some information. Fourth, if the site is

too flashy it will be a distraction. Movement and gimmicky pages are likely to detract from the purpose of the website. (Griffiths, 78-82)

Now that what to avoid has been listed, there are some good features that should be included. This following is a list of things that should be included. However, the more features included, the more details that will have to be managed. Websites should be updated regularly and reworked about every six months to a year. Links should be checked weekly and deleted if non-functioning.

1. *Bookmarks:* The Special Library provides a selection of useful bookmarks to other websites. These are chosen based on the needs of the user community. (Griffiths, 84)
2. *Practical Information:* Give the information center's address, phone number, and a map (Ibid).
3. *Training Information:* Recommend training opportunities and provide training materials as time permits. Links to information about training can be provided, but be careful about copyright concerns. (Griffiths, 84)
4. *Site Map:* A site map clearly identified on the homepage is a quick way for user's to find what they need. (Ibid)
5. *Online Catalogue:* An online catalogue helps your users find what they need quickly. All books, journals, etc. should be listed. Links to online databases and journals should be provided here. (Griffiths, 85)
6. *Librarian Availability:* Let your users know that you will answer questions through e-mail. Their questions may lead to a Frequently Asked Questions (FAQ) page. (Griffiths, 85)

Following these do's and don'ts will help get a website up and running. The key to a really good website is to refine it continually. Always be thinking about how to make it better and more widely used. The more it is accessed the better, particularly if the same users are coming back again and again and bringing new users with them.

### ***Intranet Features***

Intranets can have a wide range of capabilities. An intranet may begin with simple information sharing, but as the intranet grows and user's gain a better sense of how it can benefit the organization, then it becomes more active in the manipulation of information. In later stages of development it will be capturing and disseminating information, enabling the flow of work, reducing costs, and maximizing the collaborative work of the organization (Head, 5-6). The intranet increases functionality when

file management (databases), print management, bulletin boards, and directory abilities are added. Some best features to include on the Information Centre website have been listed. The Intranet, as a whole, also needs to include certain functions and abilities. The following features may increase the intranets usability.

1. **Shared Access to Documents:** this is the defining feature of an intranet. Documents should be saved in a standard format to eliminate compatibility problems (Baca, 1).
2. **Controlled Access:** Intranets should be password protected. Proprietary information and human resource information should be carefully protected. Consider having different levels of access. All information should not be accessible to every employee. (Baca, 1)
3. **Events Calendar, Scheduler:** This should be centralized to help keep everyone informed and on the same page (Baca, 2).
4. **Intranet Search Engine:** The best organized site can still use a search engine for locating information. A keyword search may be the fastest way to find the information needed. Search fields and go buttons take very little space. (Baca, 2)
5. **Address Book:** An organization address book with employee, vendor, and client contact information is a helpful addition. Batch e-mail becomes very easy. It can also be cost effective (save on paper and update time). (Ibid)
6. **Task Management:** Managers can use the intranet to assign tasks, reassign tasks, and prioritize the duties of their employees. Responsibilities can be shifted or deadlines can be given or changed. (Ibid, 3)

### ***Intranets, Special Libraries, and Copyright***

In the special library, the LIS professional becomes the key figure in dealing with copyright concerns. The LIS professional must know and understand copyright law and how it impacts the organizational intranet. All persons creating documents for the intranet must know the basics of copyright law and follow it (this is another good reason for the author's name to be on all documents). Information properly cited can be used. The information professional will need to teach a copyright law workshop regularly.

A review committee could be created with persons who understand the basics of copyright. All documents submitted for publishing on the intranet could be reviewed by the committee, and if problems arose the author could be consulted before posting the document on the intranet.

Making photocopies of articles and printing out articles from databases could also be areas where copyright might be abused. The information professional will cover this topic in the workshop as well. Also, a link to copyright issues could be placed on the information centre homepage. The LIS professional might provide information about copyright issues on the intranet with emphasis given to individuals who wish to publish on the intranet.

### **Information Services**

The LIS professional will facilitate some key services from the Information Centre. The basic services are maintaining the core collection of appropriate information for the organization. Acquiring new information that fits the interests of the organization and organizing that information to make it easily accessible and retrievable. The information may be in the form of books, journals, databases, field notes, lab notes, memos, etc. In addition to these basic services the LIS professional may add or facilitate some or all of the following services.

Project Collaboration is the process of assisting more than one person or group to work together on a project or document. Documents can be made available to others at any stage of their life cycle. The documents may be archived at various points in their development process. Online working, through videoconferencing, instant messaging, or discussion group technology are all part of project collaboration. Communities of Interest are groups working on related issues in different offices or locations. The LIS professional can facilitate a single virtual presence to groups with a common interests or concerns. E-mail can be used to access subject experts across the intranet.

Discussion Groups tend to be more informal than a project collaboration group. They are facilitated through a list-serve or a chat room arrangement. Ideas can be exchanged and creative thinking is encouraged. These may require some moderation on the part of the LIS professional to remind users of policy issues, like no commercial messages or no crude language, and to keep the discussion focused on topics related to the organization. Internal Newsletters can be published and posted to every computer station. Re-printed articles and illustrations/photographs will need copyright approval. Digital cameras used in-house can quickly cover many photography needs.

Online Training can be provided through the intranet. This is best if broken down into short units of ten-fifteen minutes. CD-Roms, DVDs, and videostreaming can be used to teach a wide variety of subjects. (Griffiths, 164-167)

**Conclusion**

LIS professionals have the skills in working with information, communication, and project management that make them a good fit for leadership roles in the design and implementation of an organizational intranet, however, an intranet is not static. The LIS professional must stay abreast of the changes in intranet design and use. Changes in the organization and its information needs will require the LIS professional to revise and adapt the intranet and information centre.

The programmes and resources that are working well today will become obsolete and will need to be changed. The organization's mission or business may change in response to forces in industry. As these things occur the LIS professional will respond to the new opportunities and challenges. The need for intranets may decrease in time, but the pace of change in our world will only create a larger need for the competent LIS professional.





## Training for Digital Libraries

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### Introduction

Digital libraries (DLs) are emerging as an important area of research and education for information science, computer science and a number of other related disciplines. In this paper, we briefly discuss the state of DL research, including the growing body of funding available for DL studies, and the state-of-the-art in DL education worldwide.

Our discussion is based on a recent worldwide survey of DL courses. What we conclude from our analysis is the urgent need for the development of DL education programmes amidst a burgeoning growth of DL research and practice by librarians, and information and computer scientists.

### *Digital Libraries Research*

Many books and articles are being written about this growing interdisciplinary area of research [Ben97] [Sch97] [Sam98] [BS96] [FM98] [Les97]. Increasingly, conferences worldwide are being devoted to examining the technical, social, political and user aspects of DLs, including conferences in the United States, from 1994 to the present. In the United States many different types of DL projects have emerged within university research environments, libraries and publishers. A major impetus to the development of academic DL projects has been the United States National Science Foundation (NSF) provision of more than \$90 million in research funding, primarily to computer science oriented DL projects (NSF Digital Libraries Initiative I, 1994).

During the first phase of funding, NSF, DARPA, and NASA provided \$24 million to DL projects at six universities—the University of Illinois, the University of Michigan, Carnegie Mellon University, the University of Santa Barbara, Stanford University, and the University of California at Berkeley—to construct and research DL testbeds. NSF has announced

that the second phase of DL funding being awarded in early 1999 will extend to a larger variety of DL projects, including those studying users' interactions with DLs. Similar projects are being conducted in Europe, Australia and the UK. Additional sponsors in this second phase include the National Endowment for the Humanities, the National Library of Medicine, and the Library of Congress.

A second group of DL projects is primarily made up of development projects to create digitized collections, rather than research projects. Some are conducted by librarians at major public and university libraries, such as the Library of Congress's American Memory project and the Western Digital Library Initiative (WDLI). Other projects are coordinated by the Digital Library Federation (DLF), which exists under the umbrella organization of the Council on Library and Information Resources (CLIR).

The Federation includes twelve university research libraries, the Library of Congress, the National Archives and Records Administration, the New York Public Library, and the Commission on Preservation and Access, who participate in a variety of projects and other initiatives designed to develop digital library capabilities.

There are also numerous projects being conducted by societies, publishers, and other varied organizations to create digital materials and make them available online, (*e.g.*, the Association for Computing Machinery (ACM) Digital Library, and Elsevier's Science Direct for current scientific literature, as well as JSTOR for older journals). At the same time, a number of publications dealing with DLs have emerged, including the CNRI publication *D-Lib Magazine*, and journals that publish research on digital libraries.

### **Digital Libraries Education**

Despite the boom in funding for DL research, development, and publications, DL education is behind in funding and practice. Currently, there is little systematic support for developing DL courses and curricula, and no coordinated effort in library and information science (LIS) or computer science to provide DL education. At present, we do not know much about good digital library education. We do not know what knowledge is required to produce information or computer professionals to work as digital librarians, digital developers, or in other job categories, or even what the job designations or requirements will be in the future.

Computer scientists may be responsible for the technical development of digital libraries, with information scientists focusing on the content, organization, users, and retrieval of information. Most of the development of information retrieval has been done by computer scientists, (*e.g.*, Salton at Cornell, van Rijsbergen at Glasgow, and Croft at the University of

Massachusetts were all in computer science departments). The current shortage of librarians and information professionals with the expertise to fulfil the current technological demands of libraries will be exacerbated by the future demand for digital librarians.

The emerging demand for digital librarians and digital libraries may warrant the restructuring of the library and information science, and the computer science curricula. The development of a “digital libraries” track for information and computer science students that focuses on the technical and human aspects of the web and digital libraries seems inevitable.

In the United States, several universities have reorganized existing library schools to emphasize digital information and online services. Two notable examples are at Berkeley and Michigan. The TICER summer school at Tilburg University in the Netherlands and several of OCLC’s programmes aim to update the skills of experienced librarians. In addition, there are numerous specialized courses, ranging from creating web sites for computer scientists to seminars on intellectual property for lawyers. Nevertheless, the number of courses that are specifically on digital libraries is surprisingly small.

### **Research Questions**

In order to assess the state-of-the-art in DL education, we conducted a study of the current courses and curricula worldwide that are explicitly on digital libraries. We sought to address the following research questions:

1. Which universities are offering DL courses?
2. Are DL courses taught in schools of library and information science, computer science, or other departments?
3. Are DL courses taught at the undergraduate or graduate level?
4. What is the primary emphasis in courses that explicitly address the subject of digital libraries?

The results from this study provide important data and insights into the current state of DL education, and generate suggestions for educators and policy makers for developing this emerging educational phenomenon.

### **Research Design**

#### **Data Collection**

We conducted the data collection for the study in two parts. First, we sent an email survey to LIS and computer science faculty, and we followed that with a survey of websites maintained by schools of library and information science.

### **Email Survey**

During September 1998, a short survey consisting of three questions was emailed to all LIS and computer science faculty who had attended the June 1998 ACM Digital Libraries conference in Pittsburgh, Pennsylvania. Due to a lack of resources, the researchers were unable to survey all faculty at all LIS and computer science schools worldwide. Those faculty who attended the 1998 ACM Digital Library conference were a convenient sample, but were probably overly representative of United States schools. The survey was also distributed through various listservs catering to DL issues. Email survey respondents answered the three questions listed below:

1. Does your university offer courses in digital libraries or related areas? If so, please provide as much information as possible, including URLs.
2. Are the DL courses taught in information science, computer science or other schools or departments?
3. Are the DL courses for undergraduate, graduate or the doctoral level?

Potential respondents were told that the results of the survey would be used to produce an academic paper outlining the state-of-the-art in DL education.

### **Website Analysis**

During September 1998, the researchers examined the website of each school of library and information science, worldwide, to identify any DL courses offered. We realize the survey of websites may not reveal all DL courses currently offered by LIS schools. However, we feel the website survey offers some insight into the state of DL courses at LIS schools. No attempt was made to discover DL courses taught outside LIS schools, *e.g.*, by computer science departments. Also, much of the academic work in digital libraries has been carried out in other disciplines, such as medical informatics, which are beyond the scope of this study.

### **Data Analysis**

Responses to the emailed questions were content analyzed for information regarding the presence or absence of courses specifically in the area of digital libraries. Where possible, the nature of specific DL course content was examined. Next, US and Canadian LIS websites were examined, using content analysis, to any identify DL courses.

### **Results**

We collected data on twenty (20) institutions offering DL courses. Most of the data came from faculty responses to our three email questions

to the listservs. Very little additional data was obtained from the Website analysis.

*Institutions Offering Courses in Digital Libraries*

Institution	Course Title	Department	Level
Loughborough University (UK)	Advanced Internet and Digital Libraries	Information & Library Studies	Undergraduate & Master's
University of Waikato (NZ)	Unspecified	Computer Science	Undergraduate & Master's
University of Technology, Sydney (AU)	Digital Library Manager	Department of Information Studies	Graduate Level
Universidade Federal de Minas Gerais Escola de Biblioteconomia (Brazil)	Bibliotecas Digitais	Library Science	Graduate Level
Monash University (AU)	Managing Virtual Libraries	School of Information Management & Sys.	Graduate Level
University of Pittsburgh (US)	Digital Libraries	Library & Information Science	MLIS and Ph.D.
University of Alabama (US)	Issues in Librarianship, Digital Libraries	School of Library and Information Studies	Master's and Doctoral
University of Malaya (Kuala Lumpur)	Digital Libraries	Computer Science	Master's
Nanyang Technological University Singapore	Unspecified	Division of Information Studies, Applied Science	Graduate level
Virginia Tech (US)	Digital Libraries	Computer Science	Undergraduate; Master's and Ph.D.
Catholic University of America (US)	Seminar in Digital Libraries	Library and Information Science	Master's
Old Dominion University (US)	Introduction to Digital Libraries	Computer Science	Doctoral
University of Western Ontario	Unspecified	Information & Media Studies	Unspecified
Queens College/City University of NY (US)	Digital Libraries	Library & Information Studies	Master's
University of Michigan (US)	Digital Librarianship Workshop	The Internet Public Library	Graduate level
University of Iowa (US)	Digital Libraries	Library & Information Science	Master's
Indiana University (US)	Digital Libraries	School of Library & Information Science	Master's
Southern Connecticut State University (US)	Digital Libraries	Library Sciences & Instructional Technology	Master's
University of California, Berkeley (US)	Digital Library Seminar	Computer Science	Graduate level
Rutgers University, School of Communication, Information & Library Science (US)	Digital Libraries	Library and Information Science	Master's

**International Distribution**

The subject of digital libraries clearly is receiving attention on an international level. Eight of the twenty institutions examined in this study were located outside the United States. The number of DL courses currently offered in each country is listed below:

*United States-12*

*Canada-1*

*New Zealand-1*

*United Kingdom-1*

*Malaysia-1*

*Singapore-1*

*Australia-2*

*Brazil-1*

**Level of DL Education**

Digital Library education is being offered primarily at the graduate level. Only three of the responding institutions offer courses in digital libraries to undergraduates. Nineteen courses are at the graduate level and three at the undergraduate level—in computer science departments. This is unsurprising since most of the courses were in schools of library and information science, which in the United States are primarily graduate schools.

**Type of School**

Most of the institutions offering courses in digital libraries did so within Schools of Library and Information Science. Four courses are being offered in Computer Science. The remaining two institutions were a Department of Information & Media Studies, and a Division of Information Studies within a College of Applied Science.

**Course Content**

The types of DL courses offered also vary from more technical courses in Computer Science programmes, to management oriented courses in Library and Information Science programmes. When we examine the content of the digital libraries courses offered by these schools, it appears that the primary emphasis is on issues involved in system building and digital collection building. Less frequent attention is being given to the study of digital library users and usability. The subject of “digital librarianship” is given primary emphasis at one institution.

An examination of the available course descriptions reveals a central concern with training students in the use of specific tools and techniques



in the construction of digital collections. Some digital library courses also included the words virtual or Internet in their titles. However, "Digital Libraries" appears to be the most popular title for a course.

One clear finding from this study of the current state of digital libraries education is that there is no single agreed upon definition of what constitutes "digital library" or a DL course. For many institutions, the digital library is merely a digitized collection of information items accessible via the web. In other institutional environments, the concept of the digital library hardly goes beyond traditional models of information retrieval systems. One might conclude from this that further advancement in the area of digital libraries rests upon the development of a sound conceptual foundation, which at this time is only emerging.

There is a vast difference between the view of digital libraries innovation revealed by the papers published in *D-Lib Magazine* and the level of understanding of many students. This point is underscored in the results of a small scale survey that was conducted amongst Masters of Library Science (MLS) students, in a course on digital libraries offered at Queens College for the first time during the Fall semester 1998. Twenty-eight advanced level students enrolled in the course. On the first day of class, each student was asked to write an answer to the question "What is a digital library?" Over half of the students replied "Don't Know" to the question, explaining they hoped to learn the answer by taking the course. Thirty percent of the class used various ways to describe a digital library as a library that provided online access to its catalogue. The remaining students, while not able to formulate a definition of a digital library, all cited the Library of Congress as an example of one.

Also clear, from not only these results but from a reading of the DL literature more generally, is that the creation of digital libraries marks a fundamental shift in the way we ought to envision library and information science education. We need a fundamental rethinking of LIS education that reflects the need for DL curriculum and courses, not only in LIS but also in computer science, economics, law, and other relevant disciplines.

In other words, the current state of affairs in the development of digital libraries necessitates going beyond the offering of one or two digital libraries courses, to an expansion of the traditional LIS and CS curricula to encompass a more general digital libraries track.

### **Toward of Model of Digital Library Education**

At this point in time, it is premature to suggest a fully developed curriculum, including courses, for digital library education. However, following the model of the ACM in their development of an undergraduate curriculum in Information Studies, we can suggest several curriculum

areas and substantive topics that seem to be important in the further development and incorporation of digital libraries education into LIS.

If we are to succeed in developing effective models for digital libraries education, we need to fashion a hybrid curriculum that brings together the complementary strengths from diverse departments such as computer science, psychology, policy studies, and library and information studies. Such interdisciplinary partnerships, while not new, often prove to be problematic in their implementation.

Our personal position is that digital libraries are first and foremost *libraries*, and, as such, any model curriculum should maintain a core set of courses that address the major functions and activities of libraries in general, in both digital and traditional forms.

At the same time, courses explicitly focusing on technology for digital libraries should strive to connect specific technical applications to the library environment. Our suggested list of curriculum areas for digital libraries education takes into account the need for interdisciplinary collaboration.

#### *Curriculum Areas and Suggested Topics for Digital Library Education*

<b>CURRICULUM AREAS:</b>	<b>TOPICS:</b>
Theoretical and Historical Foundations	History of libraries; Human information behavior; Information retrieval theory; Development of digital collections and digital libraries
Technical Infrastructure of the Digital Library	Information retrieval engines; Database construction of digital libraries; Distributed collections; Multimedia formats and applications; Interoperability; Network technology; Web applications in digital libraries; Interface design; Communication protocols; Query languages
Knowledge Organization in Digital Libraries	Metadata; Indexing; Classification; Database integration; Document formats
Collection Development and Maintenance	Digital archives; Digital conversion technology; Digital preservation
Information Access and Utilization of Digital Libraries	Users and uses of digital libraries; Usability and evaluation research; Information behavior in digital libraries
Social, Economic and Policy Issues	Electronic publishing; Scholarly communication; Copyright issues and intellectual property rights in digital libraries; Costs of building digital libraries; Funding for digital libraries
Professional Issues	Roles and responsibilities of the digital librarian; Management of digital libraries; Bibliographic instruction

#### **Conclusions and Further Research**

Our state-of-the-art analysis of DL education, worldwide, was an initial foray into an important and expanding area of investigation. Ongoing research is required on a larger scale to gather data from every school of LIS and computer science in order to update and extend our findings. We

need to develop good models of DL educational programmes and courses, and a greater synergy between DL research and education. Finally, we need the resources to develop and sustain an expanding and far reaching programme of DL education.

### **DOI: Current Status and Outlook**

Over the past few months the International DOI Foundation (IDF) has produced a number of discussion papers and other materials about the Digital Object Identifier (DOI) initiative. They are all available at the DOI web site [DOI], including a brief summary of the DOI origins and purpose [DOIover]. The aim of the present paper is to update those papers, reflecting recent progress, and to provide a summary of the current position and context of the DOI. Although much of the material presented here is the result of a consensus by the organisations forming the International DOI Foundation, some of the points discuss work in progress.

The paper describes the origin of the DOI as a persistent identifier for managing copyrighted materials and its development under the non-profit International DOI Foundation into a system providing identifiers of intellectual property with a framework for open applications to be built using them.

Persistent identification implementations consistent with URN specifications have up to now been hindered by lack of widespread availability of resolution mechanisms, content typology consensus, and sufficiently flexible infrastructure; DOI attempts to overcome these obstacles. Resolution of the DOI uses the Handle System, which offers the necessary functionality for open applications. The aim of the International DOI Foundation is to promote widespread applications of the DOI, which it is doing by pioneering some early implementations and by providing an extensible framework to ensure interoperability of future DOI uses. Applications of the DOI will require an interoperable scheme of declared metadata with each DOI; the basis of the DOI metadata scheme is a minimal “kernel” of elements supplemented by additional application-specific elements, under an umbrella data model (derived from the INDECS analysis) that promotes convergence of different application metadata sets. The IDF intends to require declaration of only a minimal set of metadata, sufficient to enable unambiguous look-up of a DOI, but this must be capable of extension by others to create open applications.

The Foundation intends to put into place a business model to support DOI allocation and use, probably based on a cost recovery model financed by registrants allocating DOIs via one or more registration agencies, with DOI usage free of charge, and declaration at the point of registration of a minimal “kernel” of metadata with each DOI. Although many challenges

remain to be resolved, a concept of the desired development path and long term aim is now clear.

### **Origin and Aim**

The DOI was an outgrowth of a programme of the Association of American Publishers to develop tools to enable *management of copyrightable materials* in an electronic environment. In order to protect something, it is first necessary to *uniquely and unambiguously designate* what that entity is. The DOI therefore began as a practical initiative in unique persistent naming, as the first part of a fuller implementation to include tools to manage the persistently named entities themselves.

At its simplest, the DOI system offers:

- a persistent identifier of intellectual property; and
- a mechanism to resolve that identifier to some useful information or service.

The second of these two steps *associates the identifier with some specific information*; the simple way in which this was done was to route to a publisher's web site. The DOI therefore becomes a specifier for routing to an occurrence of a piece of material on a publisher's web site, and many of the prototype demonstrations and current practical implementations of DOI embody this functionality.

However, the intent of the DOI is not for this to be the end-point, since restricting all uses of material to routing via the publishers web site is neither possible nor productive. The DOI is intended as a public identifier for use in many applications and for local uses, and as with other information identifiers [Paskin1] the DOI should be independent of specific applications—an identifier that can be freely used in many contexts and by many users.

### **Persistent Identification**

**Uniform Resource Names (URNs):** The DOI provides a persistent identifier ("name") for a resource or entity. This allows the designation of the entity directly, in contrast to the URLs used by the web, which designate a location at which an instance is held. Thus DOIs allow an infrastructure for managing digital objects independent of locations. The need for persistent names has been long recognised in the development of the Internet, and requirements for Uniform Resource Names have been specified [URN]. These requirements provide a set of principles, which DOI takes as a fundamental starting point:

- *Global Scope:* A name has a global scope, which does not imply a location. It has the same meaning everywhere.

- *Uniqueness*: The same URN will never be assigned to two different resources.
- *Persistence*: It is intended that the lifetime of a URN be permanent. That is, the URN will be globally unique forever, and may well be used as a reference to a resource well beyond the lifetime of the resource it identifies or of any naming authority involved in the assignment of its name.
- *Scalability*: URNs can be assigned to any resource that might conceivably be available on the network.
- *Legacy Support*: The scheme must allow support of existing legacy naming systems, if these satisfy the other requirements described here.
- *Extensibility*: Any scheme for URNs must permit future extensions to the scheme.
- *Independence*: It is solely the responsibility of a name issuing authority to determine the conditions under which it will issue a name.

The general form of a URN is *urn:nid:nss*, where *nid* represents a defined namespace identifier (e.g., doi) and *nss* a namespace-specific-string within that nid. Conceptually a URN may optionally include a specific scheme identifier (si), as *urn:si:nid:nss*. In each case, moving from left to right is moving down a hierarchical naming structure. For example, here is a typical DOI: urn:doi:10.1000/123456789

In this example, “doi” is a namespace identifier (nid); 10.1000/123456789 is a namespace-specific-string (nss). Where the context is clear, it is conventional to write only the namespace-specific string and refer to it as the DOI. As the example shows, the DOI is in two parts separated by a slash (/). The part before the slash (10.1000) is called the *prefix* and is administered by the authority that creates and manages the DOI; these authorities are in turn assigned by a DOI registration agency (currently, the International DOI Foundation itself).

