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The LIBER Silver Jubilee in Malta
Opening Remarks of the President

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For the first time in its history LIBER is having its Annual Conference on Malta, in the deep South of Europe. We are grateful to Dr. Paul Xuereb, Director of the Library of the University of Malta for his invitation which was received with excitement and, as we can see today, accepted with great enthusiasm. To many of us this Conference has given the first opportunity to visit Malta and to get acquainted with this famous island, located on the crossroads of European history. I want to thank you, Dr. Xuereb, for all the efforts you and your staff have made to prepare the Conference.

Dear Rector, we are indebted to you for your support and your kindness to put the University premises at our disposal. Professor Salvino Busuttil, Director General of the Foundation for International Studies, has kindly opened to us this magnificent Aula Magna as well as other premises of his Foundation. We greatly appreciate your valuable support and congratulate your Foundation, which this week is celebrating its 10th anniversary.

Mr. Michael Falzon, Minister of Education and Human Resources has supported and encouraged the organization of this Conference. Mr. Minister, we express our deep gratitude to you for your help as well as your willingness to address us personally at the opening ceremony.

Dr. Guido de Marco, Minister of Foreign Affairs , has kindly accepted the invitation to deliver the keynote speech about Malta and the Mediterranean. We are grateful to you, Mr. Minister, that you, being the most authoritative person on this subject, wanted to do us this honour. To set up a major meeting such as our General Conference requires big efforts of a great number of people. Without mentioning any names I want to thank all of you most warmly for your contributions.

Ladies and Gentlemen! LIBER was founded in 1971 under the auspices of the Council of Europe. Today LIBER still has a special observer status at that Council. It goes without saying that during its 25 years LIBER has changed greatly and so has the whole of Europe. Due to the efforts of its members LIBER has become a well established organization. It has grown to an association with more than 300 member libraries in all parts of Europe. It has also established liaisons with many other European organizations.

At the beginning of the 70's Europe was still divided into two blocks which were hostile to one another. Having the events of Czechoslovakia in mind, which took place only three years before the foundation of LIBER, the beginning of our work took place in the circumstances of the Cold War. The harsh political atmosphere deeply penetrated the cooperation between libraries. In contrast with Unesco, the Council of Europe was in the East regarded as an organization of the capitalistic West. In an authoritative handbook of librarianship, published in Eastern Germany, LIBER, therefore, was branded as a questionable, politically biased association.

It is only fair to say that LIBER did not consider itself a political weapon of the Western block. This, of course, can be said only on the condition that cooperation between West-European libraries will not be taken as a political act per se. Librarians active in the work of LIBER were, of course, aware of the division of Europe. They also knew that the scope of LIBER was limited

to the West. But that was their part, or, better expressed, our part of the world and we did not have any illusions about our power to change the political circumstances, even if we tried to maintain contacts across the boundaries between the blocks.

On the other hand, LIBER has always committed itself to freedom, freedomof speech and freedom of the printed word. It is true that the name of our association, can be understood as a manifesto, a library association of the free Europe. But if this is politics, we all might be glad to support it.

When looking at the recent development of networks and networked information we can say that this development could not have taken place without the freedom of information. Later historians will certainly ask a number of questions about the interdependence of technological development and the collaps of centrally planned economies.

It is with a special pleasure I can say that LIBER was interested in improving its relationship with the East-European libraries already at an early stage. With the support of the Council of Europe, programmes were launched to promote a modernization of East-European librarianship long before libraries were entitled to become members of LIBER. We are delighted that so many libraries from the former socialist countries havejoined our association.

As a pan-European organization LIBER is fully aware of the fact that-Europe has not only been divided between East and West. There has also been a division between South and North. LIBER has traditionally paid great attention to this division. Deliberate efforts have been made to arrange Annual Meetings in the Mediterranean countries, in places such as Rome, Florence, Madrid, Padua, Lisbon and now Msida, Malta. The role oflibraries and librarians from the Southern parts of Europe could, however, be much more visible in our work. We would be happy to see an increasing engagement of our South-European colleagues in the work of our Divisions.

Parallel to the political development in Europe, librarianship, as well as the whole world of learning have undergone dramatic changes. The rapid change of the conditions of library work is only partially caused by technological inventions. If we want to summarize the main reasons for the changes we could mention at least the following factors: 1. the price of the work and library materials is increasing constantly, 2. libraries together with their universities are subject to an increasing economical pressure, 3.requirements to achieve more with less, combined with a new budgetary policy generate new demands on the priorities and management styles in libraries, 4. the emerging networks are changing the whole environment where libraries work.

In many countries governments have drafted national information strategies. With the help of these strategies governments want to create atechnical environment which will be necessary for the future.

It is important that an information strategy is more than merely a technical development programme. It is vital for the whole society to create a strategy of content also. In that context libraries would have their given place. According to my understanding such a strategy should also cover the traditional library collections, because they will not cease to exist and because the information included in them will be made available via networks, even if the collections themselves will not be digitized. A true information policy has to make sure that the needs of the country will be met regardless of the formats in which information is made available. A major part of all information will even in the future be available in printed form only.

There are all reasons to emphasize this aspect because a strong scepticism about the need of the printed collections seem to prevail in some quarters. There are many people who assume that the Internet in one form or another will provide all information you need. This is a widely spread populistic opinion which, unfortunately, has been given a progressive flavour.

If it is becoming old fashioned to speak about printed books and journals, it might soon also become unnecessary to spend money on them. This is a dangerous heresy which will weaken the conditions of high level research in a drastic way. During a foreseeable future no centres of excellence can exist without good collections of printed books and journals combined with an access to the networked information.

A lively discussion about the future role of libraries seems to go on in many countries. To make sure that libraries are regarded as serious players in the digital environment they have to improve their competitiveness both intellectually and professionally. We have to be excellent in the use of electronic means, of course. That, however, is not enough. Computing centres have similar qualities and may be even better. To make sure that libraries will have a role in the future they have to develop their intellectual capacity. Instead of being technical service units they should become expert organizations in the subject fields they are serving. This will, of course, have far reaching consequences on the staffing of libraries.

Ladies and gentlemen! It is my hope that we at our meeting here in Malta would debate more the rationale of library work than details of technology. We will need a powerful scenario to guide our libraries into the next millenium. We can best achieve this goal together, by sharing our knowledge and expertise. The networked working environment of the future will anyway be an international environment.

But we should not forget ourselves as human beings, as men and women of culture. We have to cultivate our own personalities as well. Here in Malta we have an excellent opportunity to meet each other and to learn more about the roots of our culture when getting acquinted with the past and present Malta. Here we are met by history at every step. Please, make use of this opportunity.

I wish you a pleasant and rewarding meeting in Malta and declare the Conference opened.

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The implications of the electronic library for collection development in the Netherlands

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> "An Electronic Library is a library which gives users online access not only to its OPAC for printed library materials, but also to a variety of other electronic resources located both within and outside the library" (Costers, 1994).

Resource sharing in Dutch academic libraries

Resource sharing is not a new phenomenon among academic libraries, but it has received renewed attention for two reasons. First, the rapid progress in digitizing information promises to make resource sharing very fast and easy. Second, the combination of the 'electronic library' and increased resource sharing offers hope for a reduction in the escalating costs of academic libraries.In recent decades the purchasing power of academic libraries in the Netherlands has declined sharply because of stagnant budgets. At the same time the user demand for information resources is increasing and becomes even more

variegated because of an increase in interdisciplinary research and specialisation and new documentary resources; there is an exponential increase in the volume of new publications (complicated by the increase in formats, media, and technology), and the costs of these materials are continuously rising. Libraries can no longer be expected to support research from their own collections. Adequate national collection development, however, is of utmost importance if the Dutch infrastructure for education and research is to be maintained for present and future generations, but this cannot be realized if budgets stay at their present levels. In this critical situation the most obvious solution seems to be *resource sharing*, that is: 1) improved access and document delivery, and 2) coordinated collection development.