The concept of unique identifiers for information is not a specifically web-based or Internet-based concept. Such identifiers may have many uses—for example, the URN framework is equally applicable to telephone numbers or ISBN numbers for books, etc. [Paskin2]. The Internet Engineering Task Force (IETF) and World Wide Web Consortium (W3C) use the term URI (Uniform Resource Identifier) as the overall scheme for standardising unique identifiers in designated namespaces [van der Werf]: URIs encompass both URLs and URNs. URIs are conceived as capable of identifying resources which may include abstract entities. DOIs are consistent with the requirements laid out for URNs and URIs.

**Issues in Implementing URNs:** Whilst the principles of persistent naming are clear, implementation of wide-scale applications on the Internet is limited (despite the URN concept being developed from 1991 onwards).

The problems are not with the fundamental concept but with the practical availability of mechanisms or standards. These obstacles include:

### **Resolution mechanisms**

A *resolution system* takes a URN and returns a list of services or instances of the information identified by the URN, commonly one or more URLs.

- (1) URNs need widespread deployment and ready availability of resolution systems, with accompanying registration processes for resolution systems and for URN namespace identifiers. One proposal for doing this, which has been developed through the IETF, is the *Naming Authority Pointer (NAPTR)*, based on a new DNS resource record. It suggests using the existing global DNS infrastructure. It has not been widely implemented: at present users have to be directed to the resolver in some other way such as via proxy. Eventually, other approaches may be needed for reasons of scalability. URI registration processes are currently not controlled adequately.
- (2) Browsers must be able to recognise URN entries typed into the browser windows as transparently as they currently do for URL entries. Existing deployments of URN require dependence on http either directly or as proxy mechanisms. This requires support within browsers for mechanisms to access resolution discovery systems and resolvers.
  - *Typology of Content:* Even if a persistent naming scheme is available, content management issues arise: should different names be assigned to different entities, and how is “different” defined? [Paskin1]. This requires an understanding of when persistent names should be designated, and to what entities. Further, it requires consensus from a wide community to ensure interoperability. The skills necessary for content management of intellectual property (essentially, traditional library and publishing skills) are different from those of designing technical infrastructure, such as routing schemes, and have seldom been combined. (They are now coming together under the general rubric of digital library activities.) The analytical understanding to answer these questions is only now becoming widespread (e.g., [IFLA], [INDECS]), allowing content providers to understand the issues involved in assigning identifiers to



different formats, different versions and different categories of intellectual property.

- *Single-point or Multiple Resolution:* Commonly, there are several instances of the intellectual property identified by a URN, or several associated services. It is desirable that resolution should be able to return many or all of them. Unfortunately, resolution systems that are grafted onto today's web technology usually return only a single URL. This limits the flexibility and intelligence that can be built into URN uses on the web, and this has limited their attraction. Without multiple-resolution possibilities, it is logically impossible to build an automated system able to deliver different outcomes to a resolution request dependent on user-specified requirements. A single-resolution system can only deliver a "hard-wired", predetermined outcome, and this substantially limits the possibilities and benefits of building URN systems. Single-point resolution can still be useful, as has been shown in the case of Persistent URLs [PURL] or URN deployments such as the current DOI. It can be used to provide persistent naming even if a URL moves (*e.g.*, the content changes ownership), or it can lead to a manual version of multiple resolution. For example, the American Chemical Society uses the existing DOI system of single-point resolution to resolve a DOI assigned to a scientific article to a web page. This offers a choice of delivery formats and other services, which then requires user intervention. But clearly multiple-resolution would offer the possibility of fully automating such routings and open up enormous possibilities for creative solutions and services. Nesting of DOIs (DOIs resolving to other DOIs), plus multiple resolution, allow an intelligent network for managing resolution of identifiers to appropriate data types.

### **Resolution of DOIs**

The DOI conforms to the URN requirements and has the potential to deal with the major obstacles noted above as currently inhibiting implementations of persistent identifiers. The DOI provides not only a persistent name (identifier) but also a resolution system, using the technology of the Handle System. The Handle System may be considered URN compliant. It offers additional possibilities and features, including several that are not yet being used for DOIs [Handle].

Handles offer multiple-resolution capability, but when the DOI concept was launched, it was felt advisable to limit the introduction by making a simplification of the DOI Handle implementation to a single-point resolution, specifically one DOI resolving to one URL. The reason for this

was that the potential audience was almost wholly unfamiliar with the issues described here, and in order to begin DOI assignment and deployment, the single routing system (DOI to publisher web site) was considered a logical starting point.

An expansion to use the full Handle capability was soon recognised as a desirable development and was made a long-term goal of the DOI's development [DOI paper1]; it is a necessary development if the full potential is to be realised. We envisage that the IDF will in the future support the development of some specific applications which will use multiple-resolution capabilities (DOI registrants would then have the option of endorsing such applications by providing relevant data).

A browser plug-in for native support of Handles is available, but has to be installed by the user. Since this cannot be a requirement of use when used on the web at present, the DOI to URN resolution has to use existing protocols. The Handle developers, and the DOI Foundation, are working with browser manufacturers to encourage native support of the Handle protocol. Meanwhile, a proxy server is used which communicates with the world at large in http, and with the special Handle System tools using the Handle protocol.

Once browser support is available (directly or via plug in), a resolver must be directed to an appropriate resolution system: the registration of resolution discovery systems, and of specific namespaces within them, is another area of current Internet development which the DOI initiative is monitoring closely. It is possible that commercially important URNs or namespaces may require governance structures similar to domain naming authority [ICANN].

Since *currently* DOIs (i) are treated as a single-point resolution system and (ii) use a http proxy, much of the current DOI functionality could be carried out by simple redirection tools such as PURLs (persistent URLs). This is true of the current implementation but not of the fuller long term aim:

- PURLs are just single redirect servers (another level of indirection) whereas Handle is a direct protocol.
- Handle has multiple-resolution capability and, hence, can build "intelligent" clients; that is, it is possible to define client-side mechanisms which can return one or more resolution results (data types/values) from a list of many, by qualified input of the DOI. Prototypes of such mechanisms have been built using DOIs, and similar functionality (using a repository mechanism) exists in other Handle implementations.
- Handle is scalable.

- DOI is a URN (follows the requirements of URN) and, hence, is useful in other contexts than the web as an information identifier, a persistent name.
- Handle is a (globally) managed system whereas PURL is a local implementation and needs local technical support.

### Applications

The DOI has a practical aim. We want applications using DOIs to be widely implemented. Two successful examples of identifiers with established practical uses are ISBN and the UPC/EAN bar code. Both have global reach and significant business development built on them, because both had early applications in which they were able to deliver cost savings that outweighed the costs of implementation. Equally, neither was built in the space of a few months [ISBN, Smithsonian].

Whilst there are many interesting functions and services which can be envisaged from further development of the DOI, the DOI Foundation's emphasis is to stimulate the building of applications that provide some compelling reasons for early adoption. As noted earlier, there are no "killer applications" of URN persistent identifiers yet, and there are some reasons for this. Just because someone *can* do something does not mean they *will* do it—a lesson brought home in recent years from many failed internet micropayments systems [Crocker]. There must be a motivation or "killer application".

**A Specific Application: Reference Linking:** The Foundation intends to provide a framework for others to build applications for DOIs, rather than build them centrally. Nevertheless, in the early days the IDF must take a pioneering role in encouraging and supporting the building of such applications. The leading application currently under development for the DOI is persistent relevant linkage between pieces of information, which is being developed by a group of Foundation members. Linkage has been a goal of information architects for many years, from Vannevar Bush through Ted Nelson to the hyperlinked WWW. We are now in a position to realise that vision; persistent identifiers such as the DOI are a key component.

Since the DOI provides the *persistent names* by which resources and entities may be referenced, then it is an obvious step to use the DOI as a *persistent link* mechanism between two such entities. Such a scheme would have many advantages: it would be immediately implementable, automatable, extensible to any resource type, extensible to other applications, build on open public identifiers, and allow future extensions in a seamless fashion to future DOI capabilities such as local resolution and content type resolution. A pressing need for such linkage, which is

the first crucial aspect of this problem, is linkage from citations in scholarly journals to the paper cited, in an electronic environment.

A subgroup of IDF members is developing an implementation of this in collaboration with IDF's technology partner [CNRI], with expressions of intent from some major publishers including Elsevier Science, Academic Press, Springer Verlag, Wiley, and several US professional society publishers.

Alternative mechanisms for reference-linking already exist (bilateral agreements, or identifiers assigned by services such as PubRef): reference linking using DOIs has the potential to become a killer application if publishers and users see the additional functionality offered by an open public identifier to be worthwhile. A draft specification for comment on the topic of DOIs used for reference linking [Reflink] was recently published and is currently being revised and simplified.

**General Applications: Management of Content:** Beyond a specific demonstration like reference linking, we need to put into place a framework for open application building using DOIs. DOIs are intended to facilitate content management. Management of information implies the facilitation of transactions. Transactions occur as a result of the interplay of three things: objects (the subject of the transaction); people (the parties to the transaction); and agreements (the terms of the transaction). Interoperability requires a common framework and vocabulary for transactions. If the DOI is to become more than a single-point routing system, it requires the development of a common infrastructure for persistent naming and metadata, built upon a common foundation [DOI paper 1], to enable services as described in a paper by John Erickson [Erickson].

In developing this framework for successful open applications, the IDF has worked closely with the INDECS project (Interoperability of Data in E-Commerce Systems) [INDECS]. The basis of the INDECS activity is to provide a common metadata framework to support E-Commerce in intellectual property. The framework calls for unique identification (of intellectual property, of parties, and of agreements) as a core competence. The DOI has the potential to be the unifying identifier for intellectual property in such a scheme, and will be endorsed by INDECS.

Both INDECS and the DOI assume that respect for copyright, as codified in current legislation, deserves support; and they offer the means of automating and adding efficiency to the process. Copyright-related transactions may be paid transactions, or transactions with some other measure of value: all transactions may be seen as "E-Commerce" since those transactions of intellectual property which are licensed as free (for example through libraries) represent a reduced, limited case within a particular agreement.

**Scope: What the DOI Identifies:** An important distinction is “what the DOI identifies” versus “what the DOI resolves to”. In a single point resolution system (one DOI resolving to one URL), it may seem tempting to consider that these are synonymous: surely if I click on a DOI and obtain an entity, then that is what the DOI identifies? This is not so: it is easiest to see this in a multiple-resolution model, where the distinction becomes obvious: the DOI identifies the input to the resolver and the resolver has many different possible outputs or resolution destinations. What the DOI identifies remains unchanged (persistently identified) whereas what it resolves to may be changed. The DOI identifies the resource or entity named and used as input to the resolver; the DOI does not identify the output.

Having made that distinction, we can move on to discuss “what the DOI identifies” in more detail. Content typology—the analysis of intellectual property entities in terms of all the attributes which are necessary for unique specification—has been carried out in theoretical terms, in particular by the library community in the context of cataloguing requirements, and, practically, in the world of music publishing and trading, from which the DOI has benefited by including music organisations in its membership. The majority of the initial DOI community (traditional publishing organisations) came to this concept relatively recently.

At the time the DOI was being conceived (1995-97), there was recognition that the growth of digital publishing of text was creating the need to recognise a change from single to multiple manifestations of a common underlying abstract work (a commonplace in the music publishing world [CIS]). This is a distinction seen in logical analyses such as IFLA’s “Functional Requirements of Bibliographic Records” [IFLA], but also as an operational distinction. For example, a journal publisher has a production line which is editing articles for publication, and the publisher will use a number to identify the entity being processed.

In a print-only world, that process resulted in a single published entity (a printed manifestation). In a print-plus-digital world, the production line will bifurcate at the end and produce two (or more) entities (*e.g.*, a printed article and an HTML file). Those two entities are related (they are “the same article”). The identifier that is on the production line item and carries forward into both the published entities (telling that they have something in common) is an identifier of the work.

This recognition, which drew on existing practical analysis and implementation in the music world, led to proposals for identifiers of underlying abstract works such as PII (Publisher Item Identifier) by the STI group, and the possible extension of the proposed music ISWC (International Standard Work Code) to text items within ISO TC 46 SC9,



and is now an essential tool in, for example, discussions of persistent reference-linking [Reflink]. Subsequently, these initiatives have converged with DOI considerations of identifiers and their associated metadata.

The analysis of content typology led to a DOI scope definition consistent with the aim of the DOI: intellectual property. This led to the decision made at an early stage [DOIpaper1] that a DOI identifies any *Creation*, defined as “a thing or event in which intellectual property rights may exist”. (In this decision, the DOI became a “Digital Identifier of Objects” rather than an “Identifier of Digital Objects”.) By embracing physical and abstract creations (such as books and musical compositions) as well as digital ones, the DOI at a stroke broadened its potential usefulness enormously, so that it may facilitate e-commerce of any kind for all intellectual property through common mechanisms.

This has great attractions for those like publishers who find themselves now trading electronically and simultaneously in physical, digital and abstract property, but it also carries a cost. Of necessity the DOI must ensure that such flexibility does not bring with it a crippling ambiguity, and this places a heavier burden on the metadata which is bound to accompany a DOI to make clear precisely what it is identifying. Whilst there is general agreement among different approaches on the need to distinguish various forms of creations, a common vocabulary is not agreed upon: the DOI initiative shares its vocabulary with the INDECS analysis [INDECS], in which the primary types of Creations are:

- *Manifestation*: a tangible creation made of atoms or bits: any type of physical or digital creation. Identifiers can be attached to manifestations physically (like a barcode) or embedded digitally (like a watermark);
- *Performance*: a spatio-temporal creation, which may or may not be recorded in a manifestation. It is particularly important to distinguish between the musical work and its performance;
- *Work*: an abstract creation whose existence is only revealed through a performance or manifestation.

(Note that Manifestations and Performances are both “expressions” of Works in this terminology. This terminology is slightly different from, but not inconsistent with, the IFLA reference model.)

There are some complex intellectual property legislation implications of these practical analyses, and with rendering content in particular manifestations from a common source. Patrice Lyons has pointed out that, while a unique, persistent identifier such as Handle or DOI may be used to identify a wide variety of resources, from a copyright perspective the use of such identification schemes to identify a logical entity, a data



structure, in which a Work or other information is embodied, apart from the information itself, is of special interest, particularly in connection with emerging new forms of expression: a report of American Bar Association Committee 702 has suggested that consideration be given to specifically define “digital works” (“literary works...such as knowledge structures...that are capable of behaviour when processed”). [Lyons] The mapping of intellectual property definitions to the terminology used in identification schemes is a current activity of the International DOI Foundation (work shared with INDECS).

### **Metadata Associated with a DOI**

**The Need for Metadata:** The original concepts of Uniform Resource Names assumed that any URN persistent identifier would resolve to a standard metadata record called a URC (Uniform Resource Characteristics); it has subsequently become clear that this is too simplistic, and URC discussions have been dropped by the IETF. As with content management issues, metadata is a much bigger subject than just the UR\* implications of resource description: see the INDECS description of “INDECS Connections” for a view of some of the many initiatives that need to be considered. Why do we need to associate metadata with a DOI? Consider the wider implications of having such a persistent identifier. If the DOI is seen as “just” a single-point resolution routing system (from a DOI occurrence to a single URL at a publisher-maintained website which is the sole source of the entity), then there is little need for interoperable metadata, as any related information about the object so identified can be held within that “proprietary” web site.

The need for interoperability arises in the wider vision of DOIs as persistent names (identifiers) for content entities, and which can be used independent of the source of that content (as noted earlier, restricting all uses of material to routing via the publishers web site is neither possible nor productive). Metadata is essential to commerce as it must be possible to process transactions via unique identifiers without recourse to physical inspection of the items being traded—which may be either inconvenient or impossible, as for abstract and digital manifestation entities.

Multiple-resolution schemes for URNs necessitate the existence of some basic metadata associated with the resolution process, in order to provide parameters for an intelligent selection process. Once the DOI is seen as a potential unifying identifier which can be used to access seamlessly a variety of entities from unrelated sources, and to access different instances of the same resource at different sources (using multiple-resolution, local resolution, and building services dependent on the persistent identifier), then the need for a common vocabulary and data model for DOI metadata is clear.

The wider vision described here is, of course, not something which can be devised by one single organisation, and the DOI initiative certainly does not aim to design such a universal E-commerce scheme! More modestly, we aim to put into place an extensible framework which will enable others to use the basic DOI concept as a building block for such efforts. Currently we envisage a minimum set of metadata being declared along with each DOI allocated, as is the normal practice with other successful identifiers like ISBN.

This is not currently the case; DOIs are registered with only a few elements of administrative data. This minimum set would normally be sufficient for unambiguous identification of what the entity is (that is, to “look up” the DOI by analogy with a telephone number directory: registrants would have an incentive to register metadata since the more metadata is public, the better the chances of a successful look up). Such a set of metadata would not be sufficient alone for more sophisticated search and discovery systems provided by added value services.

Adding metadata to enable look-up is relatively simple. But the metadata required for “look-up” of a DOI is only a subset of the (potentially infinite) metadata that may be associated with an entity for the purposes of enabling other applications. It is not the intention of the DOI system to collect or collate all such application metadata; but we wish to encourage widespread use of DOIs, and it is therefore sensible to encourage interoperability and efficiency by re-use.

In the future, the look-up metadata may be re-used or extended to build applications by the registrant or by other parties, and so should be consistent with such wider potential uses by others. Designing the metadata scheme for this wider potential extensibility is more tricky; how can we be sure that the metadata elements we select as the simple starting point “look up set” to be associated with DOI entities will suffice for all content types and applications?

***Principles of Metadata:*** Just as the principles of persistent identification from the URN work are useful in designing the DOI as identifier, it would be helpful to have a similar logical framework which we could apply to guide us in designing the associated metadata scheme to guarantee such consistency. Fortunately, the development of the DOI has coincided with the publication of just such a set of principles, from the INDECS (Interoperability of Data in E-Commerce Systems) project.

We are able to use this logical framework in the same way as we use the URN principles: as a guide which enables a structured approach. The alternative is an ad-hoc or “informed guesswork” approach driven by the need of specific applications with the hope that other, yet undefined,

applications will find the same set of metadata terms equally useful. The principles that INDECS has identified are:

- Unique identification: every entity needs to be uniquely identified within an identified namespace;
- Functional granularity: an entity needs to be identified only when there is a reason to distinguish it;
- Designated authority: the author of metadata must be securely identified;
- Application independence: metadata structures should be independent of any technology platform;
- Appropriate access: everyone will need access to the metadata on which they depend (appropriate privacy is a necessary counterpoint).

Some of these logical principles of metadata offered by INDECS resonate with earlier requirements articulated within the DOI development process: in particular the two principles which INDECS considers to be the most fundamental. The INDECS principle of *unique identification* was an implicit principle of the assignment of DOIs. The INDECS principle of *functional granularity* is a restatement of the guideline made within the DOI community that “a DOI may be assigned to whatever a registrant chooses” (that is, at any level of analysis depending upon the need of the registrant). The INDECS analysis is also shedding light on related issues such as the need for persistence of metadata, and the use of XML and RDF schemas.

The IDF has affiliated with the INDECS initiative, and as the relevance of the INDECS activity became clear the IDF has moved to a position of being a financial supporter and collaborator of INDECS. We have chosen not to “re-invent the wheel”: if an existing initiative or standard offers significant synergy with DOI aims, we have adopted that pragmatically (as in the adoption of Handle resolution technology, and URN principles for the identifier itself). INDECS offers the prospect of a common framework which can accommodate a wide variety of current metadata activities, ranging from the Dublin Core resource description community to a wide variety of content sector activities (libraries, music, books, etc.), and therefore offering the possibility of community and “political” acceptability. Just as the adoption of URN principles does not commit DOI irrevocably to any generic future URN standards developments, so INDECS affiliation does not necessitate DOI registrants to be INDECS participants; but in each case there should be good reasons for any divergence from the fundamental approach.

***The DOI Metadata Kernel; DOI Genres:*** The full INDECS analysis of metadata has offered a solution to the problem of what metadata elements to specify for a DOI to both enable unambiguous “look-up” (which

is, of course, logically simply one application) and be re-usable as part of a wider set of metadata for other applications. DOIs may apply to any Creation, and therefore to a wide variety of entities (abstract works, physical and digital manifestations, etc.) and content types (video clips, text, etc.), yet should be interoperable and extensible in a multimedia environment.

To solve this, we have found it useful to start from the basis of considering potential applications in general terms, and then define what these should have in common (a minimum common metadata requirement).

#### *DOI Minimal Kernel Elements of Metadata*

<i>Element (top level)</i>	<i>Definition</i>	<i>Status</i>	<i>Number</i>	<i>Allowed Values</i>	<i>Possible genre qualifications</i>
<b>DOI</b>	A DOI	Mandatory	1 only	DOI	This is the key for this record
<b>DOI Genre</b>	A class of resources with common characteristics defined by the IDF community	Mandatory	1 minimum	From DOI Genre tables	
<b>Identifier</b>	A unique identifier (e.g. from a legacy scheme) applied to the resources	Qualified	1 minimum	Any string but must include an identifier type, e.g. ISBN	Mandatory <i>unless</i> the DOI Genre extension rules specifically exclude it
<b>Title</b>	A name by which the resource is known	Qualified	1 minimum	Any alphanumeric string	Mandatory <i>unless</i> the DOI Genre extension rules specifically exclude it
<b>Type</b>	The primary structural type of the resource	Mandatory	1 only	From: <i>Work</i> <i>Physical Manifestation</i> <i>Digital Manifestation</i> <i>Performance</i>	
<b>Origination</b>	The process by which the resource is made	Mandatory	1 minimum	From: <i>Original</i> <i>Derivation</i> <i>Excerpt</i> <i>Compilation</i> <i>Replica</i>	
<b>Primary Agent</b>	The name or identifier of the primary agent(s)	Mandatory	All	Identifier or Name from an agreed Genre namespace	The specification of Primary Agent (normally but not necessarily the creator) is determined in the extension rules for each DOI Genre.
<b>Agent Role</b>	The role(s) played by the primary agent(s)	Mandatory	1 minimum	Role from an agreed Genre namespace	

\*In addition to the minimal kernel metadata elements (and any extensions for a specific DOI Genre), administrative data such as registrant, date of registration, record version number, etc. is compulsory.

The interoperable common metadata set is defined as a minimum required “kernel” of metadata elements which applies to any DOI. Specified “extensions” to this kernel may then additionally apply to some, but not

all, DOIs characterised as similar in some way (a “DOI genre”). A working definition of a genre is “A set of creations for which particular additions or qualifications to the DOI metadata kernel are mandated, either for general purposes or limited to specific functional requirements as designated by the Genre.”

The proposed DOI minimal metadata kernel elements. These eight minimal elements may be qualified or added to in any degree: the extensions for a DOI genre may be additions (for example, a specific genre might add a ninth element such as “audience”) or they may be qualifications (for example, in a possible genre for reference linking between Works, the top level minimal kernel element of *identifier* is “qualified” into a multiple of more detailed enumeration elements: *work identifier*, *related manifestation (rm) article identifier*, *rm journal identifier*, *rm publication date*, *rm page number*, and so on.). So a DOI Genre may be defined, for example, for journal articles in general, or restricted (as now) to the purposes of linking journal articles containing references to one another.

Both the DOI kernel metadata and any extensions (qualifications or additions) fit within the framework outlined by the INDECS metadata model, which enables any other conforming metadata scheme to be used in the design. It is not necessary to adopt the full INDECS model for this purpose; the DOI metadata elements follow the metadata principles such as unique identification, and can be mapped to most other metadata models using the INDECS framework. Attributes can be specified at varying levels of depth, depending upon need, ranging from a simple label (text string) through a defined class, a relation, or part of an event structure. The underlying data model is capable of accommodating any entity at the highest level of specification, but a specific application or Genre may not need such detailed specification. Some of the DOI metadata elements can be “transformed” from the highest event-based level of the model into a “flattened” form (e.g., “origination” in the minimal kernel).

### **DOI Genres and Applications**

The Genre approach is now being developed further in practical applications (including the IDF’s own look-up requirements), where there is a need to derive specification standards and metadata registration procedures for the specific elements.

It seems likely that Genres will be defined functionally; that is, in terms of an application. In order to take advantage of the application so defined, a registrant will commit to registering (declaring) some metadata elements; this common set will ensure interoperability of DOIs from multiple sources in that application. As the element set conforms to the overall data model scheme of the kernel, other applications can become interoperable (i.e., applications can be written to take advantage of multiple Genres).

One such Genre already in development is a DOI Genre for using DOIs in reference linking, as noted above. This application-focused approach may seem at first sight a paradox, in that metadata should be defined in an application-neutral way, yet the Genre is named for a specific application.

The specific metadata elements are indeed application-neutral; in an extensible metadata system, structure and values should be application independent. For example, two distinct elements shouldn't be combined irretrievably for the convenience of one application when they require separation for another; broader limitations on attributes or values shouldn't be imposed by local constraints. However, the potential metadata associated with an entity is infinite; a Genre specifies which elements are *mandatory* (must be declared) in order to carry out a specific function. To fulfil a particular function (like discovery, linking or rights management) certain values will be required, or useful, or not relevant. For example, for journal article searching all authors may be required, whereas for reference linking only a minimal set (*e.g.*, first named) may be required.