The electronic infrastructure to improve access to and delivery of information resources

For the period 1970-1990 the *automation* of the card catalog and of major internal library processes was the *paradigm* of change in research libraries. This processing revolution led to substantially improved efficiency levels in technical services, catalog access, and circulation. PICA, the Centre for Library Automation and Networking in the Netherlands, played an important role in this activities. Especially through its central services such as the Shared Cataloguing System (operational since 1979) in which the new titles of the Library of Congress, the British National Bibliography and the Deutsche Bibliothek are downloaded weekly, while the titles of the Dutch National Bibliography are entered online by the Koninklijke Bibliotheek (National Library of the Netherlands) and are then directly available to the participating libraries. Another central service is the Dutch Union Catalogue which offers interlibrary loan facilities and access to centrally stored reference databases. A second type of service is concerned with the development and exploitation of local library systems. This transformation of processing, however, only had consequences for the retrieval

and availability of the inhouse collections. The use of these facilities depended on the patrons who physically visited the library.

The tools created by this wave of change have been supplemented with access to offline and online databases and to shared utilities such as the Open Library Network (OBN), developed in 1989 by PICA, with the financial support of SURFnet, the scientific research network organization of the Netherlands. The concept of OBN is that systems of various libraries are linked online witheach other and with the central PICA-system. This electronic network marked the beginning of a new era. *Access* became the *paradigm* of the 1990s, that is: improvement of the delivery of information resources among libraries with more widespread user self-service. Since 1993 the OBN has been expanded with direct end user access to the PICA Online Contents database with entries of articles from 12.500 most frequently used periodicals in Dutch libraries, which is connected with the document delivery system RAPDOC. Since 1994 the Dutch Union Catalogue, containing the holdings of more than 200 Dutch libraries, with more than 7 million book titles and 455.000 serial titles, has also been accessible by means of the OBN. End users can make a direct loan or document delivery request and pay by deposit account: a copy of an article is delivered within 48 hours at the user-defined (electronic) address, and a book is delivered within 4 days to the library of which the user who ordered the item is a member. This library registers the actual loan in its circulation control system and is responsible for returning the item to the supplying library. So, for the user the combined collections of libraries working together in the OBN function as if they are part of one large collection ('electronic or virtual library') from which the desired publications can be requested for loan or as a copy, thanks to national cooperation and collectively forming a strong distribution network for information (Costers & Koopman, 1995; Klugkist, 1995).

We can say that the infrastructure to share resources, that is: access to bibliographic records, to local collections, to other collections, to the information highway, and so on is very well organized in the Netherlands. But although the infrastructure is very well organized, the *electronic functions* of giving access to data inside or outside the library are *supplementary* to the *traditional functions* of building up and managing a collection. Together they make up the quality of the library service. Being able to see where all kinds of information is stored, but not being able to get this information, does not lead to widespread user satisfaction. The availability of needed information is the most important aspect. The question, however, is: does the sum of the individual research collections make up for an adequate national research collection?

Coordinated collection development

The driving motive behind sharing resources today is the rising cost of library materials (with the additional expenses for technology), against the background of declining library materials budgets and an explosion in the number and variety of publications. This means that all research libraries are acquiring an ever decreasing portion of the world's publications. Since 1970, academic libraries have spent more money for less information in multiple formats. In 1990 the annual number ofvolumes added to the thirteen university libraries in the Netherlands was 30-50% less compared with 1980, despite the increase of the total acquisition budget by 28%. In spite of many cancellations, serials are claiming more and more of library materials budgets (on average 70%). This means that the level of collection development of books is declining at a fast rate. There will be irrecoverable gaps in the near future. Consequently, coordinated collection development is becoming very necessary.

In 1993 a pragmatic strategy for cooperative collection building, coordinated by the Koninklijke Bibliotheek, was implemented. Instead of a central, overall approach to the whole area of learning and science, the approach is differentiated and directed at discussion groups of collection development librarians, who are responsible for 'their' collections. The instruments for coordinated collection development are the Conspectus method, the Dutch Classification System (NBC) and the Shared Cataloguing System or central database of PICA. Coordinated collection development can only be achieved through cooperative efforts. Albeit on a voluntary basis, there is a commitment to cooperate because the situation is so critical. But before we get this far, there must be made collection and/or collecting profiles of all the participating libraries to get a sound judgement about the strengths, weaknesses, and gaps in the Dutch collections. Lesser used or specialist research materials, in particular, are in danger of falling casualty as collections become more and more restricted or are stripped down to their bare essentials ('core' collecting strategy), thus are becoming increasingly homogeneous, owing to the financial straitjacket. This situation is complicated by the growing importance of information resources in new formats which compete for the limited funds. Cooperative collection development aims at efficient deployment of the - meagre- resources for collection development. In other words: broaden the breadth and coverage ofresearch resources by shifting costs by minimalizing any unnecessary overlap of lesser used or very specialist publications. At the local level, collection and collecting profiles are now (being) made by five of the eleven participants. The existing collection strengths and current collecting intensities are being mapped with the Conspectus method and the NBC. With the Conspectus method the libraries rank their collections and collecting intensities by some 2.000 subject headings of the NBC on ascale of 0 to 5. PICA has developed a facility to record the profiles in the central database. Access to the profiles will also

be offered to end users, to inform them where they can find strong collections on subjects of interest.

The shrinking national collection

In 1995 the Koninklijke Bibliotheek has carried out a mainly quantitative study of the level of current collection development in Dutch academic libraries with regard to 22 disciplines. For each of the disciplines the sum total of recently acquired books and current serial subscriptions - which are registered in the central database - was compared with a sample of recently (1991-1993) acquired books (400 à 500 titles) and current serial subscriptions (200 à 250) of a single authorative German library (a 'Sondersammelgebietsbibliothek'). The quantitative comparison has revealed that the coverage of foreign titles acquired by Dutch libraries as compared with the German academic collections, is a mere 50%. After eliminating those titles considered by collection development librarians to be non-relevant for academic research in the Netherlands, a still unsatisfactory coverage of around 70% is attained. Coverage in a number of humanities disciplines, however, is substantially lower.

The conclusion of this study is that the collections of foreign academic publications in the Netherlands are shrinking. With greater collaboration, improved cooperative collection development and more intensive use of information technology there is a good chance of compensating a part of the backlog. However, the means for achieving this are limited. If the collections become restricted and increasingly homogeneous even less coordination can take place and - despite an efficient inter-library lending network - there will be little left to exchange. To break through the current impasse, additional financial resources are necessary.

From collection development librarian to information specialist

The rapid developments of information technology demand an active role of libraries. There is so much information on offer and the supply is so varied, that the library must guide the user through the 'electronic jungle' to find the specific piece of information which he needs at that precise moment. The very fact that information service is less tied to actually having information in one's own collection makes the quality of service an increasingly important factor. Users want not just access to resources, but also cost-effective delivery: it has to be fast, easy and cheap.

What do those developments mean for the collection development librarian? It means that (s)he has to be well informed about the research and education programmes of the education institution, and about the demand and supply of information. Moreover (s)he must be familiar with computers and computer programmes, with the use of CD-ROMs, online databases and the Internet, and with document delivery services. Continuing education and specialization has become indispensable to re-equip collection development librarians with the skills essential to perform effectively.