The wider the net is cast in terms of covering multiple applications, the larger the Genre set will become, with a practical balance between being comprehensive and being too burdensome in terms of requirements. We might view the ultimate aim as to have a broader "all function" Genre kernel for each creation type, to which end the "functional" kernels are realistic stepping stones. The schematically how genres might build by such practical applications being developed, rather than trying to achieve a full set by design *ab initio*. "Well-formed" metadata (following basic principles) for a creation type X may include the elements A B C D E F G H I J K L M For an "X Discovery" Genre (for the application facilitating discovery or "look-up") the elements may be A B D G H L For an "X Rights Management" Genre the elements may be A B C E F I J K M An "X (All Functions)" Genre would be A B C D E F G H I J K L M The latter might be added to as time goes by and other specific Genres are added. In each case, the elements A, B, etc. may be additions or qualifications to the minimal kernel.

The INDECS web site contains much more detail on this approach [INDECS]. Key points of importance for DOI include:

- A fully comprehensive approach integrating *descriptive* metadata with *rights* and *transactions* (essential for DOI's role in transactions of entities having rights);
- A thorough analysis and guiding principles for content typology, providing solutions to content management issues;
- The possibility of transformation processes to express the same metadata at different levels of complexity for different requirements;



- Plans for practical implementation frameworks such as RDF schema expressions and standardisation;
- A tool not a tyranny: INDECS does not prescribe a new data model to replace what may already be in use, but allows existing systems to be used and extended within a common interoperable framework.

### **Business Model**

The availability of a DOI as a public identifier with managed validation processes, infrastructure, common standards, and managed associated metadata provides added value but also incurs some necessary costs. The costs are broadly in three categories:

- *Registration*: prefix issuance, validation, maintenance, information dissemination, and guidance on content management issues; recording of appropriate metadata and /or guidance in enabling registrants to declare their own metadata in interoperable form. This function is “content-facing”, and likely to be carried out by one or more organisations familiar with specific content sectors.
- *Infrastructure*: resolution services, development, scaling, and guidance on technical issues. This function is “technology-facing” and appropriate for organisations with skills in similar functions elsewhere.
- *Governance*: overall management and further development of the DOI system; this is the remit of the International DOI Foundation.

It is intended that the DOI system operate on a cost-recovery basis, with the costs born by the parties assigning DOI numbers; that is, DOI prefix holders. At the outset, a very simple model was introduced whereby a prefix assignment is purchased for a one-off fee (currently \$1,000); the possibility of annual fees of some form has been noted but not yet introduced. Ideally, the IDF would like to see the appointment of third parties to carry out the processes of *registration* and, potentially, all or part of the *infrastructure* activity, with cost recovery by these organisations on the basis of efficiencies of scale, competition, and market forces.

The *governance* aspects would be retained by the IDF (who would appoint the third parties on agreed terms) on the basis of either cost recovery from the DOI System operators by royalty (or similar) payments, or separate funding by interested parties. Registration agencies would devise flexible pricing structures for prefixes dependent on volume, etc. At present, the business model is far from this ideal, and all three areas are being financed essentially by what should be only the final *governance* structure portion: the IDF is financed largely by membership fees with a relatively small proportion of cost recovery from operational activities.

This was expected and planned for during the start up period, but we do not wish to continue on this basis indefinitely; it is questionable whether this would be either feasible or sensible. Migration to a cost-recovery basis requires the appointment of one or more registration agencies.

Although there are several lines of discussion open on this issue, the IDF has not so far been able to sign any agreements for the appointment of registration agencies and is carrying out this function itself. One of the issues causing delay is the need for any registration agency to commit development costs to an operation which is, by definition, a new development, and where the numbers and rate of take up are difficult to forecast. Registration agencies also need to consider the business aspects of supporting specific applications by defining Genres and ensuring that the appropriate metadata is declared, which is a new way of thinking about the development of interoperable applications: the concept is laudable, but can appropriate incentives and rewards be offered for this effort?

There are some existing services which demonstrate that such a business model (costs born by registrants) is achievable, including the ISBN model (cost recovery by building additional value-added services) and the UPC/EAN bar code model (cost recovery by sale of prefixes, annual fees, and added value services).

The latter, in particular, shows the feasibility of a very large scale and ubiquitous system built on simple principles; the UPC/EAN system is used by over 800,000 organisations [Barcode]. Both of these models are being explored by the IDF. However, neither are exactly comparable with the DOI's twin requirements for identification and resolution processes. Adding to the complexity is the largely undeveloped but potentially significant role of registration activities in the World Wide Web environment. As ICANN (Internet Corporation for Assigned Names and Numbers) opens the previous monopoly structure of domain-naming registration, additional schemes need to be put into place for identifier namespaces, resolver system registration, metadata schema registries, etc. Will these also prove to be amenable to commercial competition and exploitation, and if so, what are the implications for the DOI?

### **The Future**

**Development Path:** The development path of the DOI can be described as three parallel tracks:

- Current implementations of the existing DOI mechanism. There are already several hundred thousand DOIs assigned, *e.g.*, Academic Press has recently announced the assignment of DOIs to every article carried in its IDEAL electronic journal environment. As part of this strand of development we recognise the need to further

improve the availability of information about the DOI, and to develop a DOI manual and other supporting documentation.

- Further functionality. This includes building further features compatible with the existing implementation, such as metadata registration and devising mechanisms for local resolution, defined services, etc. The majority of these tasks will be to provide a basis for open application development.
- Standards tracking. An essential component of DOI development is working with existing and emerging standards activities. This includes ensuring that DOI conforms to appropriate standards, such as registration of namespaces, but also that emerging standards activities are aware of the DOI's aims. Standards activities which we are following include official standards (ISO, NISO), Internet standards (IETF, W3C), and emerging standards in areas such as metadata (Dublin Core, INDECS).

Over the next few months, targets for the DOI Foundation include the following key issues. Where appropriate, we will produce practical prototypes and a document setting out the issues and solutions for each area [DOI Resources], as has already been the case for the topics of scope and metadata [DOIpaper2]:

- Metadata (revised summary)
- Services
- Local resolution
- Standards conformance and activities
- Registration agency requirements
- User guidelines (update and expansion of existing document)
- Implementations
- Future financial and operational basis (business model)
- Continued expansion of participation from all sectors of the information community.

**Issues and Challenges:** It is clear from the description above that there are several issues to be dealt with if the DOI is to succeed:

- Supporting the development process (financially and in terms of commitment by the community) whilst striving to produce demonstrable, short-term applications. Similar issues have faced initiatives such as the Dublin Core metadata activity (1995 to present) and URN definition and implementation (1991 to present). What is clear is that if the concepts of persistent identification and copyright management are accepted, then the DOI (or something

like it) is needed; and that if the DOI is not supported, the likely solution may be less acceptable to the content creators and users, as it may be driven by technology alone.

- Continuing explanation and education on the principles and possibilities of the DOI, thereby encouraging the development of applications, including the creative use of the new tools available through resolution, content typology and metadata design. Included under this heading is the development of guidance materials and the overall aim of allowing DOI registrants the maximum flexibility of use and minimum hindrance in registration overheads.
- Obtaining wider support. Currently the Foundation has the financial backing of over 30 organisations, many of them significant players, but it needs further support to succeed in a realistic timeframe. The recent addition of representation from the library community when OCLC joined the foundation is a welcome step in widening the base of support for the initiative.
- Not leaving the job half-done. To stop development of the DOI at the point when it provides single point resolution to a web site, and a possible tool for reference linking of scientific journal articles, would be to miss the potential of a wider application. Internet solutions are unlikely to succeed unless they are globally applicable and show convincing power over alternatives.
- Ensuring that the DOI fits into the emerging web infrastructure: registration of URN namespaces, resolution mechanisms, browser support of resolution services, etc., and emerging standards for metadata structure and expression such as RDF.
- Creating business models, and migration strategies from the current situation to those models, which facilitate cost recovery with acceptable levels of costs to users.

The vision of what the DOI might enable is an exciting one; undoubtedly it requires effort and goodwill to ensure its success, but the effort involved in gaining consensus and making practical progress pales into insignificance beside the costs to the intellectual property community of not trying.

## **Information Property and Digital Libraries**

### ***The Research Library Model***

Collections are now being placed online by research libraries, individually and in consortia, by digitising paper-based collections and placing them in the public domain on Web pages. Often these collections are unique archives for which libraries own the intellectual property rights, or materials out of copyright. In many cases these collections are

the creation of academic disciplines for which access to information is very difficult, either because the discipline is small and geographically dispersed, or because research materials are rare. Thus there are projects to publish archival materials in many such academic fields, such as:

- the study of papyri
- or medieval history
- or the history of science
- or the preprint server at Los Alamos, on which can be found the important papers in high energy physics.

These projects share the same the economic model as the research library, in which use is subsidised; thus each also faces the dilemma that research library budgets are growing far more slowly than are the price and volume of information. A new business model is needed to support libraries — print or digital — for startup funding for digital projects is far easier to find than continuing operational budgets.

Fortunately, libraries have long experience in inter-institutional cooperation. For example, the US national cataloguing exchanges (the Research Libraries Group and OCLC) are now creating digital collections, paid for by membership dues or subscriptions. And new consortia are being created. The Digital Library Federation (DLF) has decided to build collectively an American history archive, called 'The Making of America'. An alternative financial model for cooperation is illustrated by the Mellon Foundation creation of the Journal Storage Project (JSTOR), a non-profit but self-funding business to digitise and provide access to back runs of rarely used but essential scholarly journals. JSTOR is funded by subscription, and if it can attain fiscal self-sufficiency, will bring the last century of journal publications to every networked desktop.

These are important beginnings, but what is still lacking is national and global coordination, both in the form of common technical standards and collection policies and priorities. Thus the next great task of libraries is to organise these collections, to evaluate and catalogue them on a global basis. Needless to say, the precondition for this effort is the creation of a viable business model, since most print library collections do not have adequate support, either by subscriptions to subsidise use, or fees for 'value-added' services. There is also a great deal of discussion about reinventing University Presses, that is, creating non-profit digital publishing companies (such as Stanford's High Wire Press) to compete with the commercial publishers that are driving up journal collection costs.

### ***The Web as a Gift-exchange Society***

If print libraries serve as the model for the digital libraries being built by librarians, with their expertise in quality control through bibliographic

control and collection building, the World Wide Web is being built directly by authors. According to Internet Archive statistics, there are 7 million writers on the public portion of the World Wide Web, each creating and giving away intellectual property in the largest gift exchange community ever created.

### **We Know the Virtues of the Web**

The Web is equivalent in size to a library of about one million volumes, doubling every year, largely free. Copying digital documents and distributing them globally is nearly instantaneous. Storing them is inexpensive and compact, compared to library storage. Managing digital documents is easier because they can be searched in seconds, and their content reshaped to the reader's needs. And, of course, they may be multimedia, combining text, sounds and pictures. Soon, with the development of XML, the Web will become more personal, recognising the identity of its users and providing custom services to them.

### **And We Know the Problems of the Web as a Digital Library**

First, there is no quality control on the Web; thus a search on a given topic will provide a list combining reliable and unreliable information in equal measure. Search engines, modelled on library catalogues, do not solve this problem; indeed, identical searches using different search engines will provide different outcomes. To solve this problem there is substantial research on 'collaborative filtering', the computer equivalent of asking your friends for recommendations.

Thus when I bought Yo Yo Ma's recording of Bach's *Cello Sonatas* on Amazon.Com, the online bookstore, I was informed that people buying this CD frequently also bought Arvo Part's *Litany*. While this is a kind of solution to the problem of quality, it is different from established procedures. It resembles evaluating scholarly articles on the basis of their use, as measured by the frequency of citations in other publications, rather than pre-publication peer review and editorial screening. Perhaps this is what 'the marketplace of ideas' ultimately means.

Secondly, information on the Web is notoriously fugitive, as content changes frequently and servers disappear often. If the Web is to be used as a library, it is essential to preserve and archive it in a reliable way. (For a review of the strategy of the Internet Archive, and an agenda for action on digital preservation.) As the discussion of quality control suggests, in thinking about the Web as a library we must recognise that it is not just the format of the library that is changing, but the nature and use of information is changing as well. In abolishing the distinction between writing and publishing, new cultures of information are being created; often Web publications are collectively written, at times by groups of



participants who do not know one another personally. The most original single consequence of this is that the concept of authorship is changing, for collaboration in writing these works is possible between people all over the world. There is a particularly striking passage that describes leading-edge scientific research, which has profound implications for the way we think the relationship between information, communities of practice, and the production of knowledge. Describing authorship in biotechnology, Dan Cohen says:

*... the complexity and rapid pace of research means that advances are necessarily made by large teams connected by their interlocking areas of expertise rather than by employment at the same institution or location. Thus ... a recently published paper on the DNA sequence of yeast chromosomes listed 133 authors from 85 institutions. In the biotech industry, collaborative networks are becoming the places where important intellectual activity occurs; belonging to them is essential to success in an industry that exists on the frontier of developing knowledge ... These virtual teams point to the future shape of knowledge work in general, which some predict will be accomplished by widely dispersed groups and individuals woven into communities of practice by networks, group-ware and a complex common task.*

While biotechnology may be an unusual field in the degree of collaborative research across both corporate and national boundaries, it raises profound questions about our concept of authorship and the role of groups in the creation of knowledge. What will the shape of libraries become if knowledge becomes a kind of public dialogue among authors?

### **The E-commerce Library**

In other respects as well, Amazon.Com may be the best illustration of the digital library of the future. Today, most publishers do not *sell* digital books or journals to libraries, but use contracts *to license the use* of their 'information content'. These contracts are very new, and the terms are changing rapidly as publishers and consumers learn to manage the new format.

In the US, some believe that contracts will replace the copyright doctrines of first sale doctrine (which allows inter-library loan) and fair use (which allows copying for educational purposes). Publishers' contracts generally forbid the use of digital documents in manner permitted by copyright, although in practice it is difficult to prevent illegal copying, without, that is, the use of technologies which make it extremely difficult to access and use information (such as encryption).

Here again there is a problem with funding the preservation of digital documents. In the past, libraries have preserved and stored printed information as an archive of the history of knowledge. As information loses its commercial value, it is unlikely that commercial rights-holders will subsidise its continued existence.

But the primary unsolved problem is the social inequality implied in this model. The use of contracts formalises the transition from an information policy based on public libraries to a system of 'universal access', modelled after American telecommunication policy. With universal access, public access to the network is subsidised, but the consumer must pay for the information used.

Previously, the fair use exemption to copyright has subsidized information access for educational purposes. Today, 'universal access' is being defined as access to the Internet itself, rather than to educational information on the Internet. Thus information flows in the digital library of the future will likely be governed on a per capita or fee for service basis; on the other hand, the argument goes, these revenues will fund the development of vast high quality online libraries.

### **And Yet**

Up to this point, this argument has been based upon an assumption that the future will be like the present, which is probably the least likely possible future. Current intellectual property doctrine is based upon current economic perceptions; however, we do not yet know very much about the dynamics of the Internet economy, about information markets, or about the shape of corporations in the future, including publishers. Let us consider each in turn, very briefly.

The contract model for distributing commodities is based upon experience in industrial markets, which will probably not resemble the Internet economy once it develops further. Manuel Castells' book *The Rise of the Network Society* describes the nature and dynamics of the information economy in comprehensive terms that may help focus the issues, just as Daniel Bell's *The Coming of Post-Industrial Society* did in earlier decades. At its heart is this description of the historic change in the relationship between information and the economy:

The contemporary change of paradigm may be seen as a shift from a technology based primarily on cheap inputs of energy to one predominantly based on cheap inputs of information derived from advances in microelectronic and telecommunications technology. Information is its raw material: these are technologies to act on information, not just information to act on technology, as was the case in previous technological revolutions. If information is a raw material, value shifts from information itself to its

use, and from producer to consumer. As a consequence, some argue that access to information will shift market power from the producer to the consumer, as customers have more information about products and providers, thus the key to success will be in creating customer loyalty by providing more services.

Secondly, we do not know how consumers will use online information: is the future of publishing in the sale of the journal subscription, of journal articles, or a database of information in a given field? What will be the relation between print and digital information? MIT Press published William Mitchell's book *City of Bits* online, for free, and ended up selling twice the predicted number of print copies. The nature of supply and demand is still unknown.

Thirdly, corporations themselves are being transformed by networked information, outsourcing manufacturing functions and redefining business management as knowledge management. Publishers, for example, now describe themselves as investment bankers in intellectual property. There is a possibility that publishers and libraries could develop new kinds of partnerships, as, for example, libraries printing customised texts for publishers.

These are only possibilities, but it is worth noting that publishers are no more in control of the future than are libraries. Therefore, it is more important to envision the digital library we would like to build than the one we may be forced to accept.

### **The Digital Library as a Community**

A library is more than books and bricks. If it is successful, it supports a sense of community among its users, as an archive of its collective knowledge and as a resource for its future. Yet digital libraries thus far have tended to be digitised versions of card catalogues, books and journals, and as such do not evoke a sense of community. But digital libraries might well be designed to do so.

First of all, it seems that digital places can evoke emotional and intellectual engagement. In *Life on the Screen* Sherry Turkle has described the way that software and network communications are transforming psychology. As a sociologist and psychoanalyst she concludes that 'virtual life' is emotionally and intellectually part of 'real life', but simulations of virtual life with their anonymous role-playing are capable of supporting emotional experimentation and growth.

And secondly, it seems that digital places can support a sense of community. The term 'virtual community' describes the feelings of social solidarity made possible by interactive network software. The strong case for virtual community is made by journalists Howard Rheingold, describing

'The Well', a San Francisco Bay Area based chat group (IRC), and Julian Dibble, describing Lambda Moo, an experimental Xerox PARC MOO designed as a virtual rooming house. Social scientists Barry Wellman and Milena Gulia argue that social networks on the Web are not very different from social networks experienced anywhere else. Deep feelings of community are rare in modern life, they argue, and virtual communities are more like the relationships most people have with casual acquaintances than with intimate friends.

Virnoche and Marx agree that 'virtual communities' and 'real life' are not opposites, and that the strongest sense of virtual community comes when network communications are reinforced with face to face meetings. There are three kinds of virtual communities, they argue, each connecting physical and virtual senses of place, called community networks, virtual extensions and virtual communities.

### **Community Networks**

Community networks are based upon geographical proximity, but participation in a sense of place and community is extended by network communication, such as electronic mail, Internet relay chat, bulletin boards and Web pages. Examples of community networks include municipal governments using the network to involve citizens in political deliberation, or corporations using electronic mail and teleconferencing. Clearly any traditional sense of community is dependent upon frequent personal interaction, but community networks reinforce a sense of membership by making information or communication more accessible. Many libraries use Web pages, email and lists in precisely this way to extend a sense of access into their communities; thus digital libraries should be designed as an extension of a physical library, not their replacements.

### **Virtual Extensions**

Virtual extensions sustain a sense of community among a group of people separated by geographical distance but who have intermittent personal contact. Virtual extensions typically create a sense of place by collaborative work on a shared problem, requiring occasional face-to-face meetings, but sustained by a sense of shared culture and profession. Many classrooms use Web pages and electronic mail as virtual extensions, to encourage discussion outside classroom hours. Professions and academic disciplines use Web pages, email and lists in this manner, to reinforce professional values and trade information on skilled practice; librarians are exemplars of this.

### **Virtual Communities**

Virtual communities in this strict sense, then, are groups of strangers separated by geographical distance, but sharing a common interest,

expressed by participation in computer-mediated communication. Virtual communities in this specific sense may have relatively little stability over time, and relatively more listeners than speakers. And yet they are of great interest because they may be robust even if the members have never met and are separated by great distances. They are, in essence, a sustained conversation on a (usually) narrow topic of mutual interest or shared problems rather than physical proximity.

Thus many of the most successful sites provide scarce information and advice about very specialised topics, such as political movements or the treatment of rare diseases, or perhaps simply a place to talk about a controversial topic without risk. For example, SeniorNet is an organisation using digital network services to link together elderly people, many of whom live alone, into a vibrant online community. Studies of the use of SeniorNet services suggest that it is not online information (*e.g.* databases) that sustains a sense of community, but rather the interactive services (such as electronic mail and online chat groups) that SeniorNet provides.

How, then, do network communications create and sustain a sense of community, when they do? According to Wellman and Gulia, social relations in cyberspace have the following characteristics: topics tend to be specialised, not general; social structure is based upon a sense of reciprocity, and social status is gained by giving good answers; anonymity fosters communication among a wider diversity of people than most face to face communities; and they tend to be quick to respond to questions. On the other hand, unlike traditional communities, they are not intimate, nor long-term, do not require frequent contact, and do not have depth over many social contexts or concerns.

A true virtual community, in this sense, might enable the creation of a virtual library, in which users around the globe interested in some specialised field could work together. These, of course, already exist, particularly among specialised scholars, or people who share a very rare disease; but librarians, who might bring order and quality to the information involved, rarely mediate them.

Each of these kinds of digital community is consistent with the idea of the library, and each uses commonplace technologies, such as Web pages, electronic mail and lists. But of course far more sophisticated technologies are emerging that might be used. Anonymous communication in online environments might be used to provide or support mentoring, or role-playing that enables users to participate in educational experiences not otherwise accessible. Anonymous role-playing might complement learning in educational places, by encouraging participation in learning by those traditionally silenced by the hidden currents of power and authority in the classroom.

Thus far, Internet communication has been far more successful as a tool for games than for learning; indeed, investment in computer games is far greater than investment in computer learning. But the spontaneous development of learning technologies on the Web, in parallel with far more sophisticated MOO technologies (which go beyond text and numbers to multimedia representations of information), have led to increased investment in these technologies for business training and development. Pensare, for example, is a Silicon Valley start-up that uses MOO technologies to teach business skills, including video mentoring by experts, simulations of business situations, and links to online discussion groups; when they become successful they hope to support experiments with libraries and schools using these technologies.

The premises of this paper are straightforward. First, it is too soon to make intellectual property policy because we lack even elementary knowledge of the dynamics of an information economy, a term which is still a slogan more than a social fact. Hence we live in a world with parallel systems of intellectual property, with parallel kinds of digital libraries. This in itself is not alarming, but it is rather complex, since each of the three libraries is, in one way or another, problematic. Second, information technology is not changing libraries alone; so too are publishers in change, and authors.

The transformation of authorship, and thereby information and knowledge, and the ownership thereof, is the most fundamental of all. Third, having stated that it is more important to envision the digital library we would like to build than the one we may be forced to accept, I accepted my own invitation and began to imagine how virtual community technology might be joined to digital library technology. Australia is the best place in the world to build this kind of a digital library, for obvious reasons.

## **Digital Libraries: A National Library Perspective**

### ***National Library of Australia***

A digital library, like any library, is a service which is based on principles of selection, acquisition, access, management and preservation, related to a specific client community. This paper examines some of the key challenges which these processes encounter when dealing with digital collections, with particular attention to the issues which are raised for national libraries. Examples are the challenge of selecting significant national digital publications, the challenge of how to acquire efficiently those digital publications which are selected, the challenge of integrating access to digital and traditional information resources, the challenge of ensuring reliable delivery of digital publications given their changeable



physical location, and the enormous challenge of how to preserve digital publications.

The paper refers to the National Library of Australia's Digital Services Project, which has developed system requirements in the light of these issues and challenges. The term "digital library" began to be heard in the early 1990s, as universities and other institutions began to build discipline-based collections of information resources in digital form, and to provide access to these collections through local and wide area networks.

Today, hundreds of services which might qualify for the description "digital library" have been developed, and it is possible to survey what has been achieved by such services and what challenges have been identified.

### **Definition of "Digital Library"**

The Digital Library Federation has proposed the following definition:

*Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities.*

This definition emphasises that a digital library, like any library, is more than a mere aggregation of information resources: it is a service which is based on principles of selection, acquisition, access, management and preservation, related to a specific client community. All of these principles are relevant when we consider the meaning of a digital library and the practical issues involved in service delivery.

A digital library collection may include two types of information resource. One type comprises the "digital original" resources, which are sometimes referred to as resources which are "born digitally". The other type comprises "digital surrogates", which are created from traditional information resources through format conversion. While both types of resource have the same access and management requirements, they raise different issues of selection and acquisition, and their preservation imperatives are also different. Some definitions of "digital library" are broad enough to embrace services which integrate access to digital and traditional (e.g. print) materials. In the interests of clarity of terminology, the use of the term "digital library" in this paper will be confined to services which are based on digital materials. On the other hand, it would be appropriate to use the term "digital services" to encompass the use of electronic services designed to improve access to traditional library collections as well as digital collections.

**Integration of Access and Delivery**

We should bear in mind that the library community has a responsibility to collect and deliver information resources regardless of format, and indeed to strive to put in place mechanisms which will promote integrated access to all formats. This will become more important as an increasing proportion of information resources are available only in digital form. As Lynch and Garcia-Molina have observed: The objective is to develop information systems providing access to a coherent collection of material, more and more of which will be in digital format as time goes on, and to fully exploit the opportunities that are offered by the materials that are in digital formats.... There is, in reality, a very strong continuity between traditional library roles and missions and the objectives of digital library systems. Integrated access to diverse materials is usually accomplished through services which allow the relevant metadata for all materials to be searched simultaneously.

Integration can also be realised in the delivery process which follows discovery and access of the information resources. For example, it is now possible to deliver, in digital form, information resources from traditional library collections to remote users, using document delivery services such as Ariel. In this case the key difference to the user between a digital service based on a digital collection, and one based on a traditional collection, is the length of the delay that occurs before the collection item is delivered.

**The Development of Digital Libraries**

The emergence of the World Wide Web in 1993, and its rapid development thereafter, has allowed developers to provide universal access to digital libraries. Previously, access to digital collections was supported by proprietary networks or by local or campus-wide networks. These services also depended on a variety of end user software and hardware. By contrast, access through the Web is based on open standards (such as the HyperText Transmission Protocol) and on widely available browser software which can be used from anyone's desktop computer. Because of the Web, place is not a barrier to access to digital libraries.

Amongst the earliest examples of pre-Web digital collections, we should recognise the construction in the 1970s of databases of full-text documents, supported by software such as STAIRS. These collections were single format, and access was limited by proprietary communication protocols and rudimentary interfaces. A relatively ambitious pre-Web attempt to build a digital library was Project Mercury (1989-1992), a joint development of Carnegie Mellon University and OCLC. It developed software for uniform access to textual and image databases, including page images of journal articles. Access was to be confined to the university campus, with X Window interfaces.

The TULIP Project (1993-1995), which was planned prior to the emergence of the Web, facilitated access to materials science journals. Each of eight US universities developed their own solutions for access to the electronic versions of these journals. The project revealed a host of practical problems with content delivery, content storage, lack of integration with other services, printing, and authentication.

Any examination of digital libraries must recognise the achievements of the National Digital Library Programme (NDLP) of the Library of Congress and its predecessor, the American Memory Project (1990-1994). This Project aims to make five million collection items accessible online by the year 2000, through digitisation of materials in the collections of the Library of Congress and other cooperating institutions. Key features of the NDLP are the attention given to selection, the quality of presentation of the digital surrogates, the use of quality cataloguing data, the standards and facilities which have been developed to support discovery and access, and the depth of the technical documentation made available on the project site. The NDLP was one of the first examples of a publicly accessible, Web-based digital library service.

Some of the key digital library possibilities and challenges are being explored by the Digital Libraries Initiative (1994-1998), which comprises six research projects funded by the National Science Foundation, in partnership with the US defence and space communities. These projects will build testbeds of digital collections in a range of disciplines, evaluate their use, test various indexing and searching techniques, explore interoperability standards, and examine authentication and security issues. The research results are being shared within the group and are being progressively reported to the public.

### **The Technical Framework**

While the development of digital libraries is motivated by the imperative of improved information delivery for users, most of these projects also have a research aspect, as we have observed with the Digital Libraries Initiative projects. Alongside these pilot projects, research is also proceeding to develop conceptual models of the digital library, and to clarify the technical framework.

In one of the key early research papers, Kahn and Wilensky described a framework for digital libraries, and for “distributed digital object services” in general. This paper established some basic definitions and terminology which are used to describe digital library services. The framework takes account of the fact that while content in a digital library takes a wide variety of forms, it is possible to define a “digital object” which applies to all such forms. The digital object is conceptually contained within an envelope which informs the access software how to unpack it, what standards

it conforms to, and so on. Furthermore, a digital object consists of digital material plus a unique identifier for this material, sometimes called a “handle”, and access to the objects is supported by a distributed system which supports the discovery of these “handles”.

A paper by Arms, Blanche and Overly provides an excellent summary of the issues relating to the information architecture for digital libraries, including the Kahn/Wilensky framework. The framework has been extended by others, including Payette and Lagoze, who have described an architecture for storing and disseminating digital library content. This architecture provides a more complex model, for example by recognising the ability to have a range of different interfaces to the same digital object, and the ability to associate rights management schemes with the dissemination of the object. The architecture is being applied to specific projects such as “The Making of America II”, a Digital Library Federation project which is assembling digital information resources concerned with transport in the United States between 1869 and 1900.

### **Digital Libraries and National Libraries**

This paper is particularly concerned with the issues raised for national libraries in the delivery of digital information resources. What is the role of a national library in the digital age? And how should a national library facilitate the delivery of national digital services?

The role of national libraries involves:

- collecting and preserving significant national information resources;
- cooperating with other institutions to ensure the most comprehensive possible collection and preservation of these resources; and
- cooperating with other institutions to ensure that there is an effective national infrastructure for the registration, discovery, access and delivery of information resources.

In the context of these roles, the following are amongst the challenges for national libraries which arise from the rapidly expanding world of digital publications:

- the challenge of selecting significant national digital publications, given the large volume and variable quality of these publications;
- the challenge of how to acquire efficiently those digital publications which are selected;
- the challenge of integrating access to digitised and non-digitised collections of original heritage materials;
- the challenge of constructing metadata infrastructures to support access to nationally distributed digital collections;

- the challenge of ensuring reliable delivery of digital publications in a distributed environment, given their changeable physical location;
- the challenge of reaching agreement with publishers on reasonable access conditions for digital publications received on deposit;
- the challenge of managing and controlling these access conditions; and
- the enormous challenge of how to preserve digital publications, which is of particular importance for those publications “born digitally”.

These challenges will be examined in the context of the key library processes of selection, acquisition, bibliographic control, access control and preservation. It is recognised that a number of these challenges (particularly those of acquisition and access control) are not ones for national libraries exclusively.

The National Library of Australia has previously identified these challenges in a number of discussion papers. It is continuing to discuss these issues with other libraries, particularly the Australian state libraries and other national libraries.

### **The Selection Process**

National libraries have a responsibility to collect and preserve the nation’s information resources, in all formats. In doing this, they must take account of the expanding world of digital publications, particularly given the rapid development of the World Wide Web since 1993. The fact that the Web has allowed large volumes of digital material to be published creates a particular problem for national libraries. The high cost of publishing in traditional formats has meant that publishers have effectively undertaken a filtering role, selecting only quality works, or those with high market appeal, from the many manuscripts submitted by authors. However, the Web has allowed many authors to find an alternative, lower cost, publishing channel. For national libraries, this presents a significant challenge in identifying and selecting the publications to be preserved, and in identifying these in the absence of traditional selection tools and legal deposit provisions.

A statutory deposit system is often used to support the building of a comprehensive or highly intensive collection of resources relating to the country or jurisdiction concerned. In Australia, at the national level, the Copyright Act does not mandate legal deposit for digital publications, but the National Library is pursuing the development of amendments to the legal deposit section of the Copyright Act which will make electronic publications, both physical format and online, subject to legal deposit. Of

course, even when these amendments to the Act are made, the Library will not wish to retain all Australian electronic publications, just as it does not retain more than a small sample of printed ephemera.

It is also necessary to distinguish between selection for current access (including online reference services and licensed information services) and preservation for future access. In the first case (and unlike the traditional library) the library does not need to collect the object, but only provide the means for discovery and access. In the latter case, the library must either collect the object and take responsibility for its ongoing access through technological change, or make sure that some other institution has taken responsibility for this.

In Australia, through its PANDORA Project, the National Library has created, and is continuing to develop, an operational proof-of-concept archive of selected Australian Web publications. The Library has developed a set of guidelines for its selection of online Australian publications. These guidelines take account of issues such as: Australian content, Australian authorship, the “authoritative status” of the author, research value, whether the publication exists in hardcopy form, whether there has been any “quality control process” in the online publishing, public interest in the subject matter, and whether the publication is indexed by a recognised indexing service.

### ***The Non-selective Alternative***

One way of by-passing the selection problem is to collect and preserve everything published on the Web. In this context, national libraries have an interest in recent efforts to do just that. The Internet Archive is a well known project to archive the entire World Wide Web and some other components of the Internet, such as the Gopher hierarchy. The Archive was founded by Brewster Kahle in April 1996. In October 1998, the archive for the months of January and February 1997, containing two terabytes of data, was deposited with the Library of Congress.

In 1997 the Royal Library of Sweden initiated the Kulturarw Project, in order to archive the Swedish domain of the Web. To date, this project has made three comprehensive harvests of the Swedish web domain. The result is a file of about 200 gigabytes covering 31,000 Web sites. This attempt at a comprehensive collection of digital publications is consistent with the Royal Library’s practice of collecting printed ephemera through a legal deposit framework under which printers, rather than publishers, deposit their product with the Library.

Both the Internet Archive and the Kulturarw projects have stated that they will attempt to use data migration to maintain the readability of the documents. However, there must be doubts about the costs of storage



and migration involved in this non-selective process, given that it involves successive snapshots of a large and rapidly expanding volume of information. There must also be doubts about the practicality of supporting access to each snapshot through an appropriate index.

### **The Acquisition Process**

A digital library collection may be built through either or both of the following processes (in addition to creation of content by the library itself):

- digital documents may be created by digital conversion of existing printed or other analogue materials; or
- existing digital documents may be gathered from the Web or from physical digital sources such as CD-ROMs.

**Digital Conversion:** In many cases, the materials selected for the digital library will consist of non-contemporary heritage materials, or other resources which exist only in non-digital form. In such cases a digital conversion process, such as imaging or OCR scanning, or a combination of both, must be used if it is desired to deliver the resource through a digital service.

The digital conversion process is a costly one because it is laborious both in processing time and in project management overheads. It is also a process which requires careful planning to ensure that the full informational value of the original material is preserved. Chapman and Kenney argue strongly for a strategy of “full informational capture”, in which the conversion process is matched to the informational content of the original, in those cases where the digital conversion is undertaken primarily for preservation purposes.

The National Library of Australia has had direct experience of two major digital conversion projects in recent years. One of these projects has developed IMAGES1, which now contains more than 20,000 digital surrogates of items in the Library’s pictorial collection. Access is delivered through the Web, through the Library’s catalogue and in the future through the Kinetica Service. The digital collection is updated through a routine digital conversion process as new items are acquired for the pictorial collection.

The Australian Cooperative Digitisation Project, also known as the Ferguson Project, provides access to digital surrogates of printed materials published in the 1840s. This Project has proved to be significantly more complex than IMAGES1, for several reasons. Unlike IMAGES1, the Ferguson project had a preservation as well as an access objective. Microfilming was part of the preservation process, and this introduced complexities into the imaging process. There were stringent resolution requirements, because there needed to be sufficient resolution to enable

the digital surrogates to be read comfortably while also being downloaded in a reasonable time. Finally, the use of OCR scanning, used to improve search access to the Ferguson materials, added to the complexity of the Project.

***Collecting Digital Documents: the Markup Issue:*** Even where contemporary materials are involved, some digital library projects have created collections through a combination of imaging and OCR scanning from print originals, such as journal articles. On the surface this appears to be unnecessarily costly and inefficient, given that these contemporary resources, during their preparation, existed as machine readable text. Moreover, the process of OCR scanning re-introduces errors, violating authors' moral rights unless they are painstakingly corrected.

The builders of digital libraries would benefit greatly if they could obtain the authoritative version of any document in machine-readable form, complete with structural markup. By flagging the logical components of a document, structural markup allows descriptive metadata (author, title, abstract and so on) to be extracted efficiently from the document text. The processes of structural markup have been defined by the international standard framework known as SGML (Standard Generalised Markup Language). Use of this standard during the complete publishing process would support the more efficient integration of documents from various publishers into the digital library. It would also support more powerful and precise searching of the contents of the digital library, by allowing searches to be focussed on the descriptive metadata, the abstract, executive summary or other appropriate parts of the document.

There has been limited success in pursuit of this goal. One example is provided by the role of SGML markup in the Illinois Digital Library Project. This project has constructed a multiple-publisher testbed containing tens of thousands of full text journal articles in the disciplines of physics, engineering and computer science. The project has been able to utilise SGML markup provided by the publishers, although it has converted this into a standard SGML format for federated searching. The Illinois Project has been fortunate to obtain, from publishers, the authoritative texts with structural markup already in place.

Most publishers perceive it to be too costly to treat their publications in this manner, and the prospects for adoption of SGML in the publishing community appear to be limited to specialised areas (such as the markup of case reports by legal publishers) or situations where it might be mandated (such as university theses). Web documents already possess a weak form of structural markup in the HyperText Markup Language (HTML). The recently developed Extended Markup Language (XML) will increase the extent of structural markup for documents published on the Web. Some

observers have expressed the hope that XML will be taken up by the commercial publishing community, helping to deliver “all the power of SGML without all the complications”.

**Gathering Resources from the Web:** Another method of acquiring documents which are already in digital form is to harvest or “gather” them from the Web, with their limited HTML markup. There is no need to undertake this process unless you wish to ensure the preservation of the materials concerned, since you need only to link to the resource to support current access. Since national libraries have a strong preservation mandate, gathering from the Web has been the approach which the National Library of Australia has used in its PANDORA Project. The gathering process itself raises a number of challenges.

To preserve fidelity to the original resource, it is necessary that the archive copy should replicate the directory structure, file names and internal links of the original resource, in parallel form. On the other hand, links to external resources will need to be disabled and replaced by a suitable message, unless these external resources have also been archived or continue to exist unmodified with permanent names. For efficiency reasons, it is desirable that the gathering software should automate these processes, while also collecting administrative metadata associated with the resource. Needless to say, gathering software with all these features does not yet exist.

### **The Control and Access Process**

It was noted above that the world of digital publications has created challenges, for national libraries and others, such as:

- how to integrate access to digitised and non-digitised collections of original heritage materials;
- how to support navigation through levels of information resource in a collection, or within a collection item;
- how to construct metadata infrastructures to support access to nationally distributed digital collections; and
- how to ensure reliable delivery of digital publications given their changeable physical location.

**Metadata and Integrated Access:** Bibliographic data (or metadata) is the key to integrating access to digital and traditional collections. A searcher often needs to discover information resources in all formats relating to a given subject, or which have been created by a given author. Services such as “subject gateways”, which have been developed primarily to support access to quality information resources on the Web, have the potential to support browse and search access to distributed collections of both digital and traditional materials.

Integrated access can be a particularly desirable goal when only part of a collection has been digitised, which will usually be the case for any library with a large collection of original materials. For example, a national or state library with a large pictorial collection may offer a service which allows a searcher to discover a digitised image of a picture or photograph which meets a particular information need, if the library has digitised this picture. But what if the picture that meets this need is one of the majority in the collection that have not been digitised?

The answer to this question is to offer a digital service which supports access to all of the library's pictorial collection. The elements of this service might be (a) the original collection items, (b) the digitised images, (c) the metadata about the entire collection, and (d) a "digitisation on demand" service which supports the progressive digitisation of the collection in response to user requests for access to collection items.

One potential barrier to integrated access is the divergence of metadata standards between the world of traditional publications (based mainly on the AACR2 and MARC standards) and the world of digital publications (which may be based on Dublin Core or other non-MARC standards). The Dublin Core metadata standard has been developed during the past few years, with two main purposes. One has been to support "simple resource discovery" for digital collections. The second has been to provide a kind of "lingua franca", with the potential to integrate access to the digital services of libraries with those of institutions such as museums and archives, and with access to the wider universe of Web based resources.

The development of this standard continues to be beset by debate within the community of implementors over the degree of structure and rigour which the standard requires. This discussion intensified at the most recent Dublin Core Workshop in Washington in November 1998, where the key debate focussed on the question of a more rigorous data model which might guide the development of a Dublin Core Version 2. Representatives of the commercial Web publishing community argued that the development of such a model would encourage the widescale implementation of the standard in the publishing and rights owner communities. However, others argued that development of a new version at this stage would undermine confidence in the standard, and would not be necessary given the basic purposes of the standard.

As well as being a "lingua franca" across the sectors, the Dublin Core standard may be useful in supporting search access across various collection levels. For example, the experience of the library and information industry has exhibited a divergence of standards between those used to describe and support access to the whole item, on the one hand, and those used to describe and support access to part of the item, on the other. This

traditional dichotomy between the cataloguing community and the abstracting and indexing community has the potential to create access barriers. The Dublin Core standard may assist in bridging these barriers, by providing a basic set of descriptive elements to which the cataloguing and indexing data elements can be mapped.

***Navigation Through Collection Levels:*** For both traditional and digital collections, users have a need to navigate up or down through the levels of a collection. This may apply, for example, to items within a manuscript collection, articles in a journal, photographs in a collection, or individual pages within a book. In the physical environment it is straightforward enough for the user to manage this browsing process. However, in the digital environment the linkages between the components of the collection (or collection item) must be made explicitly.

There is no clear consensus on a preferred or standard method of supporting navigation through collection levels, given the wide variety of published and original materials which the digital collection might need to support. While the use of the Dublin Core “Relation” element is one possibility, another is a generalisation of the system of component part identifiers which has so far produced the Serial Item Contribution Identifier (SICI) and Book Item Contribution Identifier (BICI). These identifiers, while uniquely naming a component part of a serial or book, are structured so as to carry information about the serial issue, serial title or book. A more generalised standard might be able to carry similar relationship information for any multi-level resource, including collections of original materials.

At the lowest level, the part-of-item level, structural document markup also has a role to play in supporting access to text-based resources. For various purposes, searchers may wish to confine their searches to the abstract, the methods section of a scientific article, the citations, and so on. Research by the Illinois Digital Library Project has drawn attention to the potential for this kind of markup to support the disaggregation of journal articles into separate components.

### ***Distributed and Centralised Metadata Infrastructures***

The Digital Library is likely to consist of a distributed set of digital objects. But is distributed metadata the best way to provide access to the objects? There is no simple answer to this question, and existing projects reveal a continuum from:

- services which have no central metadata component (such as those which rely on the Z39.50 protocol); through to
- services which use a distributed index architecture (such as the Whois++ index service used by the ROADS software); through to



- services which use a single central index to distributed metadata (whether this metadata is embedded in the resources or stored in multiple repositories); through to
- totally centralised metadata repositories such as the Australian National Bibliographic Database.

A digital service may attempt to support integrated access to diverse categories of information resource, or to resources from diverse sources. The more diverse these categories or sources, the more likely it is that a centralised model (based on a uniform metadata standard) will be required, because the less likely it is that there will be sufficient alignment of the entire set of protocols that are needed to support the fully distributed approach. This issue was discussed last year in the context of government information by the Search Engine Working Group, which was charged with developing a model for metadata based access to Australian government information in digital form. As the Working Group commented:

*The distributed approach would rely on significant standards and software development. It is essentially a parallel searching mechanism that is able take a user query in a single query syntax, translate it to multiple syntaxes of the underlying (agency) search engines in question, and translate the results (and the relevance rank values) back into a coherent result set. This demands that query and result syntaxes, and the ranking algorithms of each individual search engine, be made known to the whole-of-government search facility.*

In this case, the Working Group was dealing with a relatively uniform collection of information resources-Australian government documents-but still judged it more practical to rely on a single central index to the distributed metadata until standards and the software were available to support a more fully distributed approach.

### **Permanent Naming and Resource Registration**

It was noted above that the Kahn/Wilensky Framework assumes a highly reliable system of unique identifiers, called “handles”, to support basic universal access to digital information resources. The “handle” and its supporting infrastructure would ensure that a resource can still be accessed even if it changes its location. The standard for Uniform Resource Names (URNs) as proposed by the Internet Engineering Task Force, together with a network of URN resolver services, are compatible with the requirements for a universal system of “handles”. In a 1996 paper, James Miller drew attention to the important role of national libraries, as institutions of long standing, in relation to “handles” or permanent names:



*There must be one or more entities that take institutional charge of the issuing and resolving of unique names, and a mechanism that will allow this entire set of names to be moved forward as the technology progresses..... The Digital Library community must identify institutions of long standing that will take the responsibility for resolving institutionalized names into current names for the foreseeable future.... I propose that a small consortium of well-known (perhaps national) libraries could work to provide the computing infrastructure.*

The National Library of Australia has indicated that it favours the use of Universal Resource Names (URNs) in any national registration system. Consequently, the Library is exploring the implementation of a national mechanism enabling publishers of digital publications to register them, and in the process to apply for Uniform Resource Names. Publishers would contribute metadata as part of the registration process, and the metadata repository would be maintained as an Australian URN resolver service.

### **Controlling the Use of the Collection**

As commercial publishers increasingly make use of the Web as a publishing medium, important issues are raised in the relationship between publishers and libraries, including national libraries. Publishers have been comfortable with the role of libraries in relation to traditional publications (including the legal deposit system), knowing that the physical format provided natural limitations on access to the publication. However, there would be a threat to the remuneration of publishers and copyright owners if unlimited access to commercial digital publications were provided by libraries.

For these reasons, libraries must deal with the challenge of reaching agreement with publishers on reasonable access conditions for digital publications, including those received on deposit. They must also deal with the challenge of managing and controlling these access conditions. Because of the difficulties posed by these challenges, many digital library projects have concentrated on the digitisation of original materials which are not subject to copyright or which have little commercial value. The access conditions could theoretically involve a wide range of options such as:

- the digital item is accessible only within the library building or campus (this is very limiting for a public, state or national library with a mandate to serve a widely dispersed community);
- the digital item can be accessed by only one reader at a time;
- a licence fee is paid which permits a given number of readers to access the digital item at the same time;

- a royalty fee is paid each time a work is printed or copied, or possibly even each time it is viewed; or
- one of the above limitations applies initially, but is relaxed over time once the publisher has received adequate remuneration, or once the resource has lost its commercial value.

There has been insufficient dialogue between publishers and libraries for agreement to have been reached on the above options. For their part, libraries in Australia will not wish to see any agreement which weakens the “fair dealing” principles, especially given the recent report of the Copyright Law Review Committee on the Simplification of the Copyright Act. The Committee recommended that the Copyright Act be amended to consolidate the fair dealing provisions into a single, technology neutral provision which would, amongst other things, uphold the place of fair dealing in the digital environment.

If a satisfactory agreement were negotiated, there would remain the issue of managing and controlling the agreed access conditions. Currently, some major projects are underway to better define this management process, and to develop clearer models for commercial traffic in digital information resources. The recently commenced INDECS (Interoperability of Data in E-Commerce Systems) Project will attempt “to create a genre-neutral framework among rights-holders for electronic [Intellectual Property Rights] trading so that companies [such as] record companies, film companies, book and music publishers can trade their creations in a coherent single marketplace”. INDECS is funded by the European Commission, and the trade associations of almost all the major rights sectors are participating.

The control process demands the availability of software which can allow or deny access to a digital object depending on the rights conditions associated with the object, and possibly also depending on the category of user. The software should also notify potential users of conditions of use applying to an object, and support the online payment of copyright, reproduction or delivery fees. There is also a need to log usage of each object and report this to a designated copyright collection agency where applicable.

The process of controlling the use of the digital collection includes the requirement to recognise and authorise users, either as individuals or as members of a category. The issues involved in user authentication and authorisation have spawned some major projects. An example is the CNI Programme on Authentication, Authorization and Access Management, which issued a key discussion paper in April 1998. This paper is the focus of continuing discussion amongst information providers and institutions, who wish to see an efficient process through which end users can gain access to registered information resources.

In the United Kingdom the ATHENS Project, which is based on a central database of authorisation information, is providing what some observers have judged to be a satisfactory interim solution. The Web has become a powerful information tool despite its chaos, partly because its open, standards-based system of hypertext links has given it a genuine universality. Many of the existing digital library services, and those under development, are based on free and unfettered access to the collections. As these services are joined by digital libraries which impose user charges or other access conditions, the universality provided by the Web is weakened. To quote from Clifford Lynch:

*As long as all resources are free, the move from one sphere of control to another is not so important to the user. But as transfer from one system, which may be free, to another, which charges for use, becomes commonplace, the notifications of these transitions may weaken the sense of a coherent information space. Indeed, the user may want a less coherent presentation to make cost implications more visible.*

For institutionally based users, this problem can be addressed in part through the use of licence arrangements for access to the commercial services, so that the user could effectively search these services and free Web resources through a common subject gateway, with no metered charging applied to either. However, this option is not available to the independent scholar or the casual user, and its implementation for institutional users depends on solutions to the challenges of authentication and authorisation.

### **The Preservation Process**

This paper has surveyed many of the challenges which are involved in building and managing a digital library. These challenges are all the subject of continuing research or standards development. But none of them is as serious or as potentially intractable as the problem of digital preservation.

It takes an effort to recall that the personal computer is barely 20 years old. Computer technology is changing so rapidly that the design, the interfaces, the technical standards and the file structures of the computers of 2020 are very likely to be quite different from those used today. For national libraries and other research libraries, which have a tradition of building collections to meet the needs of scholars many decades or even centuries into the future, this presents a very formidable challenge. The ability to access and read digital information in the future will depend on strategies such as migration (in which the data is migrated, if technically feasible, to new operating systems and data structures) or emulation (in which modern computers emulate the operating systems and data structures of previous eras).