The concept of 'collection' is changing in the digital arena. Collections are becoming a combination of traditional library materials (print and non-print) and digital resources ('virtual collection') to which the end user has guaranteed access. This implies that the term 'collection development' gets a broader meaning and that the practice of collection development changes, and also the objectives: to provide end users with efficient access to materials by bibliographic control, fast availability and to provide support services. Just like paper documents, electronic documents are selected, collected, catalogued, stored and will be made available to library users via a standard user-interface. The 'catalog' of the future will be a collection of traditional

bibliographic records, of records of offline electronic documents (CD-ROMs), and a gateway to networked information. Internet and the document-offerings from thousands of servers in the Internet do not form such a controlled environment. It is, however, a challenge for collection development librarians, because of their skills in the identification, selection, evaluation, description, and organization of information resources, to create World Wide Web subject resource collections for an academic audience. In this way they can also expand their own library collections by providing access to networked information which would have otherwise been unavailable (Piontek & Garlock, 1995).

The Internet is becoming very popular in the academic libraries in the Netherlands. In 1993 a Dutch Classification Web (NBW) was set up as a Gopher Service as part of the activities of InfoServices, a national networking information service of which the editorial staff is based in the Koninklijke Bibliotheek (Werf, 1994). Early in 1995 it migrated to the World Wide Web (NBW,1996). The NBW is a system for the retrieval of Internet resources relevant to academic research. The resources are selected and described by collection development librarians and classified according to the Dutch Classification System. At the beginning of 1996 a project was set up to develop the NBW in cooperation with other academic libraries into a national service. One of its main goals is to create an experimental environment for research concerning the selection and indexing of Internet resources. The need is felt for an experimental environment to test new solutions and gain more knowledge and experience in this field. Experiences in the Koninklijke Bibliotheek with the selection, classification and description of Internet resources have given a better understanding of the complexity of the problems related to the development of consistent selection criteria, determination of the level of indexing, instability of Internet resources, identification of documents, the lack of 'metadata',

choice of format for descriptions, etc. Investigation of the issues in a joint venture will prevent libraries from doing the same things allover again. For the collection development librarians this excercition means a considerable extra workload, also because it has to be continuously updated and because of the instability of the Internet resources. This can be frustrating, but on the whole it is an exciting experience to 'surf' the Net and find valuable resources. The NBW-project will be evaluated at the end of 1996.

Conclusion

Information technology has brought about a lot of change in the library community in the Netherlands. Thanks to the improvement of the network and data communication infrastructure, cooperation and library services have been greatly improved, especially with regard to access tocollections and outside databases. This process of change is taking place in a climate of static or declining budgets, rising costs for information and new technological possibilities. The crisis has to be seen as an issue of underfunding as much as overpricing, especially with regard to science serials. The use of electronic networks is transforming the user environment and the whole system of scholarly and scientific communication. The library's role as intermediary is becoming more useroriented. The quality of service becomes an increasingly important factor, because competition has risen among other libraries and between various other parties, all of whom are vying for customers. Libraries, however, have to find the right balance between access and ownership, and this balance will shift over time. Article delivery instead of local collections would massively increase the cost of each use. Besides, for many researchers browsing is an essential part of their work. This means that library collection development and maintenance is a fundamental part of research. Libraries need both strong local collections - especially of books - and a

system that delivers 'just-in-time' copiable items such as periodical articles from other sources (Line, 1996).

Or, like Crawford said: "Libraries of today and tomorrow:

will increasingly offer services to remote users as well as users in the library, although probably never quite as effectively;

must continue to seek innovative ways to provide access to information and materials not locally held, although the physical collection will continue to be a primary tool;

need to adapt tools and techniques that will make extended libraries work, and work well. There are many such tools already in existence and many more will evolve in the years to come." (Crawford, 1995, p. 165).

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Shared Digital Collection Development: the First Steps to the Virtual Library

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I.

"Shared collection development" is actually an old, classical task of libraries, even if putting it into practice has been carried out with varying success in the individual states and regions. "Shared digital collection development" can in part certainly tie up with the experience and structures gained there, but the technical possibilities of digital communication techniques offer partly new possibilities of co-operation and distribution of tasks. Now that in the "virtual library" the boundaries of individual libraries have begun to dissolve, co-operation between libraries can and must play a key role in the development of a "shared digital research library".

In thinking about "shared digital collection development" it is of course not sufficient to concern oneself with the organisational problems of co-operative holding models only. One always has to take into consideration as well that with "digital collections" new structural tasks arise for the libraries. Taking the definition by Peter S Grahams as a starting point, whereby the "digital research library" is a ".....set of electronic information organised for the long

term"[1], it becomes clear that the term collection at a digital library is clearly more comprehensive and with that also less clear, as is the case in a conventional library; because - according to this definition - it is not restricted to documents only, but embraces electronic information in general which can also be databases and not only texts in the strict sense. One could quite rightly, in an extension of the definition by Graham, include conventional documents - which are digitised on request and, via the net, put directly at the disposal of the person making the request - in the material of a digital research library.

Despite the elevated status of co-operation and the technical possibilities of the virtual library, the problems to be solved locally always remain at the lowest level, particularly since digital libraries in general are not created as a new facility but form a new task area of existing, conventional libraries. "Shared digital collection development" can only function if sensible solutions for "local digital collection development" exist.

However, concerning the subject "shared digital collection development" , the following three subject groups should, therefore be addressed:

1. The organisation of the holding development of shared digital libraries: what needs to be done if libraries, in co-operation - be in the framework of co-operative systems or other models, - wish to jointly develop digital libraries?

2. The contents of specialised digital research libraries: what falls under the term "electronic information"? Which forms of digital information essentially belong to the holding development of a digital library? How can such a digital library be created technically?

3. The local holding development, that is the procedures which are to be organised locally at individual libraries: this

1 Peter S. Graham: The Digital Research Library: Tasks and Commitments, 1996 (http://csdl.tamu.edu/DL95/papers/graham/graham.html).

includes queries about internal organisation, but also the type of technique for acquiring electronic information.

So much regarding the subject: "shared digital collection development". "First steps to the virtual library" means that in the main these questions cannot be discussed in a theoretical manner but, first and foremost, an attempt must be made with concrete examples and planned projects - essentially from Germany - to show to what extend first concrete attempts at solutions have been made, which can form the basis for digital research libraries. With this, essentially the following projects and planned projects are addressed:

The WEBIS project; the SSG-Fachinformationsprojekt (SSG Specialized Information Project); the MEDOC project; the concept of new information structures for science through the associations of German Mathematicians, Physicists, Chemists and Computer Scientists as well as the WEBDOC-Project.

II.

The decisive problem in the realisation of a digital library is in the mean time no longer technical, but organisational and therefore also inner-librarian. Librarians have to agree on a concept how subject areas will be distributed to individual libraries, how the pertaining financial arrangements can be structured and, to me this appears to be an essential aspect, how mutual comprehensive access to these digital information resources can be organised for the user and ensured in the long run.

In Great Britain attempts are made to implement such a concept with project Catriona. In Germany are first beginnings which take up on the existing concept of the "Sondersammelgebiets-Plan" (SSG), special subjects field programme, sponsored and supervised by the Deutsche Forschungsgemeinschaft (DFG) (German Research Society). The

entire spectrum of knowledge is thus divided up into 110 main subject fields and supervised by a total of 36 libraries. There the relevant scientific literature is acquired as completely as possible. In compensation for the financial support by the DFG for the holding development, the libraries agree to make the acquired holdings available to the national loan service without restrictions[2].

It is obvious that this collective order must also apply to digital media. Basically the concept of the special subject fields programme, especially with the new possibilities of the networks, will come really to its own with the technical basis for direct access to shared main collection areas. Then the user wouldn't be longer, as before, dependent on inter-library loan orders. There is no question that SSG-libraries have already started to offer their services via Internet: first Online-Document Ordering and -Delivery Services have already been implemented and some libraries meanwhile also offer access to their catalogues, Current-Contents-Services and new acquisition lists via the net and are beginning to develop their own document servers[3].

It is naturally of great importance for the success of these local endeavours that uniformly structured access is developed on the shared servers which - from the view of the user - combines all locally developed digital services. This uniform access is currently implemented with the WEBIS Project which is carried out by the Hamburg State- and University Library and is sponsored by DFG[4].

2 Deutsche Forschungsgemeinschaft. Unterausschuß für die Sondersammelgebiete: Überregionale Literaturversorung. Index der Sammelschwerpunkte, Bonn 1985.

3 See for example the services of the State- and University Library of Goettingen: http://www.uni-goettingen.de/sub/homepage.htm.

4 For further information see: http://wwwsub.sub.uni-hamburg.de/.

What precisely is being done by WEBIS? A World-Wide-Web-Server has been developed which offers structured access to the entire subject range and the electronic services of SSG-Libraries. Users who are looking for information and literature concerning a certain subject are in each case steered directly to the holdings of individual libraries which have comprehensive collections, whereby the holdings in principle integrate conventional as well as new media.

Decisive for the practicability of this concept is that essentially uniformly organised central access is available, but this central access server can be administered remote by the individual SSG-Libraries. A special menu-driven editor permits the co-operative online-actualisation of the servers' HTML-files by the participating libraries without the respective employees having to have the necessary technical knowledge about the setting-up of such files. With this each library can - from a certain access level onward - decide whether information is to be stored on the central WEBIS server or links put on the own server. With this, a gradual transfer has been created between central entry which, in future, can also include enquiry in OPAC's or union databases with possible access to electronic documents.

WEBIS is a technical solution for entering a comprehensive future digital library which, from an organisational point of view, is based on the shared holdings of the special subject fields programme. Essentially the success of WEBIS is of course also dependent upon the fact which digital services the individual SSG-Libraries are able to offer. One example of what can and should in fact be developed in future offers the "SSG-Fachinformations-Projekt", the specialized subject information project carried out by the Göttingen State- and University Library which is also sponsored by DFG. In this project initially, electronic resources for a few select subject areas - the earth-sciences and geography, as well as pure mathematics, are being assessed and prepared for the user. The decisive conceptual approach of the Göttingen

project is not only to collect, and to organise access to the electronic specialist information and documents, but initially to establish guidelines for a qualitative assessment of electronic information for defined subject areas. The information collected in this manner is in accordance with a defined standard and offers the user who makes use of it the guarantee that his enquiry may lead to relevant results concerning the content and needs not lose himself in any innumerable sources of information as we have known it to happen only too well up to now on Internet. It is therefore a meta system which uses existing directories and search services, but extends these by a qualified component. Especially in the assessment of digital information the libraries have an opportunity to transfer their expertise which - up to now has been proven by the acquisition of printed media - to the new media and to create interesting additional value for the user.

At best, this model could then be taken over into the remaining special subject fields which would cover the entire spectrum of knowledge; and at the same time it could offer the beginning for subject related co-operation by librarians. The SSG-libraries could take on an editorial function for their subject fields and, technically speaking, they would function as information server whilst the other co-operating libraries could offer this joint service as an entry to certain specialist areas to their users.

In principle this possibility of staff co-operation cannot be emphasised enough. Due to the digitalisation of our communication system "shared digital collection development" may, for the first time in the history of libraries, not only mean that holdings are developed in a work-sharing form but also that regionally or nationally or at least internationally shared staff resources can be utilised jointly. Naturally totally new forms of organisation have to be developed for this. In Germany first approaches and considerations are evident on a regional level of library unions - for example in Northrine-Westfalia as well as on the national level of the special subject fields programme. This

also includes, of course, the necessity of technical solutions for shared assessment and acquisition of electronic information and documents. As it seems there can be two different approaches for that: Either one can use a model of cooperative cataloguing based on an union database or a model based on an editorial centre and an organised electronic communication system.

A further basic problem - which must be solved in the development of shared digital libraries - is the question of right of access. This then becomes relevant only if it is a case of documents from commercial publishers. Then the question arises how far shared digital libraries will possibly limit free access to information which - up to now - was guaranteed by conventional inter-library loans. Organisational concepts for shared holdings development must always take this political question into consideration as well.

Another basic problem which presents itself quite naturally is, whether this organisation must and should initially be carried out on a national if not regional level. It is obvious that global interlinkage not only enhances international co-operation but in fact also calls if not demands it, if one wants to work efficiently and cost effectively in view of ever decreasing public funds. Despite this, there are a number of reasons to begin with the development of shared digital libraries on a national, perhaps in some cases even on a regional basis. Here one of the most important reasons could be that the relevant organisational infrastructures already exist, such as the union system of libraries, special subject fields programmes and the like. It is in the genuine interest of libraries to further develop these structures in an evolutionary manner. In addition that, for example, in the "humanities" the digital research library should also include access to printed materials as these, in the foreseeable future, cannot be completely substituted by electronic publications. This integration underlines the necessity to take up existing areas of collection emphasis.

III.

However basic the organisational problems and the question of structurally uniform access in the development of shared digital holdings may be, one can only really speak of a digital library in the actual sense of the word, when a foundation of digital documents and information resources has been developed. With this the problem of content and the technical implementation of a digital research library presents itself. Two examples may illustrate the different methods of approach.

In the MEDOC-Project a digital library for the subject area Computer Science will be implemented which encompasses electronic documents, journals and books as well as electronic information. With this, not only publisher products subject to costs, but also free information sources from Internet should be integrated which are stored on different servers. MEDOC is a joint project of the association of German Computer Scientists, of the "Fachinformationszentrum Karlsruhe" (specialized information centre Karlsruhe) as well as the "Springer-Verlag". It includes numerous other project partners, among them the Hannover Technical Information Library which, as special subject field library for Computer Science, is involved on the librarian part in this project[5].

The main emphasis of this project is less on content but developing a technical model. It is planned to limit oneself to approximately 20 journals, 200 - 300 electronic books and approximate 1000 technical reports which will be made available within the framework of the project. The centre of the project is rather the development of technical solutions for a digital research library. The concept developed takes up on the approaches of the "Digital Libraries Project" of the University of Michigan in that, with the employment of so called "intelligent

5 See http://medoc.informatik.tu-muenchen.de/medoc/

agents", developments from the area of artificial intelligence and expert systems are taken up which are to organise access to the content of the entire spectrum of electronic information.

This concept reveals which technical problems can occur in the development of a complex shared digital research library. Integrated access to heterogeneous digital information is only possible by a technically sound level of conveyance, the "intelligent agents" which in themselves are again divided into different components: user agents, broker and provider agents. The precondition for the functioning of such a complex system is of course a general standardisation of communication between the individual components. In general, the development of shared digital libraries is increased by the need to adhere to technical standards and regulations. This also applies to the document format and mainly to standardised header information which actually makes the automated administration of digital information possible.

In the MEDOC project the development of a sophisticated technical concept for a limited subject shared digital research library is regarded as a precondition which can then be filled with further content. Project conceptions of German mathematicians which were developed at the Konrad-Zuse-Centre in Berlin, however use a different approach. Here one assumes that the existing technical possibilities are entirely sufficient for the implementation of a shared digital research library. What is important is that a suitable organisational solution is found. Their model envisages that, to a large degree, scientists organise their own publication method by themselves. Since each institute in the meantime has it's own web-server and in addition mathematicians have for a long time been using uniform standards and systems in the development of their documents - especially Tex and Postscript - and beyond that have an internationally recognised classification, they envisage a sufficient basis. What is considered

to be most important is the development of a system of reference and archiving which organises access to the documents[6].

In this concept the library is primarily allocated the function of continuous archiving and the accessibility of digital documents in the long run. The shared holdings development itself is, for the time being, the task of scientific institutes which publish the works of their own members. First concrete organisational steps haven been taken insofar that a co-operation agreement by four specialist associations, that of mathematicians, physicists, chemists and computer scientists has been concluded which is to form the basis for concrete co-ordinated projects.