A National Library of Australia position paper on electronic publications observed:

*There are unresolved technical issues to be confronted. These include the necessity to reformat material involving conversion from one format or medium to another.... Details of how a continuous programme of updating, through migration or refreshment, as a digital preservation strategy might work remain to be developed. For multimedia publications it may not be possible to keep the "look and feel", and interactive or dynamic aspects of these publications may be lost.*

The many aspects of this challenge have been documented on the PADI (Preserving Access to Digital Information) web site which is maintained by the National Library of Australia, and the interested reader is urged to explore that site thoroughly. The issues were also explored in depth by a key report commissioned by the Commission on Preservation and Access and the Research Libraries Group.

Another report from the Commission on Preservation and Access has discussed the importance of structural markup, using SGML standards, to the long term accessibility of digital materials:

*When viewed from the perspectives of the preservation community and the digital librarian, SGML appears to be the best choice for archival document storage. SGML is standardized, portable, flexible, modular, and supported by the market. [Its] vendor neutrality, extensibility ... and ability to manage large information repositories make it an attractive choice for both archival and retrieval purposes.*

Some less optimistic observers have questioned whether, given our short experience with digital information formats compared to that of paper, the quest for digital preservation has any realistic chance of success. Michael Gorman presses this point:

*I would suggest that we should work out collective schemes to make copies of such documents on acid-free paper, catalogue them, and add the resulting records to local, national, and international databases. I insist on saying that the only practical manner in which we can preserve our present for posterity is to create print on paper archives and to create an enduring bibliographic structure to sustain those archives. All suggestions of massive electronic archives are confronted with insuperable economic, technological, and practical problems.*

Peter Graham has also expressed serious doubts about the practicality of digital preservation:

*The investment necessary to migrate files of data will involve skilled labour, complex record-keeping, physical piece management, checking for successful outcomes, space and equipment. A comparable library [project for] data migration cost and complexity at approximately this order of magnitude would be the orderly photocopying of books in the collection every five years.*

These remarks rightly warn us of the depth of the challenge that this issue presents. However, it would be premature to assume now that the problem is incapable of a solution. Many international research efforts (including the CEDARS Project in the UK, the work of Jeff Rothenberg on emulation, and the work of the Digital Library Federation) are actively pursuing the digital preservation question from a wide range of perspectives. There is a great imperative to find a solution, or a combination of solutions.

#### **The Nla's Digital Services Project**

Since it began to deliver information through the Web, the National Library of Australia has developed digital library services through projects such as IMAGES1, the Ferguson Project and PANDORA. The Library now needs to find better systems tools to enable it to meet the twin challenges of managing its present and future digital collections, and of supporting shared access to digital collections. To this end, it has commenced a project which it is calling the Digital Services Project.

The Library expects that the system resulting from the Digital Services Project will enable it to collect, organise and preserve its digital materials, and to support access to them which is integrated with access to its traditional collections. These services will apply to items that are “born digital” and those which are reformatted from non-digital originals. The system would enable the Library to manage, in a robust, high performance systems environment, collections such as:

- its collection of significant Australian electronic publications (in a re-vamped PANDORA archive);
- its IMAGES1 collection of pictorial images;
- its collection of digitised oral history recordings; and
- its collection of digitised journal articles indexed by the Library (through the Australian Public Affairs Information Service and the Australian Medical Index).

The Library also expects that the system will enhance the “national digital infrastructure” by enabling the Library to:

- implement a national registration service (using a permanent naming system such as Uniform Resource Names) for Australian digital publications; and
- support shared access to other nationally significant digital collections, in cooperation with state libraries and other Australian cultural institutions.

Theoretically, Kinetica could be enhanced to support the second of these goals, and this remains a possibility. However, Kinetica is limited in terms of the types of metadata that it can support. Consequently, the Library may decide to support the cooperative access services outside Kinetica. In any case, the Library has stipulated a number of technical standards, to ensure that the resulting systems can interoperate with other national and National Library systems such as Kinetica and the Library's web catalogue, and also to ensure that the Library is able to load, store and search a wide range of structured digital documents, representing formats including text, sound and image.

The Library has allocated capital funding to initiate this project. In December 1998 it distributed an Information Paper setting out its detailed requirements for the Project, with the aim of encouraging comment from libraries and the IT industry. The Library is planning to release a Request for Tender in the second quarter of 1999, after taking account of the comments received in response to the Information Paper.

This paper has discussed key challenges faced by the developers and providers of digital library services, with emphasis on the challenges for national libraries. The challenges span the entire range of library functions: selection, acquisition, access, management and preservation. In many of these areas, research efforts are attempting to pilot possible solutions, develop better conceptual models, or formulate improved standards. However, the solutions to these challenges cannot be left only to the researchers. They will require a response by all of us who are attempting to build new or improved digital services.

This paper has identified some themes which might influence these responses. One theme has been the importance of standards to the processes involved in digital services. More effort is still required in the development and implementation of standards. For example:

- improved and more precise search access, including integrated access to resources in all formats, will depend on the adoption and further development of metadata standards such as Dublin Core;
- it is desirable to encourage the use of common standards for the storage of digital materials, and for the recording of preservation and other management information;



- standards are clearly needed to support navigation through the collection levels of materials in the digital collection; and
- widespread adoption of long term persistent names such as Uniform Resource Names is needed to support access to materials which change their location.

A standards issue which has been raised a number of times in this paper is the importance of structural markup of digital publications.

For example, structural markup can:

- support the more efficient capture of digital publications into the digital library, and the automatic extraction of metadata from documents;
- support more precise searching of digital library content, including searching of specified components of a document; and
- support the digital preservation process through the non-proprietary nature of the standards involved.

Another of the themes of this paper is that many of the responses to the challenges of digital services appear to require a more concerted dialogue with publishers, and with the rights owner community. For example:

- legal deposit libraries, in consultation with publishers, should work more urgently to secure legislation which mandates legal deposit for digital publications;
- the library community should establish better processes to attempt to reach agreement with publishers on reasonable access conditions for digital publications received on deposit;
- standards bodies, libraries and systems developers should work with publishers to improve their mutual understanding of the barriers to more widespread use of structural markup in the publishing process; and
- national libraries, in consultation with publishers, should begin to implement working registration and permanent naming services for digital publications.

The development of digital libraries has opened up an exciting new world of information delivery for the researchers and citizens of tomorrow. It is our responsibility to improve these services by addressing these challenges in concert with our colleagues around the world.

### **The Impacts of the Internet**

The paper reports a study which assessed the benefits to and impacts of the Internet on Victorian business libraries and whether any of the

benefits and impacts carry though to libraries' end-users and host organisations. Results from a mail survey of 34 questions to 139 Victorian business libraries strongly upheld a primary hypothesis that host organisations did benefit from their libraries providing value-added and timely information through Internet connections. Business librarians have introduced many new electronic resources; respondents agreed that the most popular of these was the Internet, ranked above CD-ROM and online databases. It was also apparent that respondents did not fully understand the importance of value-added services, and did not do a cost—benefit analysis when marketing the benefits of new Internet services. Further, business librarians provided little input in formulating IT policies, which were controlled largely by the IT department.

In the title of this paper, the term '*impacts*' was extended to include both *impacts* and *benefits* of the Internet. This study examined the possible impacts and benefits that the Internet has brought already and will continue to do so for both the Victorian Business Library and the host organisation. Thirty-four questions in a mail-out survey to 139 Victorian business libraries were used to test a hypothesis and a series of assumptions.

### Research Area Overview

The research undertaken for this paper was to be used in analysing how 139 Victorian business libraries managed the introduction of the Internet within their organisations, and to gauge the lasting impacts and benefits to all business library users. While some case studies had been reported from a special library perspective by two North American authors, little else had been documented either here or overseas concerning the experiences of the Internet in Australian business libraries. The fact that Australia appeared to be well ahead in the development of the latest Internet technologies did not imply that the benefits had been passed on to Australian business libraries and their organisations.

With the nature of increased work loads and higher productivity levels expected by corporate Australian employers, informal comments made by librarians over a period of time indicated that there were many business libraries which had implemented Internet connections, but probably had not documented their problems and/or results. It appears that there had been little time to devote to either pure or applied research and to document it for the larger Australian business library sector. There were two reasons which may explain what was really happening in business libraries.

Respondents would be asked to what degree they had been able to participate in decisions about initiating an Internet connection for their library. Many of the technology strategies appeared to be driven by the so-called 'information technologists' in IT departments of large companies,

rather than by librarians. The emphasis was often placed upon the technological advantages that would result from the introduction of Internet to business organisations. This came at the expense of value-added information, which previously might not have been easily accessible.

Some library professionals believed that the methods used in their libraries to implement the Internet may be so specialised that a short discussion would not do the topic any justice. Allied to the specialised nature of many Australian business libraries, some libraries might have felt in breach of their organisation's commercial code of practice if they were to reveal even the summary details. Business libraries which might fall into this category included the banking and legal sectors. It was likely that either the library or the host organisation would have produced some form of internal documented evidence as either working papers or departmental policies and procedures. The intention was to verify whether this was a general trend.

### **Research Objectives**

The objective of the mail-out survey questionnaire was to present evidence to either support or refute the proposition that the host organisation did benefit either directly or indirectly from its library providing value-added and timely information through an Internet connection. Properly handled, Victorian business libraries could use the introduction of or expanded use of the Internet as a very powerful marketing tool to justify the existence of the library, offering new user services, maintenance of staffing and on-going funding.

### **Hypothesis and Assumptions**

#### **Hypothesis**

That there are positive impacts and benefits for Victorian business libraries and their host organisations in the use of the Internet.

#### **Assumptions**

- Specific user requests for information are now easier since the introduction of the Internet.
- The intermediary in the business library is still important.
- There are specific search methodologies required when using World Wide Web search engines.
- There are now changes in the manner of delivering information to clientele.
- It is the business library's role to establish and maintain IT and security policies for Internet-related functions.

- There are positive impacts of the Internet on the business library and host organisation.
- There are positive impacts of the Internet within the business library.
- The Internet has caused or will cause changes to library services in the business library.
- The business library only is responsible for Internet access issues.
- Internet training is provided to both the business library staff and users.
- Technical and reference services are aided by the Internet.
- Cost-benefit analysis and marketing of Internet services are crucial.
- The Internet has placed more emphasis on value-added services in the business library.
- Potential benefits of the Internet fall into specific categories.
- Business libraries benefit from full-text resources available on the Internet.
- The business library has been able to advise its host organisation on the advantages of accessing information from the Internet.

## **Findings**

### **Overview of the Business Library**

Sixty-two business libraries responded out of a total number of 139 survey recipients, giving a return rate of 44.6 per cent. Fifty-eight organisations out of 62 provided library service to staff and 38 of the same gave access to 100 per cent of staff. The number of staff employed in each organisation ranged from two through to 65 000.

### **Providing Information and Reference Services**

Examples of specific user requests for information since the introduction of the Internet were many and varied and were grouped into 14 specific categories. The concept of free 'intermediary' assistance was important in business libraries, with most not charging for their professional services (72 per cent) and network use by users (81 per cent). Only two said that they intended charging in the future.

Business libraries only provided dedicated reference staff in 20 per cent (nine out of 44) of cases for answering Internet-related searching queries. Eight of the nine supplied dedicated reference staff only on a part-time basis (average 21 per cent) to answer questions concerned with Internet searching. A majority (67 per cent) of reference staff spent more than five minutes in answering questions from Internet users. Typical

questions asked by Internet users fell into the categories of client education, government sources, Internet access or connection, reference sources, search techniques, search tools, software issues and subject reference.

Business librarians still delivered information in the face-to-face interview, telephone interview and through printed reports, brochures and publications to the same extent as previously (72 per cent), despite recent electronic methods being now made available. The number of library staff employed remained the same.

### ***Internet Connection and Responsibility for IT Policies***

Forty-seven business libraries had an Internet connection and 33 of them also claimed that they had an IT policy. Yet the findings indicated that responsibility for establishing IT policies and security policies for use of and access to the Internet and intranet within the organisation largely rested with the IT department (75 per cent). However, when revising such policies, within the corporate library, the business library and IT department combined had slightly more input (47 per cent) than the IT department alone (42 per cent).

### ***Impacts of the Internet on the Library and Organisation***

Business librarians agreed (82 per cent) that there were already marked impacts of the Internet on the business library and organisational environment. While 83 per cent of respondents believed that the Internet would empower users and deliver positive financial impacts for both the library and organisation in 86 per cent of cases, it would not necessarily change every facet of library work (54 per cent), nor would it transform the business library into the 'virtual library' (62 per cent). Respondents saw the Internet as requiring new skills and new policies (95 per cent). Downloadable software tools from the Internet were considered one of these new skills (91 per cent).

### ***Impacts of the Internet within the Business Library***

Business librarians had mixed views about the impacts of the Internet within the business library. Slightly more than half (53 per cent) said that the provision of Internet services in the business library would not result in reduced spending on collection development. Fifty-eight percent of respondents accepted that the introduction of the Internet had seen the need for staff to become more familiar with content than purely technical issues. Numerous interpretations were given about the meanings of 'content', 'subject knowledge' and 'technical knowledge'.

### ***Anticipated Changes to Library Services***

Business librarians anticipated changes to library services over the next two years. Sixty percent said that they would add new resources,

while only 17 per cent would withdraw services. Respondents concentrated most on acquiring CD-ROM databases (30 per cent) and then gaining access to the Internet (26 per cent). Deletion of specific library services were very small in number.

### **Internet Access to Users**

Business libraries did not always provide Internet access to users on terminals both inside (67 per cent) and outside (69 per cent) of the business library. Internet access was mostly paid for by the company (42 per cent), but in some instances by the user's department (28 per cent), the IT department (20 per cent), or the corporate library (10 per cent). The percentage of computer terminals with Internet access varied considerably between organisations. Seven respondents' answers fell into the 25 per cent to 50 per cent category, nine into the 60 per cent to 100 per cent group and 13 went into the 1 per cent to 10 per cent region. Internet access was available to most users, regardless of their position in the organisation.

### **Benefits and Impacts of Internet Training**

Internet training benefits were broken into two distinct groupings. Firstly, 65 per cent of librarians benefited from formal Internet training sessions being provided. However in 59 per cent of cases, the training provided was of the self-training type, that is of an informal nature. Sixty-one per cent could not benefit from refresher Internet courses. Secondly, 48 per cent of librarians gave Internet training to their clientele, followed by 40 per cent who did not provide any and the IT department doing so only in 12 per cent of cases. Those libraries providing Internet training did so mostly at an introductory level (67 per cent) and tended to use the one-to-one instruction method (52 per cent). However, 30 librarians (75 per cent) disagreed that one of the negative impacts of the use of the Internet in business libraries was the continuous need for training of library staff and that the ongoing costs should be absorbed within the traditional budget.

### **Library Functions Aided by the Internet**

Library functions that were aided by the use of the Internet brought some interesting results. Overwhelmingly respondents used the Internet for reference related work in the areas of ready reference questions from users (51 per cent) and email reference questions (28 per cent). However, the large majority (89 per cent) did not see the benefits of obtaining copy cataloguing records from the Internet.

### **Non-decisive Issues in Business Libraries**

Cost-benefit analysis, marketing of Internet services and value-added services were not decisive issues. Most respondents (87 per cent) said they



had not carried out a cost–benefit analysis of sourcing the information from the Internet. Only a few had done so on an informal basis and were also responsible for setting up the terms of reference for the cost–benefit. However, when librarians were asked about marketing the benefits of the Internet in their library and organisation, 63 per cent said they had managed to do so. A large majority (86 per cent) said that there was no greater emphasis placed on value-added services, since the introduction of the Internet to business libraries. However some were able to give examples of value-added services.

### ***Business Librarians' most Important Benefits of the Internet***

Business librarians ranked reference enquiries, followed by online databases and electronic mail, respectively, as the three most important benefits of the Internet in a business library environment from a list of 11 items. The three least-favoured benefits in order of rank were video conferencing, followed by electronic mailing lists and then serial publications.

### ***Full-text Resources on the Internet***

Obtaining subject-related full-text resources across the Internet was a popular option for a little over half of the respondents (52 per cent). Of those who did, the United States (41 per cent), followed by Australia (23 per cent) were the two most likely countries from where the full-text resources were acquired.

### ***Passing on Useful Information to the Organisation***

Business libraries were prepared to pass on useful advice to their organisations on the advantages of having access to timely and cost effective information available from the Internet. Respondents also provided a multitude of examples of the major benefits that the Internet had brought to their business library and organisation.

### ***Outcomes***

The outcomes for this paper were determined by three important factors. Firstly, whether the hypothesis and in turn the set of assumptions were upheld or dismissed in relation to the findings. Secondly, whether the main survey findings were upheld by a previous literature study. Finally, the literature might not have covered some or all of the topic areas raised in the survey findings.

### ***Support of Hypothesis***

Business librarians' responses to the survey indicated that there were positive impacts and benefits to Victorian corporate libraries and their host organisation of using the Internet. Therefore, the hypothesis advanced

for this study was upheld. Some respondents did not discern many differences between whether it was a particular impact or a series of impacts which had resulted from the introduction of the Internet to their business libraries. The same situation was observed for the *benefits* of the Internet. Further, many respondents did not distinguish differences between the *impacts* and *benefits*. In some cases, particularly in the open-ended questions, librarians gave overlapping answers, which implied that some impacts were interchangeable with benefits.

The number of business libraries surveyed and the overall response rate achieved suggested that this study was overdue and that respondents were open in expressing their views. The figures gathered on the number of organisations providing a library service to staff, those that already had an Internet connection and at the same time an IT policy had not been researched beforehand.

### **Support of Assumptions**

- Specific user requests for information are now easier since the introduction of the Internet: With the large number and varied examples provided by respondents' answers, this assumption was fully supported. Since Steele's article of 1996, in which she claimed that the librarian needed to carefully access if Internet technologies were beneficial in providing users with information which was of some value to them, the trend has changed noticeably. Users appeared to be pleased with the information that their business library was able to source from the Internet. They also returned to the business library with follow-up requests for more information or asked for specific information on other topics.
- The intermediary in the business library is still important: This assumption was verified as true and therefore strongly upheld. Nicholas and Fenton had said that even allowing for the stronger link between information providers and users, the intermediary would still be necessary, but less visible. The intermediary's role was considered as very visible by the level of positive responses given to the three questions asked in the survey.
- There are specific search methodologies required when using World Wide Web search engines: The responses received from five questions concerning issues about search methodologies used by World Wide Web search engines all revealed a common theme. It emerged that it was necessary to spend more than five minutes in answering a multitude of different questions from Internet users. This highlighted the fact that reference staff had to clearly demonstrate specific search methodologies to users, even when doing a simple search. This assumption was therefore supported.

A warning must be added that business libraries seemed to be under the false belief that all the Internet queries could be easily answered briefly by perhaps only one dedicated reference staff person. King correctly hinted at this trend when he said that software tools on the Internet did not make the information well organised and easily accessible. The situation would not be resolved in the short term.

- There are now changes in the manner of delivering information to clientele: The series of three questions which tested this assumption was dismissed by respondents. Librarians said that they were delivering information in the same manner and to the same extent as previously, prior to the introduction of sources being made available across the Internet.

Ladner suggested that those business libraries which were members of resource sharing electronic networks could gain considerable benefits when delivering information to their clientele. These benefits could include consultation, courier-document delivery, email/electronic bulletin boards or reference assistance. The findings suggested that Victorian business librarians appeared not to have taken to using these electronic networks, including the Internet, in large numbers as many had believed to be the case.

- It is the business library's role to establish and maintain IT and security policies for Internet-related functions: This assumption was analysed in a group of three questions. The survey findings concluded that the assumption was invalid, as it was mostly the IT department who was responsible for IT and security policies. Of interest was that librarians said their business library had an IT policy already in place. When they were questioned further, respondents gave a different answer about who was responsible for maintaining IT and security policies within the business library. The IT department and business library shared the responsibility equally.

Gilbert's concerns that business librarians were not able to set the information policy for both the business library and host organisation were still perfectly valid. Evidence produced by Shockley also was still correct for these findings. He queried how many librarians were asked by their organisation to develop Internet policies and procedures. It must also be noted that librarians should take the initial steps in making their ideas known to the organisation about such policies, rather than just waiting to be approached for any contribution. By implication an effective information policy could encompass Internet access, usage and security issues.

- There are positive impacts of the Internet on the business library and host organisation: The responses given to a group of seven

questions only partially supported the above assumption. In five of the questions, respondents upheld the assumption, while in the other two it was dismissed. Librarians disagreed about the Internet changing every facet of library work and transforming the business library into the virtual library without walls.

Missingham said that special librarians had made good use of new technology, particularly the Internet, to deliver services and manage information for their host organisations. Contrary to Roby's belief that the Internet was definitely not the friendly empowering environment for users, the results suggested that this was not the case here. Also, respondents broadly supported Roby's comments that as users came to realise the pitfalls of surfing for information, business librarians could reinforce their position as mediators and specialists in finding information. Victorian business librarians accepted that there were positive financial impacts in delivering information for both the library and host organisation.

There are positive impacts of the Internet within the business library: The answers given to this assumption indicate that it was supported. By dismissing the suggestion of less spending on collection development in the business library with the advent of Internet services, librarians indicated that it was more a positive impact than a negative one. Likewise, respondents realised that it was more important and therefore a positive impact for them and their libraries to become more familiar with Internet content than being a technical master of electronic-derived information.

King realised the positive impacts of having an information professional who was not only a technical master of the Internet, but also familiar with the Internet's content. He said that what was most needed was someone who understood how to look — an information detective. Even companies with intelligent search agents were finding that by adding librarians' searching expertise to their projects could enhance search results noticeably. Librarians could integrate traditional database searches using other Internet resources as well as print and non-network, online resources, such as modem-accessible databases. By combining a command language and rich bibliographic resources, the result would be a stronger search tool.

- The Internet has caused or will cause changes to library services in the business library: Business librarians partially supported this assumption. The findings demonstrated anticipated changes in regard to additional services, but not concerning a reduction of services. However, setting up CD-ROM networks was slightly more favoured than coordinating access to the Internet. Contrary to expectations, respondents were very optimistic of retaining nearly all existing library services. This was in spite of increased accountability and tighter budgetary controls demanded by the

corporate funding body. The five categories of services mentioned in the results appear not to have been considered collectively before, but only as individual items.

- The business library only is responsible for Internet access issues: In a series of questions, respondents were asked about Internet access issues relating to the *business library* and *host organisation*. The findings showed that largely the business library was not responsible for these types of issues. Responsibility appeared to be vested in other parts of the host organisation. This research did not attempt to find out where that may have been. Based on answers to other questions concerning responsibility for IT policies of the Internet, the IT department could also have dictated the requirements for Internet access. No such experiences were found in earlier studied literature which revealed an Australian business library view.
- Internet training is provided to both the business library staff and users: Business library staff and users only partially supported this assumption. The first of two sets of questions considered Internet training provided by the business library and host organisation to its librarians. Tillman and Ladner's figure of 35 per cent of respondents who underwent formal Internet training contrasted dramatically with 65 per cent of librarians in this survey. The same authors found that 25 per cent were responsible for their own Internet training. Victorian business librarians were much more accountable for their training— self training — with a response rate of 59 per cent. This question had considered both formal and informal types of training. Tillman and Ladner did not provide any findings on refresher Internet courses.

The second group of questions addressed Internet training given by business librarians to their users. No direct evidence emerged of previous findings into whether librarians provided Internet training for their clientele. Tillman and Ladner only referred to the fact that their respondents considered the subdividing of training in larger organisations. The IT department could offer classes on the basics of the Internet, while the library could provide seminars on available network resources in specialised subject areas. This suggestion could go part of the way in explaining responses received from Victorian business librarians who gave Internet training and to a particular level.

- Technical and reference services are aided by the Internet: This assumption was tested in a set of four questions. The three questions which pertained to technical services asked respondents about the use of copy cataloguing records downloaded via the Internet. The

fourth question asked whether business librarians used the Internet for reference-related work. The assumption was strongly dismissed on the technical services question, but strongly supported on reference services.

- Two contrasting opinions emerged in the literature concerning technical services being aided by the Internet. On the one hand, Missingham believed that the World Wide Web and Internet access could be used much more than reference services for clients. The author claimed that one of the uses which she had experienced in working in special libraries was reducing original cataloguing, and checking authority files from both local and overseas organisations. By implication, Missingham was probably referring to the downloading of copy cataloguing records and authority files via the Internet as occurring on a routine basis.

However, Ladner and Tillman maintained that special libraries in the corporate sector would not be able to use the Internet to the same extent. Corporate libraries tended to have small numbers of staff, sometimes only one professional, and therefore could spend only limited time in technical services functions, like copy cataloguing. Business librarians concentrated more on emphasising access to information than collection development and stressed current awareness functions more than other special librarians.

The findings from Victorian business librarians' use of the Internet for reference work were supported by Ladner and Tillman's research into the use of the Internet for reference. The authors said that 'as the Internet became a more integral tool of the information workplace, the almost instant responses to questions and other serendipities that occur on the Internet would become commonplace.' Special librarians were considered as the 'early adopters' of using the Internet.