Whilst the mathematicians' conception basically reflects conventional publication structures simply and directly on digital technical possibilities, it essentially being a case of organising access to digitised texts, the MEDOC-Project reveals on the other side that digital libraries can be more but in return display clearly more complex structures. In the digital age, the term 'information' itself becomes more complex and multi-layered as was the case up to now, as the transition between individual forms often is no longer clearly defined. Electronic information includes documents, that is texts, as well as electronic discussion lists, databases and expert systems. The conventional term of 'collection' may therefore in future change, as users will not only be searching for certain texts or journals in electronic form, but for thematic servers which permit access to a broad spectrum of different information; and beyond that, own expert systems will carry out for the user the enquiry and, selected from the available holdings, offer the results of the enquiry directly to him.

6 A short description of the project concept gives: W. Dalitz, M. Grötschel, J. Lügger, W. Sperber: Verteiltes Informationssystem für die Mathematik. Kurzfassung eines Projektplans der DMV, 1996 (http://elib.zib-berlin.de/0x82496c0_0x00008b73).

The possibly end of a clear separation between reference databases and information itself means for the libraries that they either themselves, or in co-operation with each other and with subject information centres and research facilities, set up and organise such servers and thereby move more and more into task areas of computer centres; or that they only organise access to such servers for their users and concentrate on the collection of digital complete texts and guarantee their continuous availability - in other words - transfer their classical tasks to the area of digital documents.

IV.

Even if libraries restrict themselves to the latter, namely the integration of digital documents in the strict sense, they have to develop technical and organisational solutions for the respective procedures for the development and administration of their local digital holdings, which at the same time, as a tie-up of a shared digital research library, must in turn be integrated into central reference databases. A project which currently develops solutions especially for the integration of digital documents in the strict sense into the available holdings of a library, is the WebDOC-Project. WebDOC is a joined project, organised and coordinated by Pica, of several Dutch and German University Libraries, together with scientific publishers. Meanwhile a cooperation agreement exists also with the Research Libraries Group (RLG) in the USA. The general purpose of the WebDOC project is to provide a network infrastructure where library users are presented with adequate localisation facilities of digital documents and where they will have a guarantee of the document maintenance. Therefore a central database of electronically available documents, the WebCAT, contains the necessary bibliographic information together with abstracts and subject classification. The participating libraries and publishers build and maintain their own

document servers that are referred to the central catalogue. A licensing and accounting mechanism allows the integration of documents of publishers[7].

What I wish to emphasise here is that with the WebDOC-Project a solution has been found which permits libraries an evolutionary development of their existing structures. Electronic documents are recorded in a central catalogue analogous to printed books; access is steered via this catalogue and instead of the librarian at the loan counter, an accounting module ensures that only entitled users may have access to the electronic documents. With this it is also possible, via one system, to integrate free digital documents as well as those subject to licence from publishers, and to offer them to the user - naturally on different conditions.

One viewpoint of the WebDOC-Project which I would like to emphasise here, is the local procedure of a library. Because development of shared digital holdings must of course commence first and at the lowest level, which means with the individual local library. This in turn means that for the different tasks in the holdings development of a local digital library concrete organisational and technical solutions have to be found. Among others the following aspects have to be observed:

- enquiry and assessment of electronic information and documents
- acquisition of electronic information and documents subject to costs
- control of the completeness of acquisition, e.g. in the case of electronic journals
- technical dealing with digital documents
- indexing of electronic documents
- providing end-user access to electronic information and documents

7 For further information see: http.//www.pica.nl/

- storing large quantities of digital documents
- long-term archiving of electronic documents

Essentially, within the WebDOC-Project a solution for the recording of electronic documents is being offered which takes place in a conventional manner in the central union catalogue, as well as for the provision via Web-Server. The central development is of particular importance insofar that it represents the precondition for sensible use of share digital holdings. At the same time it permits libraries at a local level to continue their previous practice as it were also for digital documents. Local solutions still have to be developed for selection and acquisition and the technical dealing of digital documents.

Just as up to now national bibliographies, review organs, brochures and other materials have served as a selection basis for the acquisition of literature, in addition specialists at libraries now have to regularly and systematically assess comparable sources of information for electronic documents. Besides specialist electronic discussion groups relevant news servers can be part of this, as well as the regular new acceptance of electronic journals in NewsJour-Server of the Association of Research Libraries. For such purposes automated solutions can and should also be employed; robots which regularly scan relevant servers for new information.

If relevant electronic documents have been selected, the question arises, what the technical form of acquisition can look like. Apart from the possibility to only put one link on certain documents the question arises for all other documents to be stored locally, how to carry this out in a technical manner: documents can be downloaded individually from the net. This is without doubt the most cumbersome and worst solution. It is better to work with the mirroring technique, which means via FTP to automatically mirror regularly from a defined server all new documents into the local server. From a technical point just as practicable are off-line-data deliveries.

For documents such as electronic journals which are published regularly, it must of course analogous to the printed periodicals be checked that all documents are regularly received and catalogued. For this task for example the acquisition module of an integrated library system can be employed. This applies in particular when the electronic documents are also catalogued in the own catalogue. The development and administrative form of acquisition would then take place with the conventional modules of the library system.

More complex than the individual tasks to be solved, are of course the integration of these tasks into a stringent process. Only then a problem becomes really obvious: one has to deal with data which can no longer be handled physically. Organisation and comprehension for the necessary process require therefore a higher degree of abstraction than the conventional, in part already sufficiently complex, procedures have required. Insofar that the digital library does not exceed a certain structure one can surely work with such means as email and a well defined directory system for the various work procedures. In the long run this may of course not be sufficient. In future workflow-systems will have to be developed and employed for this which, based on a database, steer the entire work procedure. It is also conceivable that existing integrated library systems will be expanded by a relevant function.

V.

If one tries to present current developments collectively, new digital libraries in various projects are currently being developed; whereby the projects can be divided into two broad categories: in the one group subject related digital collections and concepts are implemented which - so to speak - can form a technical node in the net of digital libraries. In the second group attempts are made to organise entry to this net of digital libraries.

If one should attempt finally to classify the mentioned projects in an overall concept for the development of a shared digital research library, among others, the following basic aspects must be considered:

1. The area of information of a digital library will be more complex than that of a conventional one. It will not only encompass digital texts but electronic information in a general sense.

2. For the development of shared digital holdings an organisational infrastructure together with the necessary technical concept must be used or, if necessary, newly developed which organises the technical distribution of tasks between libraries. The respective responsible libraries have to function as information server for a subject area, which can certainly mean, that they partly organise only central access to information which, in turn, is stored on separate shared servers.

3. For the development and care of such information servers the libraries must also organise the co-operation of staff resources. This means, specialists for a subject area who work at different libraries, have to co-operate for assessing, acquiring and indexing electronic information.

4. For access to shared digital holdings it is necessary to have central integrated entry for the user. This applies to specialist information as well as to digital texts in a literal sense. Union catalogues may be used for this, but also entry servers.

5. Further, in developing shared digital holdings free access for users of all libraries, who are registered within the structure of this co-operation, must be guaranteed. A relevant solution has to be found for commercial publishing products.

6. Especially the shared development of digital holdings requires strict standardisation of the document format and the meta information about digital documents and information. In this manner only may local administration, but also the central

collection development and the indexing for reference databases, be automated.

However important each requirement may be, decisive for the success of libraries in the development of shared digital research libraries will be not the technical solution but whether and to which degree sensible and efficient organisational solutions for co-operation can be found.

European Research Libraries Cooperation:
The LIBER Quarterly, 6 (1996), 383-406.

Digital Metadata, Standards for Communication and Preservation[1]

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Trials and tribulations of knowledge

For millennia people have gathered information to help understand and govern the functioning of society and its natural environment. To make this knowledge more permanent they have recorded it, amongst others, on stone, clay, bark, papyrus, paper, etc., and in this recent age on electronic media.

The written/printed knowledge can be divided into two distinct classes: raw data and processed data. Many administrative (parts of) organisations have records of raw data, which, if not (purposefully) destroyed, found their way into archives. Through the ages much raw data has been processed in one or more stages into intermediate and final forms and been deposited in archives, libraries, museums, private households and so on.

1 The author is long serving Secretary of the Groupe des Cartothécaires de LIBER. This article is based on the Proceedings of the 9th Conference of the Groupe des Cartothécaires de LIBER, held in 1994 in Zürich, Switzerland (The LIBER Quarterly, Vol. 5/1995/3, pp. 225-347) and on a paper read at the 1996 Conference of the Dutch Cartographic Society. It gives, however, the author's personal view of the matter and cannot be read as the opinion of the Groupe des Cartothécaires de LIBER.

Libraries contain many written and printed records which illustrate a process of selection, editing, renewal of sources, reworking of data, gaps of lost data leading to speculation, and so on. Sometimes the intermediate stages are in time so overwhelming that only ghosts of the original data are discernable. Raw data records, however, are the lesser part of a libraries holdings.

From hardcopy to digital: changes in sources?

As with so many developments the digital age started out with substituting. I.e., the ultimate form in which knowledge was reproduced remained the same, but the processes to arrive at this stage were different and faster. Input was/is still governed by output. This means that derivative processes like cataloguing have not undergone much significant change.

But the digital age creates also its own innovative developments. Has manipulation of data been a very tedious process in the past, digital technologies can overcome much of the difficulties. Not only brings it within our reach the manipulation of the aforementioned intermediate and ultimate stages of data. Because of its many available algorithms, its processing speed and the availability of enormous memory banks it can also help to reprocess the original or raw data. This will not happen much, but (re)processing can get closer to the original source than we are used to in libraries. Because of the available technology the value of the final result of processed information becomes less permanent. Andrew Tatham (Keeper of the Map Collection of the Royal Geographical Society) sees our future consequently as follows: "We shall no longer provide the users with someone else's selection and presentation of data, but with the data itself and with the means by which the user can make their own selection

and presentation of this data to inform or to mould their own or other people's image of the world."[2]

Of course the older media still will exist keeping all the inherent functions of libraries intact, but if his words will come true this means an enormous addition to our functions.

The case of spatial data

Compared with the information most departments of research libraries collect, map departments are on a way-of-no-return when speaking of digital data.

The bigger part of spatial data, that is all geo-referenced data including statistical data, are produced by governmental agencies, federal, state, provincial, municipal, etc. Mainly so because private organizations cannot bear the financial burden of keeping up a permanent framework in which these are gathered. This is especially true for geophysical, meteorological and demographic data, including aerial photographs and remote sensing images. For these governmental organizations the digital age came in the nick of time, because the imbalance between the amount of data produced on all levels and the number of personnel and the technology available to process them was getting bigger and bigger. Now almost all governmental agencies are creating or have created digital spatial databases which are the basis for their products. As Patrick McGlamery of the University of Connecticut, U.S.A., said: "We have reached the point in spatial information revolution where the amount of spatial information available outstrips the ability to represent it cartographically."[3]

2 TATHAM, Andrew: Can the map curator adapt? In: The Liber quarterly, Vol. 5/1995, No. 3, pp. 330-336.

3 MCGLAMERY, Pat: Maps and spatial information: changes in the map library. In: The Liber Quarterly, Vol. 5, 1995, No. 3, pp. 229-234.

Not that hard-copy will not be produced anymore by the agencies, but they are a selection of all data available. Even if we want to we never can put these vast amounts of data on paper. And when we talk of vast amounts it is closer to terabytes than gigabytes. But these unused data may have potential for other or future users. It also means that we, map curators, must adapt quickly to digital practises or opt-out and become museums as some of us think will happen.

Digitizing means more than creating the mental ability to manipulate the raw data time and again. During the last map curator's conference one of the issues was in how far map collections are willing to offer cartographic software and support the use of them to their clients[4]. Chris Perkins has arranged cartographic software packages in increasing order of difficulty and increasing functionality. They range from fixed pre-defined electronic views of data with limited interaction to complete Geographical Information Systems (GIS)[5]. This presupposes the availability of digital infrastructure (soft- and hardware) to realize this manipulation. It does not only raise the problem of continuous education to map curators, but also the issue of preservation. "By rigorously reducing the complexity of the matter in hand, we can say that the [digital] system we need consists of data, software and hardware. Each of these elements has its own life-cycle."[6]

4 SMITS, Jan: Mapcuratorship in transition : report on the 9th conference of the Groupe des Cartothécaires de LIBER, 26-29 September 1994, Zürich, Switzerland. In: The Liber quarterly, Vol. 4, 1994, No. 3, pp. 345-362.

5 PERKINS, C.R.: Leave it to the labs? Options for the future of map and spatial data collections. In: The Liber quarterly, Vol. 5, 1995, No. 3, pp. 312-329, Figure 1 "Types of cartographic software" (see appendix 1).

6 BÜTIKOFER, Niklaus: Archiving electronic information: some aspects. In: The LIBER quarterly, Vol. 5, 1995, No.3, pp. 274-279.

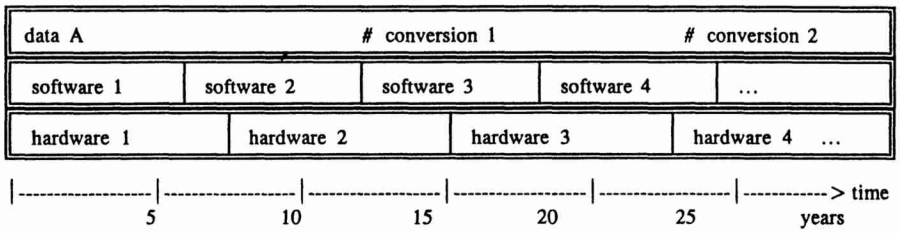

Figure 1: Succession of hardware and software generations
(From: BÜTIKOFER, Niklaus: Archiving electronic information: some aspects. In: The LIBER quarterly, Vol. 5, 1995, No.3, p. 276)

This poses the problem that the (cultural) value of digital data cannot be viewed independent from the environment it functions in.

But the linchpin is the purveyor, in our case the maplibrarian. "Probably the most important factor for the map library is the complexity of the software and the level of interaction it allows. This is important because of the degree of library staff input required, and the nature of tasks which can be performed."[7]

7 PERKINS, C.R., ibid.

We are constrained by our present knowledge and practices. The problem is, as Andrew Tatham stated: "Does the map curator, as an individual, and does his or her institution, have the confidence to help bring about the future?"[8] That means, are we prepared to advance our knowledge and do we want to think digital, without losing that special understanding of spatial relations and patterns which has been the case with map curators until now. But if we want to change, we have to built on our strength: collecting, describing and providing access. And then we have to live with the uncommon practise that we may not own part or the whole of datasets.

Interacting problems

The digital age confronts us with (at least) two problems: How to access digital data and, if we own them, how to preserve them and their functionality. In library-practise up till now these problems were two distinct tasks of the institution, though the one supported the other.

In order to be able to access and preserve digital data we have to understand their functionality, use and the technical infrastructure in which they function[9]. This is only possible when we know more about their quality, their technical functions, their availability etc. It means we have to think digital. But are we able to do so? Can we acquire this knowledge in due time or are there better options?.

If we do not act soon I'm afraid that, because of digital technology evolution, a lot of valuable digital data will fade away from the collective memory and leave a gap in our history.

8 TATHAM, Andrew, ibid.

9 We have seen already many examples where digital census and satellite data have become unretrievable, because the technical infrastructure in which they functioned has become obsolete.

We are not an island!