- Cost-benefit analysis and marketing of Internet services are crucial: This assumption was only partially upheld, as respondents tended to not carry out any cost-benefit analysis. Yet it was supported on the importance of marketing Internet services. It seemed a little strange that business librarians were able to effectively market the benefits of the Internet, without having always done a cost-benefit analysis. It remains to be seen that if respondents had been more inclined to do cost-benefit analysis then their success in marketing Internet services could have been higher still. The contradictory findings from the two questions suggest that respondents may not have understood the significance or importance of a cost-benefit analysis in a business environment.

Cram did an extensive study into the importance of cost-benefit analysis and marketing of the Internet's potential benefits. She alleged the paradox of the Internet was that it could deliver improvements to the



library's bottom line in terms of reduced or offset costs and improved productivity, and almost simultaneously, could increase costs and decrease productivity. Cram indicated that the nature and range of costs pertaining to an individual business library must be known and answered according to a set criteria.

- The Internet has placed more emphasis on value-added services in the business library: The two questions which sought to verify this assumption was only partially supported. Since the introduction of the Internet, many respondents had placed little emphasis on the importance of value-added services. Despite this, some business librarians were able to give examples of value-added services.

The findings vindicated Matarazzo and Prusak's research in America which stated that business libraries could derive many more benefits from being a part of the growth in computing power and the expansion of network capabilities, including the Internet and World Wide Web. Corporate libraries could also become more involved in target-marketing of on-line products and services, to both end-users within and outside of the corporate organisation.

- Potential benefits of the Internet fall into specific categories: Undoubtedly survey respondents upheld this assumption. They were asked to order benefits in degree of importance from 1 through to 11. No recent studies could be found giving similar results from among business libraries both here in Australia and overseas. The only exception was some related research carried out by and Ladner into how special librarians used the Internet and the importance they attached to five Internet functions. Their findings, based on a set of 'functions' of the Internet, provided for some means of comparison with the eleven 'benefits' on which Victorian business librarians rated the Internet for their library and organisation. Where Tillman and Ladner's results were expressed in percentage terms, this survey used a factoring analysis to calculate the spread of the first benefit for each of the eleven listed library services.

Tillman and Ladner asked special librarians to briefly describe their use of the Internet. They organised the findings into seven umbrella categories. Eighty-nine percent of respondents selected 'work related communication and email', followed by 60 per cent for 'electronic forums, bulletin boards and e-journals', then 40 per cent for 'searching remote databases'. 'File transfer (FTP) and data exchange' followed 28 per cent, then research and publication on 28 per cent and nine percent for 'personal communication, leisure activities'. In last place was the 'other' category with six percent. Tillman and Ladner also queried the same respondents about the importance of five Internet functions — email, searching remote databases, discussion lists, file transfer, and chat/talk, based on a five-

point scale. The results of this analysis showed that email ranked first, followed by searching remote databases and discussion lists. Three out of four considered email to be essential or important in their work, two out of three believed searching remote databases to be essential or important. In comparison, less than half considered discussion lists to be essential or important, and only one out of four felt that way about FTP.

- Business libraries benefit from full-text resources available on the Internet: While business librarians upheld this assumption, no recently written articles could be located which specifically discussed the supply of full-text resources from the Internet in a business library environment. The survey findings suggested that those librarians who used the Internet for this purpose did so on an extensive basis. Many respondents took the option of choosing more than one country of origin for sourcing full-text materials. This would have accounted for the high number of countries or regions that respondents selected. If more respondents had indicated that they had benefited from the availability of full-text resources from the Internet, then the figures for the origin of full-text material would have been correspondingly higher. While it was not surprising that America was the most popular place for sourcing full-text materials, Australia was also regarded as a very good supplier of these resources in second place.
- The business library has been able to advise its host organisation on the advantages of accessing information from the Internet: The final assumption in this study was strongly supported. The quantity and quality of responses suggested that business librarians had been able to clearly define these benefits of the Internet and therefore inform their host organisations of the advantages which could be gained. In many cases respondents provided multiple examples, some of which were shared also by others. It remained a little unclear as to whether all of the advantages given had been achieved in practice or were considered from a theoretical perspective. Without carrying out further investigation, the evidence given pointed to these advantages as practical achievements.

### **Suggestions for Further Research**

Further research needs to be carried out into how Victorian business librarians are delivering information to their users, both through the reference interview and document delivery. On the one hand, they delivered reference information via traditional methods, without always making use of the Internet as a search tool. At the same time, respondents said that they used the Internet to obtain full-text articles and reports for their users. In future, how business librarians use the Internet to answer reference enquiries should take in the issue of also delivering full-text

articles across the Internet. Also consideration should be given to examining the type of sources on the Internet that provide full-text documents and if there is much difference in charging policies between them. How would this compare then to taking out a journal subscription or purchasing of the monograph?

More investigation is strongly recommended into the reasons for business librarians not being more involved in the setting up and maintaining of IT and security policies for Internet related functions in both the *library* and their *organisation*. Until recently, this has been almost the sole domain of corporate IT departments. This could start with examining the type of information mounted on an internal Internet — intranet— through to the structure of information appearing in servers of other divisions of the parent organisation. Business librarians could also become involved in making selective internal information available to valued company clients across an ‘extranet’. Some questions to be raised on Internet policy include the following. What specific contributions has the *business library* been able to make in the setting and revising of overall Internet policy for the library and host organisation? Have librarians been trained sufficiently to understand the significance of information policy and its likely impacts throughout the organisation?

It could also ask if business librarians have been active in developing Internet training polices for both the library’s clientele and throughout the whole organisation. Another aspect to be questioned is if, and how, business librarians have participated in developing policy and standards for the material that is posted to the organisation’s Internet site.

Still more questions need to be asked about how librarians define ‘content’ and if they had been more involved with technical functions concerning the Internet than the quality of the information. These issues were reflected in optional written comments given to the main question. It proved necessary to categorise these comments into five categories. Further, there was a dividing line between ‘content’ and ‘technical knowledge’ for all respondents. Were there some respondents who could neatly combine information content with technical knowledge and therefore occupy the role of webmaster for both the business library and host organisation?

Cooper and Giles support the above trend by saying that special librarians need to become content coordinators as opposed to the technical Webmasters’ or information technology role. Simultaneously, special librarians should acquire skills in developing Intranet content, *e.g.* Web pages, directories, subject guides, filters, intelligent agents, on-screen tutorials, and employee communications.

Internet training services in the *business library* context is another area in need of wider research. Cooper and Giles imply that not only could

the business librarian have the role of Internet trainer, but also as educator and facilitator rather than just the information intermediary. They could acquire more technical skills such as 'train the trainer', information technology skills, including web publishing and setting up browser access. These aspects, if investigated, should help to identify why some business libraries have not only survived, but also diversified into a niche training area, which may not have been provided beforehand.

It is crucial to ask why more business librarians cannot benefit from formal Internet training and refresher courses. Is it due to library staff not being spared the time to attend such courses, or to inadequate staff training budgets? The result is that business librarians have to train themselves about the Internet. That may explain why 40 per cent of library users are not provided with any Internet training.

The next area suggested for further investigation is cost-benefit analysis and marketing of Internet services. What is missing from the survey responses is the common link that should exist between effective marketing of Internet services to both library patrons and the host organisation and the cost-benefit analysis. As a first step in the justification process it is important to carry out a cost-benefit analysis before conducting any marketing exercise.

As Cooper and Giles tell us, there is a strong need to enhance the marketing role of selling Internet services, promoting access to information and information sharing and improving workflow and document management over an Intranet. However, the authors have failed to mention anything about the cost-benefit analysis. Further investigation in a business library environment is warranted of these enhanced marketing roles, in conjunction with cost-benefit analysis.

The question in the survey which asked respondents whether their *business library* had been able to benefit from more value-added services with the advent of Internet-based services gave a disappointing answer. More study is required on this topic to determine how business librarians define the term 'value-added' services.

The need to concentrate on value-added services, such as increased, faster document delivery, information analysis and commentary, Intranet input and serious information content would be other aspects that should be put to business librarians. As may be evident from the above suggestions for further research, there are other aspects from the current survey findings which could also be investigated. Those mentioned emerged as the most prominent and in need of more investigation in the near future.

## Managing the Library and Information Collection

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### Looking Beyond Postmodernism

The convergence of the Information and Communication Technologies (ICTs), the Internet, and the Web are striking developments of our times. The traditional constraints of space and time stand collapsed and the whole world is becoming a “Global Electronic Village”. The Internet and the cable TV are imposing global stereotypes on the one hand, but also providing unlimited avenues for projection of the local, the particular, and the indigenous on the other.

The ICTs are facilitating self-expression and self-assertion of the ethnic minorities across the bounds of nation-states, which as such are no more in a position to contain within their boundaries, their internal ethnic mobilizations. The globalization of information is taking place, and the territorial boundaries are becoming meaningless in the face of multinational and transnational companies. There is a growing culture of interactivity.

In the case of broadcast technologies, such as radio and television, information flow is generally one-way, and the viewers and listeners have a relationship with information but not with each other. But the modern media is extremely powerful to set the agenda of the emerging information society, as well as to influence the opinion of the masses. The emerging virtual communities are expanding their use of a decentralized nonhierarchical interactive communication infrastructure that promotes self-reliance, critical thinking, discovery, and openness to diversity, problems, and opportunities. Computer conferences, scholarly discussion lists, and bulletin boards have created new virtual communities which are engaged in a perpetual dialogue on various issues confronting us today.

The ICTs and high-speed networks have an immense potential to provide real-time access to vast amounts of networked information. But the invisible hand of peer review has suffered a set back in this age of digital revolution. Since there is no competition for space on the web, a lot of junk is being made available via the Internet. The porno sites are another threat to the younger generation. But electronic publishing and the hypermedia have opened a new possibility for the academics to start their own electronic journals, newsletters, bulletin boards, discussion lists, and mailing lists. These developments have made real-time access to information a near reality.

But the search engines still are supplying a lot of junk to the end users. In fact, organization of the web-based information is the biggest challenge for the professionals today. In case of esoteric information, the search engines return very few documents, but in case of exotic information, one gets thousands of hits. This causes irritation to the end user and also an encroachment upon his precious time. Library and information professionals can play a pivotal role in organizing the web and ensuring the end users' delight by furnishing them with customized information.

There is a shift away from informing to involving people in the democratic processes in India. The democracy in India today will not be the same in the near future. The awareness and assertion of marginal groups and the end users is growing day by day, not because of the increasing literacy rate, but because of the penetrating impact of media on human minds.

The cable TV has played a significant role in this regard. In fact, the emerging information society has moved away from authority-centred knowledge to reason-based social progress. In the industrial era, reason, order, and homogeneity were the ruling concepts. But in the postmodern era, spirit, chaos, and heterogeneity are the guiding principles. Even then, postmodern paradigm has failed to solve the problems of society at large. Looking beyond postmodernism, people have started taking cognizance of systems thinking, in which every individual is a whole within a whole (www). Previously, we were talking of the dualistic mode of whole-part relationships, but now systems thinking has led us to follow a holistic approach to social transformation.

In the industrial age, the focus was on the production and consumption of tangible goods, but in the post-industrial era the focus is on production and use of intangible assets, *i.e.* information and knowledge. The economic man of the industrial era was more concerned about the material assets, but the information person of the emerging information society is more bothered about the psychological and spiritual aspects of his existence. We have moved from atoms to bits. But this transition has not been reflected



largely in library and information infrastructure (LII) in the developing countries. The LII in these countries has been designed to deal with order and homogeneity on the one hand, documents and groups on the other, whereas the need of the hour is to deal with chaos and diversity on the one hand, and networks and individuals on the other. Taking cognizance of this fact, an effort has been made in this paper to present state-of-the-art report on information management in India in the context of a networked world.

### **Digital Determinism**

Digital determinism is being perceived as a threat to human relations. Today man's existentialist freedom is being swallowed by a different kind of determinism— computer determinism – which is reducing existence into digitized data; this is a kind of determinism worse than its earlier varieties – theological, mechanistic, and dialectical— in the sense that the latter forms, while diluting man's autonomy, still entailed one or the other type of value – system derived from the divine, natural or historical imperatives. Computer determinism may be defined as the computer – done information – processing, decision – making activities in which human factor – the matrix of values – is eliminated.

But we should not be scared of this digital determinism. We have seen the assignment of manual jobs to machines in the industrial era. The automobile has played a pivotal role in the transportation of tangible goods to the benefit of society at large. Today, besides the computational jobs, the thinking and decision making processes are also being assigned to computers. But computer can not replace the human brain. It may have more speed than human mind, but it will always be under the control of human being as its direction and role will be determined by the human beings. So the bottom line is that the computer or the ICTs are not going to determine the future of society, rather the human beings will set the direction of human destiny.

### **Convergence and Transmutation**

With the convergence of computer and communication technologies, transmutation of roles and resources is taking place. The distinction between the author and the reader on the one hand, and the creator and the critic on the other is blurring rapidly. The convergence of human thinking and the digital means has made computer an expression of social thought. It needs to be explained and sustained for the amelioration of society at large. If we look around us, we find that there is a paradigm shift from stand alone libraries to library and information networks, from print-based publications to digital documents, and from intermediary to end-user model. We are also surrounded by traditional, automated, digital, and

virtual libraries across the globe. Resource sharing via networking has become a near reality. Email has tremendously improved the conceptual access of the end users. But in India, email facility is used less for academic pursuits and more for exchanging personal messages. The Internet-based resources and services, such as email, file transfer protocol (ftp), telnet, browsers, search engines, portals, opacs, databases, directories, mailing lists, computer conferences, discussion lists, bulletin boards, and newsgroups have the potential to make the world a real 'global electronic village' on the one hand, as well as to increase the existing 'digital divide' between the 'info-rich' and 'info-poor' on the other.

This digital divide can be contained successfully by framing suitable policies and developing a network culture among the masses. Commercialization of the Internet and the web also needs to be contained. Libraries and information centres' real job is to acquire, process, store and disseminate quality information.

This job can be performed successfully if the library and information professionals learn to adapt to the changing environment. As such, in the networked environment, our libraries should not work only as just-in-case store houses of books, but should also serve as just-in-time gateways to quality information, whereas the library and information professionals should play the role of information gatekeepers.

One stop shopping centres or information gateways like BUBL, available via the Internet, can provide the end-users with a seamless connection to web-based resources and services. Managing information with the help of BUBL type gateways can prove to be a good strategy to overcome the problem of the widening gap between the growing universe of digital documents on the one hand and declining library budgets on the other in a country like India.

But the catch here is that who is going to provide the Internet connectivity to the 'non-elite' institutions in this country. Today, we are dealing not only with print-based publications, but also with formless data. Information has become fluid and transcendental. It is malleable and has a tendency to expand. If knowledge is power, then information is 'instant power' as it has the potential of substituting men, money, materials, and methods. It can be accessed simultaneously by many.

The ICTs have the ability to consolidate and distribute this power. In any case, this power must not be consolidated in the hands of the 'info-rich'. The 'info-poor' must also get their share, because power is the ability to achieve one's goals. As such, access management, knowledge management, and content management should be the focus of the library and information professionals (LIPs) across the globe. Hybrid library seems to be the metaphor of the near future. It will be end user directed and

expert assisted. The mission of the library will remain intact, but the role of the LIPs will expand. India will be no exception to these developments. The ICTs will continue to facilitate global communication, but it will be the responsibility of the stakeholders to check their dehumanizing, deskilling, and dejobing impact to avoid the perils of the emerging 'digital divide'.

### **Promises and Perils**

The ICTs and the Internet have great promises for the 'info-rich', but they have many perils for the 'info-poor'. The ICTs have an immense potential to widen as well bridge the existing gap between the 'haves' and 'have nots'. If used democratically, the ICTs will promote the use of networked information, otherwise they will further widen the existing gap between the 'elite' and the 'non-elite'. In the developing countries of the world, poverty, illiteracy, unemployment, etc. are the main problems for the respective governments. Providing access to the networked information is not on their priority list because of political considerations. In the South Asian countries, information is not shared because of political reasons.

The SAARC Documentation Centre (SDC), New Delhi has not been able to serve as a clearinghouse on South Asia, because of the lack of cooperation among these countries. Political instability in these countries is another reason for such a situation in this region. Vernacular languages pose another problem in ensuring access even to print-based publications, let alone the digital documents. It is possible to retrieve a lot of pertinent information in one's area of research from the developed countries, but it is very difficult to get a few pertinent references from this region.

Even the National Library of India has not made any effort so far to digitize its resources, let alone the public, school and college libraries in this country. Political will and skill is really lacking as far as library and information infrastructure in India is concerned. The library and information science courses are still focussing on technical services, *i.e.* the cataloguing and classification. It is high time to teach about networks and use networks in teaching and learning, particularly in distance / distributed learning, otherwise the existing 'digital divide' will grow further. All the benefits of the digital revolution will go to the 'elite' institutions, *i.e.* the science and technology libraries, and other research and development organizations. Speaking globally, at stake are the relics of the past and harbingers of the future, *i.e.* the intellectual property, freedom of access to information, as well as the accuracy, security, and quality of information.

Also at stake is the autonomy and privacy of human beings. Computers and the ICTs must not be allowed to get a place in the mental space, *i.e.* the thinking, decision-making, planning, and problem solving domains of

the society at large. Local touch and equity of access to information are the likely victims of the permeating 'digital determinism' and the growing 'digital divide'. In a globe, which is divided by time zones, the ICTs are expanding their influence day by day. At stake are also the future of the Net Generation and the cultural heritage of the ethnic minorities across the globe.

The ICTs should be used to globalize the communication process, but not at the cost of the diversity of the emerging information society. In India, the library and information services are by and large print-based and the network culture has not yet spread in the rural areas and the non-elite institutions. Here lies the biggest challenge for the Indian democracy. Equality and equity of access can be ensured to one and all, only if the Government of India commits to it by adopting a suitable library and information policy.

The ICTs and the Internet are capable of creating a mental space in which there is a continuous conflict between the 'hegemonic forces' on the one hand, and the 'ethnic minorities' on the other. As such, the ICTs should be used only to promote the culture of tolerance and respect for difference. The libraries and information networks can also play a leading role in promoting mutual understanding and peaceful co-existence. In this context, the next part of this paper deals with the library and information infrastructure and supra-structure in India.

### **Library and Information Infrastructure (LII)**

Since Independence, India has developed a good LI Infrastructure to meet the complex needs of end users and to respond to the growing universe of graphic records. There are four national libraries; an elite (as the services of these libraries are confined to the respective cities and towns at the cost of rural masses) infrastructure of public library services in all the states and union territories with public library legislation only in 10 states out of 28 states and 7 union territories; libraries of varying sizes in colleges, universities, and other institutions of higher learning, research laboratories and institutions as well as government ministries and departments; bibliographical control of Indian publications with the publishing of Indian National Bibliography since 1958; documentation and information services being provided at national level by Indian National Scientific Documentation Centre (INSDOC), Defense Scientific Information and Documentation Centre (DESIDOC) and National Social Science Documentation Centre (NASSDOC); information systems and programmes, such as NISSAT, INFLIBNET, and DELNET; and education and research facilities in Library and Information Science in about 85 universities and institutes.

Several institutions, such as Bhaba Atomic Energy Research Centre (BARC), Bombay and Indian Council of Agricultural Research (ICAR), New Delhi are already functioning as input centres for the international databases INIS, and AGRIS respectively. Collaboration with other global information programmes, such as UNISIST; ASTINFO, APPINESS and several others have been developed so as to have an access to information resources at the international level. Access through information networks, such as NICNET, ERNET, SIRNET, INDONET, and INFLIBNET is being utilized in libraries and information systems. Science Information Centre at the Indian Institute of Science (IISc), and Social Science Information Centres at SNDT University, Bombay and M.S. University, Baroda have been established by the UGC to provide bibliographic services to teachers and researchers in the country.

The specialized information systems and library networks in India such as, National Information System for Science and Technology (NISSAT) (<http://www.nissat.org>); Biotechnology Information System (BTIS) (<http://www.nic.in/India-Image/btis>); Environmental Information System (ENVIS) (<http://www.nic.in/envfor/envis>); Delhi Library Network (DELNET); Information and Library Network Centre (INFLIBNET) (<http://www.inflibnet.ac.in>); etc. are at various stages of development. No remarkable achievement has been made in the provision of information services through these networks and systems, except by DELNET and INFLIBNET, and that too in the last two or three years.

This is despite the fact that many systems and networks existing today were planned many years earlier. Supra-structure for Library and Information Services Libraries in India are believed to be depositories of the knowledge of past generations. But this knowledge has not been retrieved from the manuscripts for the common good of the people. In spite of the existence of libraries and learned people to put this knowledge into use, there have not been enough developments. The missing link in the chain seems to be the suprastructure for library and information services. The Government of India (GoI) announced a New Education Policy in mid 1980s, but it made no reference to the role of library in national development. The Department of Culture, Government of India had also set up a Committee on National Policy on Library and Information System (CONPOLIS) on 7 October 1985 under the chairmanship of Professor D.P.

Chattopadhyaya, Chairman Raja Rammohun Roy Library Foundation (RRRLF), Calcutta to consider the document "National Policy on Library and Information System" (NAPLIS) prepared by RRRLF. The final report, "National Policy on Library and Information System: A Presentation" was submitted to the Minister of Human Resource Development on 30 May 1986. An Empowered Committee set up by the Department of Culture



examined the Report and submitted its comments in March 1988. However, the Government of India has yet to formally accept the recommendations contained in the CONPOLIS Report.

As such, there is no policy regarding library and information services in India. Even the apex body, the National Library, Calcutta, and professional bodies, such as the Indian Library Association (ILA), Indian Association of Special libraries and Information Centres (IASLIC) and others have failed to get the NAPLIS adopted by the GoI. Even if the recommendations of the NAPLIS were to be adopted today, these would not have proved effective, as the developments in ICTs particularly in the 1990s have changed the situation so much that a new national policy for library and information services needs to be framed.

The only bright spot in the available suprastructure is 'IT Action Plan' submitted to the GoI on July 4, 1998 by the National Task Force on Information Technology and Software Development. It contains 131 sections. The IT Policy of India is a comprehensive framework required for creating an ambience for the accelerated flow of investment into the IT sector, with specific orientation towards the Software Industry to make India a global IT super power by ensuring the export of software of \$ 50 billion and IT for all by 2008. This is really an encouraging development for the 'info-poor' in India. A few relevant sections of the "Content Creation and Content Industry" of the IT Action Plan (Part III) Long Term National IT Policy of India read as under:

- It will be made mandatory for all the universities or deemed universities in the country to host every dissertation/thesis submitted for research degrees on a designated Website.
- The national, regional and other public libraries will be required to develop databases of their holdings, which will be hosted on a designated web site for free access to users.
- The Government in association with the industry will evolve appropriate guidelines, codes and systems to ensure those materials anti-social, unsuitable, illegal or posing a threat to national security are not put on the websites.
- The Indian language based systems are crucial for the growth of the content industry and for spreading the impact of IT to the grass root level. All Government funded software tools developed, for handling information in Indian languages, will be actively promoted for widespread use and made available at nominal cost..
- There is a need to promote and encourage hosting of non-commercial materials related to linguistic, social and cultural aspects of the people by the public or private organisations. The Government will take initiative for providing web sites, free of cost, for such purposes.



- Government will encourage and promote Indian companies and organizations to host their contents only on web servers located in India with Indian domain addresses and these will be made available at internationally competitive prices. Any information hosted on these sites will follow the guidelines evolved by the Government in association with the Industry.
- For enabling Inter-operability between equipment, data, practices and procedures, Standards will be evolved to integrate hardware, software and communication systems and to exchange information across boundaries of different systems.
- Creation of knowledge bases requires trained manpower for collection, compilation, analysis and production of value added information products and services. Specialized training programmes, through existing institutions, will be initiated to meet the requirement of trained professionals in these areas. Traditional curriculum being offered by the universities and educational institutions in various fields related to content industry will be suitably modified, such as library science, journalism and mass communication.
- A pilot project on digital library development, based on indigenous software, will be initiated. The project will be time-bound and implemented at one of the suitable existing libraries to serve as a model. The software so developed can be distributed to other organisations to accelerate the development of digital libraries in the country.
- Virtual libraries provide extensive information and instant access to users through information networks. The Government will promote a pilot project for creation of a model virtual library. The virtual library will be enabled to work out suitable copyright arrangements with the relevant publishers for providing the service.
- A National Internet Centre of Excellence (NICE), will be established in an existing institution to promote standards, assist digital content development in India, devise standards for content building and delivery, and research new technologies.

It is obvious from the select sections of the IT Policy that the GoI is committed to promote the use of the ICTs and networks in India. But similar commitment is required for the development of library and information services also.

### **Digital Library Initiatives**

While the developments in digital libraries largely in the western world are moving towards interoperability between systems and

mechanisms to access information, in India we have not been able to move beyond experimental stages regarding setting up of digital libraries. Barring the Health Education Library for People (HELP), Mumbai, the Tata Institute of Fundamental Research (TIFR), Mumbai, IIT Kharagpur, and National Centre for Science Information (NCSI), Bangalore, majority of the libraries is providing online bibliographical access only. IASLIC-LIST and the LIS-FORUM along with the electronic newsletter 'INFOWATCH' are providing professional information.

Information Today and Tomorrow, Inflibnet Newsletter, and the Desidoc Bulletin of Information Technology (D-BIT) are a few other sources of current information on the use of ICTs and networks in India. Research and development activities regarding digital libraries are being undertaken in some institutions, for example, at the Education and Research Network (ERNET) of Department of Electronics, GoI (<http://www.doe.ernet.in>); and the electronic library being developed at the Indian National Scientific Documentation Centre (INSDOC), New Delhi (<http://www.insdoc.org>). In spite of negative attitude of authorities, lack of precedents and standards, and other associated handicaps some awakened library professionals have been able to develop electronic resources and services. A brief account of some of the resources and services is presented below:

- Development of the searchable databases on the web by Central Library of Indian Institute of Technology, Kharagpur (IIT-Kgp) in 1994 (<http://144.16.192.18> or <http://libweb.iitkgp.ernet.in>). Efforts towards digitization at IIT-Kgp Library were initiated at the beginning of 1990s. IIT-Kgp is one of the six premier institutions of quality education in engineering and technology, the Indian Institutes of Technology (IITs).
- Launching of an electronic current awareness bulletin 'Infowatch' in July 1996 by the University Grants Commission (UGC) sponsored National Centre for Science Information (NCSI), Bangalore. Infowatch, a monthly bulletin describing the Internet-based resources and services in science and technology, can be accessed through the web as well as via email by free subscription. (<http://144.16.72.150/ncsi/iw.html>)
- Launching of LIS-FORUM, a discussion forum or a list in the area of library and information services in November 1994 by NCSI, Bangalore. This was sponsored by the National Information System for Science and Technology (NISSAT). LIS-FORUM has also an archive which is searchable. LIS-FORUM can be subscribed by sending a one line command email, without quotes, "Subscribe lis-forum your name" to [listserv@ncsi.iisc.ernet.in](mailto:listserv@ncsi.iisc.ernet.in) (<http://144.16.72.150/ncsi/services/lis-archive.html>)

- Development of OPACs in many libraries such as Centre on Rural Documentation CORD of National Institute of Rural Development (NIRD), Hyderabad (<http://www.nird.org/clic/index.htm> and <http://www.nird.org/clic/L.htm>); Indian Institute of Management (IIML), Lucknow, and initiation of Internet-based resources and services in many libraries and information centres.
- Availability of the Index of 'Hitesranjan Sanyal Memorial Collection (HSMC)' at the Centre for Studies in Social Sciences (CSSS), Calcutta via the WWW. The HSMC is a collection of rare textual and visual documentation related to the history of Bengal (in 400 microfilms and 300 colour transparencies) The index to HSMC is available via the Internet. (<http://www.iisg.nl/asia/csssc.htm> and <http://www.socialsciencecal.org>)
- Creation of Health Education Library for People (HELP), in Mumbai. HELP is a privately managed site providing health-related information and managing an online catalogue of over 15000 documents. (<http://www.healthlibrary.com>)

The situation in India regarding digital libraries is very peculiar. Many government agencies, as well as institutions, mostly in the public sector are engaged in some sort of work regarding the digitization of libraries. Examples of initiatives in this direction mentioned above clearly indicate that the potential of ICTs for developing digital libraries has not been fully realized by the GoI. While one government agency is providing support for one particular aspect, the other is focussing elsewhere, without any coordinated effort by a nodal agency.

### **Conclusions and Suggestions**

The ICTs, the Internet, and the Web have made a significant impact on the life and work of people in the developed countries. Virtual environment, digital revolution, web-based resources and services, electronic publishing, hypermedia, etc. have given a deathblow to the traditional constraints of space and time. The process of scholarly communication has become more dynamic. There is ample scope for developing personal digital collections, subject gateways, and clearinghouses. Even a 'global digital library', and 'global electronic journal' is not a distant dream in the networked environment. But all this will not happen automatically. A lot of effort and lobbying is required to check the permeating 'digital determinism' and 'digital divide'. We must ensure information for all.

In India, the ICTs may further increase the existing disparities. It is a country where 47.79% of its population is totally illiterate. There are wide variations between various states and groups. The Kerala State has the highest literacy rate of 89.79%, whereas the Madhya Pradesh State

has the lowest literacy rate of 38.48 percent. Similarly the literacy rate among males is 64.13%, and among females it is 39.29 percent. In such a situation, information literacy for these illiterates will not mean anything, until and unless they are empowered with basic literacy skills.

This problem will have to be tackled at two fronts. On the one hand, by providing free education to the weaker sections of the society, and on the other by saving the neo-literates from relapsing into relative illiteracy with the help of adult education programmes and a network of public libraries throughout the country. India has very good programmes, such as National Literacy Mission (NLM) and Jana Siksha Nilayams (JSN) for this purpose. But the position of public library service and school libraries is not up to the mark. Even a large number of college libraries are suffering from a lack of resources. Infolibnet, an ambitious programme in India with its commitment to extend its resources and services to college libraries, has not been able to do much for the college libraries in India.

In the absence of a national policy on library and information system, the future of access management in the networked world is not very bright in India. The Government of India must frame a national policy to contain the growing 'digital divide' in India, otherwise the ruralites and other 'info-poor' will not be able to contribute efficiently and effectively in the national development. The professional associations in India will also have to make concerted efforts for obtaining this end. Only this way, we can sustain the democratic values enshrined in the Constitution of India.

The international organizations, such as Unesco, IFLA, World Bank, and other funding bodies like IDRC, DANIDA, and SIDA should also take a lead in bridging this 'digital divide' in India and other developing countries of the world. This world can be called a 'global electronic village' only when everyone on this earth has equal and equitable access to the networked and distributed information. Everyone, who is committed to democratization of knowledge and information, must strive to bridge the growing 'digital divide' between and within the developed and developing nations on the one hand, and the 'info-rich' and the 'info-poor' institutions on the other.

### **Library Provision to the Tamil Community in Singapore**

This study explores the provision of public library services to the Tamil Community through the National Library Board of Singapore's system of public libraries. Results of the study are analyzed and implications for services deduced through focus group interactions and researcher observations. The study concludes that improvement is needed in collections, facilities, programming, and services, particularly in the area of provision to young people. Focus group participants also propose an Internet portal in Tamil. Many indicate that the library could, through facilitating the

reading and use of the Tamil language, help in promoting the usage of the Tamil language in Singapore.

The recognition of Tamil as a national language of Singapore has given the Tamils intrinsic satisfaction because the language provides them with a living link to their ethnic culture. They believe the library can help them regain their cultural identity and also assist them in repositioning themselves positively in Singaporean society. The contribution of this study to the professional literature is the idea of cultural identity being central in public library services to special user groups.

As social institutions, public libraries have always had the responsibility of assimilating minority groups into the mainstream society. *The Library 2000 Report* (1992) of Singapore described this responsibility in the following way: "there is a need to establish specialised information services to preserve, promote the literary heritage and to encourage local communities to flourish and develop their own unique characteristics" (p.8). A steady drop in the number of Tamil speaking households from 52 percent of all Indian households in 1980 to 44 percent in 1990 exacerbates the problem of preserving this language's unique characteristics (Nirmala, 1995). Such statistics may indicate a need to improve the provision of library services to the Tamil community in Singapore.

Today the National Library Board of Singapore operates a system of the National Reference Library, two Regional Libraries, 18 Community Libraries and 46 Community Children's Libraries. Currently, 160,197 books and 17,351 serials are available in Tamil (<http://www.nlb.gov.sg>). According to the reading survey conducted by Survey Research Singapore in 1992/1993 of book readers above 13 years old, 2 percent read in Tamil (Building the Tamil Collection, internal NLB report, 1997).

The Tamil loans constituted an average of 1.16 percent of the total loans as compared to 2.69 percent of the total collection in the National Library Board from financial year 1995 to 1998. Within the Tamil collection, 56.44 percent were adult books, 38.31 percent children's books, and 5.25 percent young people's books. Among the Tamil readers, 73 percent were adults, 24.35 percent were children, and 2.65 percent were young people. The most popular books were fiction, health and fitness, computer, and self-improvement. Tamil magazines were also among the favourites (National Library Report, 1999).

The following research questions formed the basis of this study:

- How is the Tamil collection being used at the National Library Board, Singapore public libraries, and for what purpose?
- What types of Tamil materials do Tamil users read at the National Library Board, Singapore public libraries?



- How can the National Library Board, Singapore public libraries provide better collections and services to the Tamils?
- Have the National Library Board, Singapore public libraries been successful in attracting Tamil users?

The study was limited to the Tamil community and did not include the Indian community at large. The Tamil community represents 64 percent of the Indian population in Singapore.

## **Literature Review**

### ***Library Services to Ethnic Minorities***

A minority group of people such as the Tamil-speaking Singaporeans differ in some ways from the principal group in a society in that they are small in numerical strength and have fewer economic, political, and social opportunities than members of the dominant groups.

It is the belief of some researchers that libraries should help the ethnic community regain their cultural identity, no matter how small the community, because libraries are supported by the tax dollars of the whole community (Carroll, 1985).

### ***The Tamil Community***

The Tamil Indian community accounts for approximately 7 percent of the total population in Singapore, and 64 percent of that community are Tamils. Tamil education was pre-eminent in Singapore as early as 1948 (Singh, 1982). A Tamil library was established in 1951 in Singapore (Tamil Murasu, 1951, March 4), and the status of the Tamil language gained prominence in 1966 when the second-language requirements of the government's bilingual policy pushed the relevance and the usage of the Tamil language (Nirmala, 1995).

### ***Provision of Tamil Script Library Materials in Singapore***

The provision of library materials in Chinese, Malay, and Tamil was granted in the early days of Singapore. Because Tamil was the mother tongue language, established at the time of self-government in 1959, it "acted as a transmitter of Asian values and served as means of cultural identity" (Martland, 1987, p.5). Today the Tamil tongue is used in government campaigns, public education programmes, and at public functions.

The Raffles National Library in Singapore in 1960 was the first public library that provided collections in three important local languages on a large scale. At that time, the greatest problem faced by the National library was the recruitment of a sufficient number of qualified bilingual librarians to meet the demands of the vernacular materials (Anuar, 1960).



A significant Tamil collection exists at the Umar Pullavar Tamil Language Centre, which serves students studying Tamil as a second language. Students are allowed to borrow reference books for their projects in schools, and this library has promoted usage through various library activities, for example, a presentation entitled "The Usage of Library In Second Language" (Umar Pulavar Tamil Language Centre, Souvenir Magazine, 1989, p. 20).

## **Methodology**

### **Focus Group Interview as a Research Technique**

The methodology employed in this study was the focus group interview technique. According to Connaway (1996), "focus group methodology lends itself well to community analysis and the evaluation of library services and resources" (p. 236). This study followed Gorman and Clayton's (1997) recommendation that a focus group be composed of six to twelve participants with a facilitator or a moderator to guide and motivate the participants in an effort to gain an understanding of their attitudes and perceptions relevant to a particular topic of discussion.

A limitation of the focus group, however, lies in the difficulties of interpreting the immense data. This pool of information must be deciphered carefully to avoid quoting comments out of context. Also, the researcher may arrive at premature conclusions because the moderator can influence the respondents by probing to attain the desired answers.

**Focus Group Participants:** The respondents were all regular library users who had patronised the Tamil collection in the libraries of the National Library Board of Singapore. The youngest interviewee was 14 years old; the eldest was 65. All of the participants are Tamils ethnically; have studied the Tamil language in schools; and are able to converse, read, and write in Tamil. There were five males and seven females.

The participants were recruited through the researcher's contacts from civic and media organizations, recommendations from former colleagues, library users from community libraries, and others recommended by personal friends.

### **Conducting the Sessions**

The sessions were conducted in English, and each meeting lasted no more than two hours. Participants were requested to wear nametags and mingle with one another before the meeting began. At the start of the sessions, the researcher explained the objectives of the focus group meetings and how the participants as regular users of the library could benefit from the meetings. All names were held confidential. The researcher used an interview guide to direct the discussion. Open-ended questions were

designed, pre-tested, and piloted by non-selected investigators. These questions became useful in manipulating and stimulating discussion when responses opened new avenues for data collection. The researcher used the emerging and recurrent themes from the first discussion to facilitate the second and third focus group sessions while remaining on the topic. Frequently, one participant's comment led to chains of response from the others.

### **Data Analysis**

The researcher transcribed the recorded transcripts after each session and made phone calls or sent e-mail messages to several participants to clarify some responses. As the information collected was extensive, a non-linear, reiterative process of returning to the data became necessary. Moreover, the researcher employed emerging themes and patterns from the data as a means of re-organising the information gathered. Themes and patterns defined a set of coding categories based on the actual data, *i.e.*, the answers posed to the questions in the interview guide. This coding factor represented thematically cohesive content found within the narratives and, once analysed, provided a data reduction technique (Moen & McClure, 1997). Qualitative information concerning expected user benefits of Tamil collections in Singapore's public libraries, lessons learned through experience, and perceived barriers or threats to the success of the Tamil collection were all noted.

### **Reading Habits**

Many participants rated reading as one of their favourite pastimes and indicated that their reading inclined towards English materials. All twelve participants visited the library at least once a month, demonstrating that all of them were library users. This study concurred with the research done by Mani and Gopinath (1983) on linguistic trends. They stated that "each population census has clearly indicated literacy rates are higher among the Indians when compared to Chinese, Malays and others in Singapore".

### **Evaluation of Tamil Collection**

**Tamil Magazines and Newspapers:** Participants made suggestions for the use of the Tamil collections as a whole. For example, eight rated Tamil magazines as their favourite format and requested that more titles be added to the magazine collection. The participants also proposed that all magazines be placed in the lending section instead of being located in the reference collection. In order to extend the access of such popular Tamil magazines as the Indian Movie News, some libraries have placed them in the reference collection for internal library use. This allows more users

to read the latest issues. The researcher proposed that more varieties be added to the Tamil magazine collection.

The participants considered newspaper reading unpopular. In fact, there was only one participant who read the Tamil newspaper to keep abreast of developments in the Tamil community. The researcher deduced that more detailed information is easily available in the English newspapers and that perhaps the Tamil newspaper is not packaged attractively enough to lure young readers. An improvement in the physical presentation and quality of newspaper might attract readers.

**Tamil Fiction Books:** Some participants read mostly fiction in Tamil from such popular authors as Mu Va, Agilan, and Kalki. One participant suggested that the library buy more copies of these authors' books while another proposed that more varieties of popular fiction written by young authors would be preferable to those by old writers.

One participant suggested that the library highlight local authors to combat the more India-based novels and stories, which the locals may find difficult to relate to. To address this problem, the library might encourage local publishing output for the Tamil community; however, whether a small population base such as that of the Tamil community could justify a major publishing effort is another point of consideration.

**Tamil Non-Fiction Books:** Only five participants read the adult Tamil non-fiction books, saying they needed to read them for information they could not gather from English books. Some participants felt that information on Indian art, literature, and religion was richer in the ethnic-based language. One participant rated the contents in the Tamil computer magazines to be on a par with the English magazines. He concluded that it was easier to read in Tamil for the information he needed than to read it in English and then to translate it.

Most participants were not satisfied with the adult non-fiction books as there is a real need to enlarge the collection. Moreover, there is also a need to highlight the Tamil adult non-fiction books. Many Tamil users have the notion that the content or information presented in the Tamil books is inferior to that in English books. Then again, it can be argued that the Tamil books may be poorly packaged but need not suffer from a lack of content-rich materials.

**Children's Collections:** Both the fiction and non-fiction Tamil book collections needed to be greatly improved. The children's collection was small and contained books with poor quality paper and bindings. They appeared wordy and used small-print fonts.

According to the *National Readership Survey* conducted by Forbes Research, Indians constituted the highest proportion of those who read

English newspapers with understanding and comprised the lowest proportion of those who could read their mother-tongue language or Tamil as compared to the Chinese and the Malay (Development of the NLB Indian Collection, NLB Internal Report). Improving the children's collection is the first step in reversing this trend.

The participants offered such useful suggestions as the translation of popular English works such as folklore, fairytales, and other stories into Tamil, retaining the illustrations from the English books. They believed that this would help to address the shortage of colorful and attractive books. Moreover, many who are familiar with the English language can relate to the stories better when read in Tamil.

Another recommendation put forth by the focus group was to get writers of children's literature from all over "the world to write in Tamil and then publish them either in print or by electronic media." There are many Tamil writers who live in and out of India who can be a good resource to develop the Tamil children's literature collection.

Four participants felt that the library could develop non-print materials for children in Tamil. Perhaps the library could develop Tamil audio and visual materials as well as Internet resources. With a proper provision of materials in Tamil for children, it would encourage them to use the collections and patronise the Tamil collections.

One suggestion was to recruit a Tamil-speaking children's librarian in all the libraries to concentrate on collections and services pertaining to Tamil. Presently, the National Library Board is developing children's services in Woodlands Regional Library. The researcher recommends that services for the Tamil children be included in this effort as children's services would challenge them to read, learn, use, and appreciate Tamil.

### **Young People's Collections**

Many participants rated the young people's collections as the poorest among the Tamil collections, mainly because these collections failed to meet the educational, functional, recreational, and personal needs of young people. There is also a dearth of materials appropriate for the young. Moreover, most books from these collections are placed with the adult collections, making their accessibility even more difficult.

Participants suggested that the library include more interesting subject areas such as Tamil music, fashion, and cinema to attract the Tamil youths. Many young people use the Tamil collections only if they have to do school projects. The challenge for the library is to retain these users by providing materials that will continually attract them.

## **The Reference Collections**

Most of the participants said that the reference collections in Tamil did not meet their intellectual needs. Research and academic papers, seminar papers, conference proceedings, speeches, scholarly publications, and theses in Tamil need to be acquired. One other participant recommended adopting an exchange of information programme with some of the best Tamil libraries in the world. Another wished to see Singapore become the hub for “Tamil language in the region” by developing reference collections of world class standards. One participant stated, “The reference collections in Tamil must be a showcase— something that shows our history, culture, traditions and so forth.”

## **Bilingual Collection**

The participants stated that they needed the bilingual collection to enable non-Indian readers to acquire knowledge about their ethnic group. Providing English materials about the Indian community would be useful in helping the rest of the population comprehend the minority segment. The bilingual collection would help create deeper understanding among the various sub ethnic groups in the Indian community and create more tolerance.

**Audio and Video Collection:** The participants suggested that the National Library Board could acquire a non-print collection that depicts the richness of the ancient Tamil tradition. They felt that such a provision would also help other segments of the population to respect each other’s culture and traditions. One participant would like to see the development of an oral history collection in Tamil. Such a collection would be timely, especially when the elderly Tamil population consists of the first generation of immigrants. Implementing Tamil videos for lending is another way to add value to the services the library can offer to the Tamil community. At the moment, the service is available only in English, Chinese, and Malay.

## **Collection of the Fine Arts**

Some participants expressed interest in developing music, dance, and art collections for Tamil users. It was agreed that the library, by displaying mural collections, could promote ethnic values. Knowledge of the Indian civilization’s paintings and musical instruments will help the Tamil community to regain their cultural values.

## **Heritage Collection**

There is a dire need to develop the heritage collection. Indians, as early immigrants to Singapore, have contributed significantly to nation

building. Information about the history of the Indian settlers—their culture, literary and art traditions—can be collected in a systematic manner in the library.

### **Use of the Tamil Language**

Most participants agreed that the Tamil collections were flawed in many ways. They were not satisfied with the collections as a whole, including the classification and the location of these materials in the library. They also found the Tamil books unattractive, old, and outdated. The lack of materials in Tamil and the library's inadequacy in satisfying their information needs had invariably failed to encourage them to use the Tamil language progressively. This may have contributed to the decreasing usage of the Tamil language in Singapore.

The 1990 population census showed that there was an 8 per cent drop in the number of Tamil speaking households compared to 1980. A three-year survey conducted from 1989-92 on Tamil language usage reinforced the drastic picture of the community losing touch with the Tamil language (Nirmala, 1995). The survey also revealed a trend among the Tamil community to use English at home to the exclusion of Tamil.

Four out of twelve participants said they would not read in Tamil even if they could. They found no leisure time to read, and Tamil was not relevant to them because it was difficult to read and they were not proficient. They added that not enough Tamil books were available that would interest them. On one hand, the community might cite the library for not promoting the Tamil language enough to sustain its extensive usage.

On the other hand, there are other reasons for the low usage of the language. Mani and Gopinath (1983) noted that the Indian community in Singapore has not acknowledged Tamil as the intra-ethnic language. Tamil is only one of many Indian languages and cannot be regarded as the language of communication. Other Indians in Singapore are also very proud of their own languages such as Malayalam, Telegu, Punjabi, Gujerati, Sindhi, and Hindi and would like to keep their languages alive as well.

Perhaps many Tamils perceive the Tamil language as having little use in multilingual Singapore. Mani and Gopinath (1983) noted that the Tamils had belittled the value of the Tamil language as a result of their high participation in English-medium education. There is indeed a mixed perception of the usage of Tamil in Singapore. While there is a decreasing usage of the Tamil language, it is nonetheless a functional language as it is recognized as one of the four official languages in Singapore and is used in government campaigns, public education programmes, and public functions.



Further, Tamil is widely offered as a second language in most schools in Singapore (The Singapore Ministry of Education website-<http://www.moe.com.sg/>).

- 148 primary schools offer Tamil as a second language
- 76 secondary schools offer Tamil as a second language
- 5 Tamil language centres offer Tamil as a second language
- 5 secondary schools offer higher Tamil.

Out of twelve participants, eight felt the need to read in Tamil despite poor provisions and services to the Tamil community.

The reasons cited were;

- Tamil is their mother tongue.
- They have a need to keep in touch with the Tamil language.
- They have a need to keep abreast of developments in the Tamil community.
- They want to keep their roots and traditions alive.
- It is a requirement to pass Tamil in school examinations.
- They want to help their children read in Tamil.
- They want to improve proficiency in the language.
- They are fluent in Tamil.
- They are Tamils.

All twelve participants felt that the library could do much more to stop the deterioration in the use of the Tamil language. Many expressed their opinion that by resource collection and service provision to the Tamil community, the library would not only help them regain their cultural identities but also assist them to reposition themselves positively in the society.

***General Perception of the Library:*** The participants were generally satisfied with the collections and services provided by the library. They were impressed with the way the library had harnessed technology to bring about changes.

Some suggested that the library should extend its operating hours while others complained about the location of the books of their choice in the library.

***Recommendations to Improve Library Services to the Tamil Community:*** Participants in the focus group noted that books for children were unattractive, the collection size was small, and the books were published with poor quality paper and inferior printing and binding compared with books in English. The absence of reviewing journals and

other reference tools had further made the selection process of Tamil materials difficult. Special features such as indexes, bibliographies, and illustrations were lacking.

Tamil book publishing tends to be unbalanced, especially in the area of non-fiction. While there is a preponderance of books on literature, there seems to be a dearth of books on computers, self-improvement, and other subjects. Although the participants were generally satisfied with the library in the fulfilment of their information needs, those needs pertaining to the provision of library services to encourage the usage of Tamil were inadequately provided for.

Many participants suggested the following improvements:

- To revamp the Tamil collection to tailor to the needs of the community
- To have better promotion and outreach programmes in Tamil
- To encourage writing of book reviews
- To organize book displays
- To consolidate book lists
- To recruit Friends of the Library
- To organize community involvement programmes
- To organize library talks
- To organize programmes with the media
- To organize programmes for children
- To organize user orientation programmes
- To conduct class visits
- To develop a portal for the Tamil community
- To have translation services
- To implement an online Tamil catalogue system.

### **Accessibility**

Many participants said that services to the Tamil community should be more accessible. It has been noted that a low number of Tamils visit the library. Perhaps they are either using Internet resources at home or buying their own books. The challenge to the library is to bring its services to the community.

### **Mobile Libraries for Tamil Collections**

Participants stated that there are many elderly Tamils who are unable to use the library because they may be physically challenged. There may be others who belong to the lower income group and cannot afford to visit

the library frequently. A mobile library where the charges can be subsidized by the civic organizations was suggested. One participant commented, "I really hope that the library can do something to help the Tamils who are poor, so poor that they cannot buy books of their own; these people need the library more than anyone of us."

### **Home Delivery Services for Tamil Books**

The majority of the participants indicated their interest in home delivery services for Tamil books. They stated that it would be one good way to circulate the Tamil collection. Some said the library could even charge a nominal fee for the service.

### **Internet Services in Tamil**

An electronic village or virtual community that can provide Internet resources would help the community to have links with the Tamil language. Via the Web, the library can inter-connect with other resources in the Tamil language as well as libraries throughout the world with the best Tamil collections. Eleven participants were in favour of this idea. They would like to be exposed to more electronic resources in Tamil. They felt that ongoing technological changes could result in higher levels of services to the Tamil community. The Tamil collection needs to keep abreast of technological advances or will have to risk being irrelevant to Tamil users. Many traditional and new forms of information in Tamil could be collected, stored, and transmitted in digital forms.