Is the situation sketched in the paragraphs above only true for geo-referenced data or is it to come true for other science-fields the libraries cater for? We see that libraries are trying to adapt themselves to accessing CD-ROMs, other digital end-products and on-line sources mainly from the Internet. The library-community is aware of the fact that the purveyance of information is changing, especially information with a high added value.

But we built only partly on our strength, i.e. selection and access. What about preserving? Can we trust that the purveyors think about how to try to preserve the data they produce? The American Commission on Preservation and Access states in one of her reports that "Without ... a fail-safe mechanism, preservation of the nation's cultural heritage in digital form will likely be overly dependent on marketplace forces, which may value information for too short a period and without applying broader, public interest criteria"[10]

Maybe we can help them by creating structures in which selection, access and preservation have equal value. Since the Paris Principles we have created the ISBD and MARCs to cope with the problems of ever rising amounts of information. Can we not advance this knowledge to the digital age, and I don't mean with that the ISBD(CF) and resulting changes in MARC-formats.

But ideas are sooner posed than realized. Though we might be wanting to think that ISBD's and MARC-formats were created by the sheer will of librarians to make valuable information more accessible the underlying drive was economics. By creating these

10 See *Executive summary* in: Preserving digital information : draft report of the Task Force on Archiving Digital Information, commissioned bij the Commission on Preservation and Access and the Research Libraries Group. Version 1.0 August 23, 1995.

For text on Internet see: *http://lyra.stanford.edu/pub/ArchTF/Draft-Report.txt*.

standards libraries were able to enter the digital cataloguing age and produce cost-efficient enough to meet the ever increasing amount of information that was being produced, and at the same time placate governments c.q. politicians in granting ever bigger subsidies to keep them functioning. In this we did not differ from any other market-player, though our prime goal was and is as much free public access to information as possible.

However, times are a'changing, and libraries are pushed to become more competing market-players than ever before. This means not only that we have to be more cost-efficient, but that we have to treat information as a market commodity and keep it at the lowest costs possible available to our clients and the public in general.

In order that producers, public and private, are willing to cooperate in solving the problems of accessing and preserving digital information we must ensure that they can see profit from cooperation with the library field.

In the field of spatial digital data we think we can get a basic insight if we ask producers to aid us. They are the ones who have created the data, with their options and applicability, using their own highly sophisticated technologies. They are the ones who know best the ins and outs and what is valuable and what is not.

Metadata

But how is it that they can help us best in solving the digital problems we are confronted with. To understand the values of the data and the way they are structured we need a blueprint of the way they are designed and processed. It is already possible to make bibliographical descriptions, which can function in the present catalogues[11]. But a mere ISBD is not enough as its

11 SMITS, Jan: Describing geomatic datasets with ISBD and UNIMARC: problems and possible solutions. In: The Liber Quarterly. Vol. 5, 1995, No. 3, pp. 292-311.

primary goal is to identify information. Neither will an abstract do as this circumscribes only the core of the matter.

We need information about information which identifies it, circumscribes it, gives information about its structure, functions, fitness of use, quality and authenticity. We call this **metadata.**

But I would first like to prevent confusion concerning the term metadata. All data about data is metadata. In casu this includes bibliographic data. However, only since the inclusion of digital datasets in library-holdings this term is used in a library context. In a report by the Dutch IWI[12] under the title The library breaking new ground[13] there is talk of a metacatalogue. As I read it this means a bibliographic database with descriptions of digital datasets. Though this is not concerned with hardcopy books I would prefer that these kind of descriptions, which are used to identify objects or sets of information, retain the designation **bibliographic**. (We also call descriptions of cartographic materials, non-book materials, music-sheets, etc. bibliographic, so why the change?) I presume philosophies about this subject in other countries in Europe are not different[14]. Creating special

12 IWI = Committee for the Innovation of Academic Information Services. This is a managerial platform of the Dutch universities (VSNU), the Royal Library (KB), the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Netherlands Organization for Scientific Research (NWO), which aims to coordinate the activities in the field of information services innovation, primarily with respect to education and research.

13 UKB/CVDUR: De grensverleggende bibliotheek : de innovatie van de Nederlandse wetenschappelijke informatievoorziening : een verkenning tot het jaar 2000. Utrecht, IWI, 1995. 56 p.

14 OCLC/NCSA's Dublin Core descriptions are also called metadata which according to them is something between indexes generated by general search engines and bibliographic data. Element description clearly points to bibliographic data enriched with access data, though why they do not follow the ISBD/AACR2 scheme is something I do not understand. Unfortunately only document-like objects are concerned.

bibliographic catalogues also confuses the researcher who preferably would like to search only one database which contains all kinds of bibliographic data independent of the information-carrier.

I prefer to define the term **metadata** as "... data that describe the content, data definition and structural representation, extent (both geographic and temporal), spatial reference, quality, availability, status, and administration of a geographic dataset[15]." In the following paragraphs I hope to illustrate what is meant by this.

For geospatial digital data, including processed remote sensing images, we have fortunately a good example from the U.S.A.

On April 11, 1994, President William Clinton signed Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure. Section 3, Development of a National Geospatial Data Clearinghouse, paragraph (b) states:

"Standardized Documentation of Data. Beginning 9 months from the date of this order, each agency shall document all new geospatial data it collects or produces, either directly or indirectly, using the standard under development by the FGDC[16], and make that standardized documentation electronically accessible to the Clearinghouse network. Within 1 year of the date of this order, agencies shall adopt a schedule, developed in consultation with

Information about the *OCLC/NCSA metadata workshop report* can be found at *http//www.oclc.org:5047/oclc/research/conferences/metadata/dublin_core_report.html*

15 Working definition adopted by the ICA Commission on Standards for the Transfer of Spatial data at their meeting in Den Haag, August 17-20 1996.

16 Federal Geographic Data Committee. This consists next to many government departments concerned also of the Library of Congress and the Archives and Records Administration.

the FGDC, for documenting, to the extend practicable, geospatial data previously collected or produced, either directly or indirectly, and make that data documentation electronically accessible to the Clearinghouse network.[17]"

Soon after the FGDC produced on June 8, 1994 the **Content Standards for Digital Geospatial Metadata**[18].

The objectives of the standards are to provide a common set of terminology and definitions for the documentation of digital geospatial data. The standards establish the names of data elements and compound groups (groups of data elements) to be used for these purposes, the definitions of these compound elements and data elements, and information about the values that are to be provided for the data elements.

The major uses of metadata are:

- to maintain an organization's internal investment in geospatial data,
- to provide information about an organization's data holdings to data catalogues, clearinghouses, and brokerages, and
- to provide information needed to process and interpret data to be received through a transfer from an external source.

17 Fortunately this order uses the verb *to document* and not the verb *to identify* to differentiate from common library practises.

18 FEDERAL GEOGRAPHIC DATA COMMITTEE: Content Standards for Digital Geospatial Metadata (June 8). Washington, D.C., FGDC, 1994.

The standards and related documents are available from anonymus FTP server *fgdc.er.usgs.gov* in the directory GDC\METADATA or by electronic mail from *gdc@usgs.gov*. They are also available on Internet through *http://geochange.er.usgs.gov/pub/tools/metadata/standard/metadata.html*.

Another recently available full metadata standard is that of the Australia and New Zealand Land Information Council (ANZLIC). The standards must be unzipped from a file under *http://www.auslig.gov.au/pipc/anzlic/metaelem.htm*

The standard was developed from the perspective of defining the information required by a prospective user to determine the availability of a set of geospatial data, to determine the fitness of the set for an intended use, to determine the means of accessing the set, and to successfully transfer the set.

The standards do not provide instructions or techniques for its implementation and accordingly does not concern itself with the construction of databases for holding metadata[19].

Classes of metadata

Thus Metadata in this context are data about the contents, quality, condition and other characteristics of data.