### **One Regional Centre for Tamil Studies**

There is a dire need to consolidate all the Tamil resources in one place. Many participants would like to see a regional centre for Tamil studies. One participant stated, "There is [are] Chinese studies, Malay studies, but no Tamil studies in the local Universities." Another said, "There is no single Tamil book in the libraries of National University of Singapore."

One way to encourage the continued learning of the ethnic language is to provide resources in such higher institutions as universities. The findings of this study indicate a need to offer Tamil studies as a subject in the local universities. Mani (1993) stated that there is an urgent need to adopt a promotional policy of the Tamil language: "a systemic development of Tamil language as a literary studies [programme] at the highest academic levels would uplift the status of the use of Tamil language" (p.115).

The findings suggest that there was no adequate provision of library services to the Tamil community and that such provision would enhance the use of Tamil language in Singapore by having a significant impact on the perceptions and expectations of the user.

### **Conclusions Based on the Focus Group**

This study of the Tamil community's expectations of services designed for them concurs with the literature that provision of library services for the ethnic minority is essential in order to develop professional library service.

### **Further Research**

Since there are myriad Indian languages in Singapore, the requirement to meet the language needs of all in the Indian community in Singapore is a concern for the future. The needs of those who are fluent and seek materials in other Indian languages such as Hindi and Punjabi will have to be addressed accordingly.

### **General Collection Development Policy**

**General Collections:** The current General Collection Development Policy is intended to serve as a guideline to build and maintain the substantive resource collections of the AUC Libraries and Learning Technologies. The Library is the chief information resource of the University, and is obliged to maintain collections offering information on a wide variety of subjects, including those undergoing rapid development and those disciplines in which research is being done.

Collections are divided between two library facilities, the Main Library and the Rare Books and Special Collections Library. The Collections provide the academic community with the largest English language research collections in Egypt. The Media Services collection of audiovisual media, and the reference media (such as databases and electronic encyclopedias) are housed in the Main Library. Within the Main Library is a "Main Special Collection" of valuable rare and fragile books.

### **Goals of the Library**

All collections are built with the goal to support the University's varied academic and research programmes at both the undergraduate and graduate levels, and to a lesser extent independent researchers. The guidelines in the Policy will assist in developing system-wide collection development policies that will serve as planning documents and working tools for selectors, aid communications between the libraries and with users, and assure consistent and balanced growth of the collections.

The AUC Library strives for excellence in providing the information resources and services to support the University's curricular and research activities at the undergraduate and graduate levels, and to provide resources to graduate students, scholars and researchers from Egyptian and international institutions.

Students who are attending the Centre for Adult and Continuing Education (CACE) programmes are eligible to use the Library. The CACE provides certificate programmes, non-credit semester length courses and variable length customized courses to fulfil the continuing education needs of individuals and organizations in Egypt and the Middle East.

The AUC Library provides cooperative support to the Egyptian national universities, for it allows Ph.D. and Masters candidates who are working on their dissertations and theses to access its facilities and use its resources, provided they observe the AUC Libraries Visitors Policy.

### **Mission Statement**

The Library's objective is to develop its services in the new technological environment, and is consistently meeting the requirements for accreditation of the United States Commission of Higher Education of the Middle States Association of Colleges and Schools, and the standards and guidelines of the Association of College and Research Library (ACRL) Standards and Guidelines.

### **Freedom of Academic Expression**

The AUC Library supports the University's policy of advancing the ideals of American liberal arts and professional education, freedom of academic expression, the free exchange of ideas and information, the healthy debate of divergent ideas, and the promotion of open and on-going interaction with scholarly institutions throughout Egypt and other parts of the world.

The University has been historically dedicated for the free expression of divergent beliefs and values, and as the Library is the repository for any form of knowledge, it opposes censorship of library materials. The Library also endeavours to adhere to the principles stipulated by the American Library Association's (ALA) Library Bill of Rights when carrying out its collection development activities: "Books and other library resources should be provided for the interest, information and enlightenment of all people of the Community the library serves. Materials should not be excluded because of the origin, background, or views of those contributing to their creation.

**Copyright:** Under the U.S. Copyright Law and the National Commission on New Technological Uses of Copyrighted Works (CONTU) Guidelines, the Library may make "an archival (back-up) copy for the sole purpose of protecting its investment from loss."

The Library follows the "Fair Use Guidelines" incorporated into the legislative history accompanying the 1976 U.S. Copyright Act and subsequent Amendments. Neither the Copyright Act nor the "Fair Use

Guidelines” apply to published and unpublished works in the public domain. Since the Library adheres to international copyright conventions, it forbids multiple copies by one person, copying more than one article from the same issue of a journal, or copying more than 10% of a single work which is under copyright (e.g. book).

### **Policies Governing the Acquisition of Materials**

The Library collects materials and other information resources in different types of formats so long as they meet the selection criteria and needs of the academic community. Print monographs and serials remain the chief formats but increasingly information materials are being produced in a variety of media. Significant instructional and research tools also include databases available on the Internet, compact discs, and other microcomputer software. The Library also has a growing collection of videotapes and other audiovisual materials. Use is defined by the terms of the relevant licenses.

Deciding which medium or format to acquire is also part of the collection development decision process. The Library strives to build collections that incorporate all forms of scholarly communication. In each discipline, we attempt to establish a collection consisting of every appropriate format in a quantity proportional to its value for practitioners of the discipline.

**Language:** The primary language is English as it is the language of instruction at the University. Relevant materials are generally collected in Arabic, and to a lesser extent in other major Western languages. Furthermore, given the unique strength of multiple linguistic communities in Cairo and the University’s decision to offer a liberal education, works in major Western and Arabic languages such as novels, plays, histories and other literary works, particularly materials acquired by donation, will be added to the collection. For purchased materials, determining which language to select is also part of the collection development decision responsibility.

**Access Vs. Ownership:** Limited budgets, space restrictions, and in AUC’s case the Library may not acquire in a timely manner everything currently available in a subject area, due to the geographical constraints as usually the shipment of materials from abroad is slow. The Library can, however, endeavour to facilitate access of the materials located elsewhere that the faculty, students and other researchers may need by providing, for example, Internet access to full-text databases such as journals or collections of journal articles.

The Library may choose not to receive a print copy of a journal but will provide access to it electronically, or offer timely document delivery services that are rapidly provided by another source for acquiring articles



in journals and short sections of books that are subject to copyright law. The Library also arranges resource-sharing agreements with other libraries to facilitate access to information for AUC faculty, students and other researchers.

It is a member of the Research Library Group (RLG), and its SHARES programme, which is an international alliance of over 160 members, including universities and colleges, national libraries, archives, historical societies, museum and independent research collections, and public libraries.

**Electronic Resources:** Electronic resources are acquired selectively based on content, access, full image or full text, price, and ease of use.

- Content: governed by subject. Should enrich and/or complement the print collections or replace lesser used, difficult to acquire, or extremely expensive print alternatives.
- Access: IP access to the full database is preferred. Limited access, password access, or terminal-specific access may affect the decision negatively.
- Image/text: Full image is preferred for electronic versions of print publications.
- Price: value for price, cooperative purchase prices, savings from print budgets, subscription vs. per use pricing, and net cost are considerations.
- Ease of use: Electronic resources vary widely in the interface provided. Some are available through other suppliers as well as from the original publisher. The interface chosen should be easy to use, appropriate to AUC's users population, and offer full access to the database's capabilities.

**Microforms:** Libraries initially invested in microforms as a means of compact, permanent storage of print journals and other serials. This was particularly true of newspapers, which are published on poor paper and in an awkward size for shelving and use as bound volumes. In the last twenty years, microforms have become a major preservation medium as well as a medium for original publication.

The latter has been particularly valuable as it has allowed the dissemination of unpublished manuscripts, papers, and reports to a wide audience, enriching many library collections far beyond what would be possible in the print collections alone. Some preservation products have had a similar enriching effect on individual library resources while serving the primary purpose of preservation of rapidly deteriorating book stock from the late 19th century.

The Library contains both microform copies of print journals and newspapers and research collections. The latter include:

- *Confidential U.S. State Department Central Files. Egypt/United Arab Republic, 1960-January 1963 Internal Affairs and Foreign/* [microforms]. Project Coordinator, Robert E. Lester, 2002.
- *British Documents on Foreign Affairs-Public Records of Great Britain—Middle East, 1911-20*. Published by Kraus-Thomson Organization Limited (to be catalogued).

When the budget allows, the library considers microform purchases taking into consideration the following criteria:

- Expense of the print or electronic version;
- Frequency of use of the print;
- Shelf space saved by conversion to microform;
- The materials cannot easily be acquired, *e.g.* out of print, unpublished materials.
- As a preservation copy when the print is fragile, deteriorating, or unusable due to poor paper and age.

### **Current and Retrospective Coverage**

Though the Library's emphasis is on the acquisition of current resources in all subject areas, it endeavours to acquire retrospective works as needed to strengthen and round out collections particularly in disciplines where retrospective works are deemed of special importance or in the areas of excellence as identified by the University and the Library.

### **Journals**

Journals and serial literature are essential parts of an academic library collection. For some disciplines, such as the sciences, the journal literature is by far the more important information resource because of its currency. For other disciplines, such as history, monographs may share equal or even more importance to teaching and research. Achieving the proper balance of journal titles to monographs as current acquisitions is one of the challenges of proper collection management which is the responsibility of the Collection Development Committee.

### **Textbooks**

The Library purchases one copy of every textbook available at the AUC Bookstore and places it on Reserve. Although textbooks should be purchased by students at the AUC Bookstore, the Library makes an exception to this policy due to the constraints of acquiring materials that are not available locally. Those textbooks are purchased for the collection because they provide information on a subject or curricular areas, and are

valuable because they are recommended by the faculty, or they are the only sources of information on a subject. Textbooks are removed from Reserve at the end of Semester and added to the regular collection.

### **Auc Master's Theses**

A copy of all AUC Master's theses is deposited in the AUC Library. Print copies of theses are not considered as part of the circulating collections and are kept in the Wallace Annex area on the ground floor. A second copy of the theses is copied onto microfiche and is kept in the Wallace Annex. The Library acquires unpublished theses and dissertations from Egyptian and international institutions that deal with subjects related to Egypt. The criteria for selecting material of this type is based on two main factors:

- Quality of theses or dissertations to support the research programmes
- Need of theses or dissertations for particular projects conducted by AUC community.

All theses and dissertations whether in print or microforms are catalogued.

### **Gifts and Donations**

**Monographs and Non-Serials Gifts:** The Library actively solicits and accepts gifts to enhance its collections. These may be journals that could replace missing or damaged issues or whole collections of monographs. However, the Library reserves the right to refuse any gift or conditions of donation if the restrictions are incompatible with the Library's mission or impede the Library's ability to act efficiently and responsibly in the handling of resources and the spending of funds. The Director of Collection Development attempts to discuss donations with donors before accepting them.

If the gifts appear highly duplicative (particularly in the case of serials) or unsuitable for an academic library, we suggest alternative recipients. We inform all donors that the Library alone will decide whether the materials will be accepted and where they will be placed in the Library or eventually discarded. The Library is particularly open to historical rare and special information materials suitable for the Rare Books and Special Collections Library and the Main Special Collections area in the Main Library. The Library is endeavoring to become a unique and recognized information resource in certain areas in which retrospective collections are important, notably architecture, culture, economic conditions, Egyptology, Islamic literature, Middle East politics, music, religion.

**Gift Journals:** Replacement copies of journals are always welcome. Long runs of journals to which the Library does not currently subscribe

will only be considered if extremely relevant to current programmes and research. Gift subscriptions may be considered but only if unconditional and with some guarantee of ongoing support from the donor.

**Policies for Accepting Gifts:** The following considerations should apply to the acceptance of donations and gifts to the Library:

- The Library will not accept gifts that are not useful for the purpose of study and research by the AUC community.
- The Library owns the right of ownership once gifts are donated by the donor. Donations are irrevocable.
- The Library may dispose of gifts to its best advantage. Such disposition may include:
  - To retain the gift in the Library
  - To transfer it to other departments of the University.
  - To donate gifts that are needed to other national libraries.
  - Appropriate recognition should be given to the donor upon his/her request, by placing a label or plaque on the inside of the front page of the gift showing the donor's name.

### **Replacements, Reprints, Out-of-print**

The Library replaces torn-out, damaged, or lost material. Reprints are purchased to replace materials that are torn or missing, or that they are essential to include because of their academic value. Items of reprints that are already in the collection, and are in good condition, are not acquired.

Resources that are out-of-print are increasingly easier to acquire through the World Wide Web. More recent editions of books published prior to 1945 are generally preferred.

### **Library Centre of Excellence for Middle Eastern and Arab Cultures**

**Purpose:** The AUC Library has recently established a Centre of Excellence for Middle Eastern Arab Cultures in the Library. This Centre is dedicated to support the interdisciplinary programmes, and to embrace all disciplines in the humanities and the social sciences. It supports the curricula of Middle East Studies at the undergraduate and graduate levels, faculty, and scholars from the international academic community. It is intended to promote the study of the Middle East and Arab history, culture and heritage in a larger number of academic departments, and to facilitate the flow of information about them at the AUC, in the Egyptian and Arab world communities, and beyond.

**Scope:** The Collection Development in Middle Eastern Studies will endeavour to supplement the current collection to include more comprehensive sources.

The collection would be prioritized as follows:

- Primary focus will be on Egypt
- Secondary focus will be on the broader Arab world
- Third level of focus will be on the Middle East in general.

**Language:** The collection will consist of materials in European languages, particularly in English and French. It will also include modern and classical Arabic, including the vernacular component, and will be collected selectively in Egyptian, Coptic, Hebrew, Persian and Ottoman Turkish languages when considered appropriate for the collection.

**Geographical Areas:** Areas that will be the main priority in selection will include countries from North Africa and the Middle East including Israel, stretching from Morocco to Afghanistan, and to a lesser extent sub-Saharan Africa, Central Asia, Pakistan and Muslim India. The collection would encompass countries that have impact on the Middle East from ancient times to the present.

**Chronology:** The collection includes a broad spectrum of chronology, from the Ancient Near East to the present.

### **Maps Collection**

The collection is selective, and supports the instructional needs of the University. The Library has recently acquired maps depicting political divisions, populated places, physical features, infrastructure, economic conditions, historical accounts, and other subject matter related to Egypt and the Arab countries. Topographical and geological maps of the Nile Valley and various rural and urban areas in Egypt are among the collection. The collection also includes road maps of cities in Cairo and Alexandria, in addition to world maps. Medium-scale coverage-1:100,000 and 1:50,000 is appropriate for the selection.

### **Auc Press and Faculty Publications**

AUC Library acquires on regular basis two copies of any publication published by the AUC Press or faculty members during their tenure at the university. A copy will be placed in the Main Library, and the other in the Special Collections. Faculty publications that appear in the form of unpublished dissertations, theses or articles in journals are not acquired unless their subject matter or topics relate to the instructional and research needs of the courses taught at the University. Monographic gifts of faculty publications are also a welcome addition.

### **Reserve Services**

Books needed for reserve will be acquired rush with overnight delivery as needed whenever possible.

The Reserve policy allows maximum use of classroom assigned materials. Teaching faculty may provide their personal copies of books and articles, or request that books be transferred from the general Library collection to the Reserve Section. Articles that are needed for courses and are included in the journals that the Library owns are photocopied and submitted at the Reserve Section.

Reserve requests should be submitted on the appropriate forms, available at the Reserve Desk on the first floor of the Main Library. All items must be submitted on the form provided, giving complete information including desired loan period, author, title, call number.

Ideally reserve requests should be submitted at least 15 days before the beginning of the semester to ensure that material is available in time for classes.

### **Rare Books and Special Collections Library**

The AUC Rare Books and Special Collections Library (RBSC) is a branch of the AUC Library. It operates as a scholarly research facility and a teaching resource centre specializing in the civilization of ancient, medieval, Modern Egypt, and the Middle East. The special collections include rare materials such as the *Description de l’Egypte*, the *Creswell Library of Islamic Art and Architecture*, and the collections of *Max Debbane*, *Selim Hassan*, *Labib Habachi*, *Mahmoud Saba’*, and most recently of *Hassan Fathy*, and the world-class photographer *Van Leo*. The current holdings of over 50,000 books, manuscripts, photographs, slides, maps and plans attract researchers from all over the world. Scholars and other researchers should find it a wealth of otherwise unavailable or scattered information, and some areas are considered complete, rare and valuable resources. Very special titles may eventually be scanned and downloaded in the Library’s Web page for the use of international scholars. The Library also owns a collection of historical maps and atlases that are rare, and are housed in the Rare Books and Special Collections Library.

### **The Special Collection in the Main Library**

Valuable rare and fragile books in the Main Library make up the “Special Collection.” The Library has collected and continues to acquire principally through donation materials too precious to risk damage, decay and loss in the open stacks. Such valuable materials judged inappropriate for the Rare Books and Special Collections Library are then considered for the Special Collection. The Main “Special Collection” also contains many first editions, author-signed copies and other valuable books which are gradually being transferred to the “Special Collection” in the Main Library. The “Special Collection” in the Main Library includes many rare materials about Egypt, the Middle East and other topics. Scholars and



other researchers should find it a wealth of otherwise unavailable or scattered information. Materials in the Special Collection and the Rare Books and Special Collections Library serve to comprise a complete and rare collection in certain areas. Sections of these collections have particular relevance to the teaching and research community at the University.

### **University Archives**

Materials relating to the history of the AUC since it was founded in 1919 to the present are preserved and maintained in University Archives. It serves as the depository of University publications of historical significance and research value. The collection includes manuscripts, publications of the University and its Press, correspondence, photographs, memoranda, records, and other documents pertaining to functions held at the University and the activities of its students, faculty and staff.

### **General Collections Guidelines**

The parameters of the collection building should include the following:

**Language:** This area identifies the languages in which material is collected, which includes particularly English and French, and to a lesser extent other European languages. Modern and classical Arabic is also emphasized.

**Chronology:** Limitations and decision for inclusion of materials are determined by subject areas, the needs of courses taught, and research that is conducted by the AUC community and international scholars. Rare historical and archival materials that were published in earlier centuries, are a major consideration for inclusion, in addition to valuable outdated materials, and out-of-print materials.

**Subject Area Coverage:** Emphasis is on Egypt and the Middle East, with particular focus on the political, economical, developmental, historical issues pertinent to the region. Broad but selective international coverage will be also included, and some subject areas will receive more attention based on the needs of the academic programmes and areas of excellence.

**Geographical Areas:** This identifies the geographical areas in which materials are collected. Areas that are particularly prioritized include North Africa and the Middle East.

**Date of Publication:** Selectors have to consider the date of publication of the source as one of the determining factors when acquiring materials.

**Types of Materials and Format:** The Library collects materials in all formats so long as the materials meet the selection criteria.

**Books That are Subject to Limited Circulation in the Library Are Placed on Reserve:** Some types of materials are problematic, for they

may be perceived as libel by the Egyptian Censorship Office staff, and are subject to scrutiny by them, alleging that they would incite some type of religious or doctrinal controversy. They would also include types of materials that contain sexual implications, terminology, profanity or violence.

**Subject Area Coverage:** Emphasis is on Egypt and the Middle East, with particular focus on the political, economical, developmental, historical issues pertinent to the region. Broad but selective international coverage will be also included, and some subject areas will receive more attention based on the needs of the academic programmes and areas of excellence.

**Collection Depth Indicator Definitions:** The WLN collection level codes below run from numbers from 0 through 5, and they describe the three above levels of collection activities.

**Out of Scope:** The library does not intentionally collect materials on this subject.

1. Minimal Information Level
2. Basic Information Level
3. Study or Instructional Support Level
4. Research Level
5. Comprehensive Level.

**Calcutta Public Library (CPL):** Calcutta Public Library was established in 1836. It was not a Government institution. It was running on a proprietary basis. Every person subscribing Rs. 300/- in one payment or three instalments was to be considered a proprietor. Poor students and others were allowed to use the library free of charge for a specified period of time. The then Governor General, Lord Metcalf transferred 4,675 volumes from the library of the College of Fort William to the Calcutta Public Library. This and donations of books from individuals formed the nucleus of the library. Prince Dwarkanath Tagore was the first proprietor of the Calcutta Public Library. Both the Indian and foreign books, specially from Britain, were purchased for the library. In the report of 1850 we find that the library started collecting books in Gujarati, Marathi, Pali, Ceylonese and Punjabi. Donations were regularly made by individuals as well as by the Government of Bengal and North Western Provinces.

The Calcutta Public Library had a unique position as the first public library in this part of the country. Such a well-organised and efficiently run library was rare even in Europe during the first half of the 19th century. Because of the efforts of the Calcutta Public Library, the National Library has many extremely rare books and journals in its collection.

**The Imperial Library:** The Imperial Library was formed in 1891 by combining a number of Secretariat libraries. Of these, the most important

and interesting was the library of the Home Department, which contained many books formerly belonging to the library of East India College, Fort William and the library of the East India Board in London. But the use of the library was restricted to the superior officers of the Government.

***Amalgamation of CPL and Imperial Library:*** Lord Curzon, the then Governor General of India, was the person who conceived the idea of opening a library for the use of the public. He noticed both the libraries—Imperial Library and Calcutta Public Library—were under-utilised for the want of facilities or restrictions. So, he decided to amalgamate the rich collection of both of these libraries. He was successful in effecting the amalgamation of Calcutta Public Library with the then Imperial Library under certain terms.

The library, called Imperial Library, was formally opened to the public on 30th January 1903 at Metcalf Hall, Kolkata. The aims and objectives of the Imperial Library, well defined in a Notification in the 'Gazette of India' as—'It is intended that it should be a library of reference, a working place for students and a repository of material for the future historians of India, in which, so far as possible, every work written about India, at any time, can be seen and read.'

John Macfarlane, the Asst. Librarian of the British Museum, London, was appointed as the first Librarian of the Imperial Library. After his death, the famous scholar and linguist Harinath De took over the charge of the library. After his death J. A. Chapman became the librarian. Mr. Chapman showed keen interest in the affairs of the library and tried hard to improve its status. After his retirement, Khan Bahadur M.A. Asadulla was appointed as the librarian and he continued as the librarian till July 1947.

The policy of acquisition broadly adhered to by the Imperial Library was enunciated by Lord Curzon in his speech at the opening ceremony of the library,—“The general idea of the whole Library is that it should contain all the books that have been written about India in popular tongues, with such additions as are required to make it a good all-round library of standard works of reference.”

***Declaring the Imperial Library as the National Library:*** After the independence the Government of India changed the name of the Imperial Library as the National Library, with an enactment of the Imperial Library (change of name) Act 1948. and the collection was shifted from the Esplanade to the present Belvedere Estate. On 1st February 1953 the National Library was opened to the public, inaugurated by Maulana Abul Kalam Azad. Sri B.S. Kesavan was appointed as the first librarian of the National Library.

### **Collections**

**Indian Languages Collection:** National Library receives books and periodicals in almost all the Indian languages. These are received under the Delivery of Books & Newspapers (Public Libraries) Act 1954. (D.B. Act). Language divisions acquire, process and provide the reading materials to the readers in their respective languages. Hindi, Kashmiri, Punjabi, Sindhi, Telugu and Urdu language divisions maintain their own stacks. Other language books are stacked by the stack division. Language divisions are also responsible to answer the short and long range reference queries.

The library has separate Indian language division for Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Malayalam, Marathi, Oriya, Punjabi, Sanskrit, Sindhi, Tamil, Telugu and Urdu Languages. Sanskrit language division also collects and process Pali and Prakrit books. English books published in India are also collected under D.B. Act.

**Newspapers and Periodicals:** All the newspapers and periodicals of Indian languages are received and processed in their respective language divisions. But English newspapers and periodicals—both the Indian and foreign, are acquired and processed separately. Separate Serials division is responsible for acquiring and processing of English Newspapers and periodicals. Library has a rich collection of late 19th and early 20th century newspapers and periodicals, but almost all of them are incomplete. The catalogue of periodicals, newspapers and gazettes available in the library up to 1953 is available.

**Maps and Prints:** The library has a rich collection of maps. The collection ranges from 17th century onwards. Indian topographical sheets of earlier days (at scale of one inch, half inch and quarter inch to a mile) and maps of natural resources, population, transport and communication systems, agricultural production, Soil, Vegetation and Geology of India form the major part of the collection. At present the library has 85,000 printed maps, 54 cartographic manuscripts and 280 atlases

**Conservation Activities:** One of the basic functions of the National Library is to conserve the printed heritage to the future generations. For this purpose the library has separate divisions for physical, chemical, reprographic and digital conservations.

**Digitisation (Down the memory lane):** The scanning and archiving of rare and brittle books and other documents on compact disc is under taken. English books and documents published before 1900 and Indian publications of pre 1920 are considered for digitisation. So far 6,600 selected books in Indian and English languages have already been scanned and stored on 548 CDs—a total of over 25,00,000 pages.

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