In a nutshell the **Content Standards for Digital Geospatial Metadata** are concerned with the following kinds of information:

1. Identification information
2. Data quality information
3. Spatial data organization information
4. Spatial reference information
5. Entity and attribute information
6. Distribution information
7. Metadata reference information
8. Citation information
9. Time period information
10. Contact information

Metadata structure and applicability is visualized with a diagram through *http://www.its.nbs.gov/nbs/meta/meta.htm*

Except for fields 3, 4 and possibly 5 these field can be applied to any kind of digital information.

For those who want to have a better insight in the use of this Standard I refer to the the FGDC.

19 This counts for the American as well as the European standards (for these see note 22).

Descriptions of digital metadata are available on the Internet through *http://www.seic.okstate.edu/gis/metadata.html* or *http://www.blm.gov/gis/nsdi.htm*[20]. This URL also has many supporting papers for the use and creation of digital metadata and the functions of the American clearinghouse-system.

Though we are not yet developing in this field as the USA is, it might be good to take the advice of Patrick McGlamery at heart who points to the fact that the USGS[21] is running grants for cooperative projects which stimulate exchanges between data producers and libraries among others. Though governments are retreating they sometimes have to create financial means to take up new challenges.

ICSDM (International Content Standards for Digital Metadata)

The American FGDC initiative soon was followed by the European Committee for Standardisation (CEN), Technical Committee (TC) 287, which has published a draft of a European

20 Appendix 2 , retrieved through this URL, shows a metadata-description of the digital dataset "ECOREGION", at the moment the shortest description I could find. Metadata-descriptions of two to three times the size are possible. Other descriptions can be found at:

http://geochange.er.usgs.gov/pub/magsst/Updates/Contents/FGDCmeta.txt

http://geochange.er.usgs.gov/pub/sea ice/Contents/FGDCmeta.txt

http://geochange.er.usgs.gov/pub/PRISM/OFR 94-281/Contents/FGDCmeta.txt

http://geochange.er.usgs.gov/pub/volcanos/OFR 94-212/Contents/FGDCmeta.txt

http://geochange.er.usgs.gov/pub/NWR/OFR 91-346/Contents/FGDCmeta.txt

http://geochange.er.usgs.gov/pub/OFR 93-218/Contents/FGDCmeta.txt

http://geochange.er.usgs.gov/pub/deserts/OFR 95-78/Contents/FGDCmeta.txt

21 United States Geological Survey.

Standard for Geographic metadata in January 1996, which should be finalized in 1997.[22]

However, both standards are restricted to spatial information. That they are developed so soon depended on the inability to manage the vast amounts of digital geospatial data being produced otherwise.

But it would be wiser to create metadata standards which encompass all digital data in the same way as the ISBD was produced to create a general bibliographic framework: a general framework including special definitions for special properties of special kinds of digital data. The standards probably have to be open-ended as digital technology is still evolving and we do not know what new kinds of metadata are called for in future. It probably means also that a new kind of thinking is called for concerning the different kinds of digital data, which will probably differ from our current thinking in non-serial, serial, non-book-materials, music, cartographic materials, and antiquarian materials. At the same time we have to keep in mind that we want to extract data for use in bibliographic databases.

If there is not any other body momentarily proposing to design such standards, why not libraries, which have a long history in documentation. I urge LIBER, maybe in cooperation with RGL and other organizations, to start planning and make proposals to political bodies (e.g. European Commission, Unesco, ISO, etc.) concerning this matter. But this time active cooperation is needed from producers, governmental as well as non-governmental. And also of information-specialist, as these standards will pass the stage of mere identification and access.

22 WORKING GROUP 2 of CEN/TC 287: Geographic Information - Data description - Metadata [English version] : Draft V2 - for 2nd informal vote by WG2. Brussels : CEN, 1996. 42 p.

The draft is created with the EXPRESS-G model of ISO standard 10303.

Unfortunately no examples could be located on the Internet.

Because of the inside information we get from producers we may also get a better grip on the problems of collection development and of preserving vital digital data. However, be assured that it will not be an easy way, as these standards will make large inroads on finances of governmental and non-governmental organisations.

One of the tasks the American Commission on Preservation and Access has set itself is to use metadata for digital preservation through migration[23]. Though this Commission primarily focuses on document-like objects (i.e. documents which can be represented in a print format, which to my opinion excludes interactive digital spatial data) they may find functional structures in the FGDC-standards.

How the data has to be formatted and which kind of organizations will archive dynamic digital datasets is a question which is not the subject of this paper and therefor will not be answered for the moment.

Conclusion

The most important result of these standards will be that producers will have an obligation to deliver the metadata concerning their databases. As said before, they are the ones with the best knowledge of how these data were produced and how they can be used. But the blade cuts more ways. When the right metadata are provided the producer can market the digital datasets more efficiently, which probably will be an incentive for them to cooperate with libraries. On the other hand this information provides collection developers with a means for

23 Preserving digital information, ibid., Executive summary.
"Migration is a set of organized tasks designed to achieve the periodic transfer of digital materials from one hardware/software configuration to another, or from one generation of computer technology to a subsequent technology".

easier and better selection of digital datasets, and at the same time present more handles to cope with the problems of preserving these datasets.

We as librarians can also use the metadata to create catalogue-records, which will fit in our general bibliographic catalogues in order that users will be able to search a continuum from written and printed to digital material and will be enabled to pick from them what they can use best. This will put a greater strain on the competencies of librarians, but we shall have to live with that if we are to continue playing a vital role in the world of informatics. I can envisage a future in which bibliographic records are hyperlinked to records in metadata-databases, in this way enabling access on different levels for different users.

We may not be able to maintain free access to current information, as this becomes more and more an economic commodity, but we may be able to maintain at least the possibility that anybody can find the information that is needed. But time is short if we want to play a significant role in it.

Afterword

This paper was read by Susan Vejlsgaard at the LIBER Annual General Conference in May 1996 in Malta. Since then the author of this paper -as observer of the IFLA Geography & Map Library Section- has attended a 4-day meeting, August 17-20 1996, of the 'ICA[24] Commission on Standards for the Transfer of Spatial Data'. The main topic of this commission during its 1995-1999 cycle is "[to produce a book] which will examine and assess national and international metadata standards". Therefor some 15 national metadata (some existing, some in the process of being developed) and transfer standards will be examined together with

24 International Cartographic Association.

the metadata standards of CEN[25]/TC 287 to which many European countries will adhere, and the ISO[26]/TC 211. The CEN and ISO standards probably will be finalized in 1997. Knowing the backgrounds of the ICA Commission members I wonder how many of my colleagues are involved in this work and how map collections and/or cartographic information centres are preparing themselves to use these standards and how to develop the resulting clearinghouses for metadata and spatial data?

Acknowledgement

I am grateful to Pablo Garcia i Garcia and Anna Lluch i Galera for providing the environment in which I could first concentrate my thoughts upon this subject. I would like to thank my colleagues Susan Vejlsgaard (Det Kongelige Bibliotek, Denmark), Patrick McGlamery (University of Connecticut, USA), Chris Perkins (Manchester University, UK) and Tony Campbell (The British Library, UK) for their critical contributions, of which many I took to heart and incorporated in this paper.

25 Comité Européen de Normalisation.

26 International Organization for Standardization.

Appendix 1

Illustration Perkins

Figure 1: Types of Cartographic Software
Arranged in *increasing order of difficulty* and *increasing functionality*.

Slideshow Atlas and Information programmes are intended to present fixed pre-defined electronic views of data, together with associated text and statistics. Export to other programmes is possible, but only limited interaction with the data is facilitated. The maps may not be changed or customised. *eg Global Explorer*

Route planners concentrate upon optimising and mapping route choice through a road or rail network and are usually user friendly packages. *eg Autoroute*

Simple Paint Packages allowing manipulation and creation of raster images on screen. *eg Paintbrush*

Map Creation Packages are intended to create simple maps for inclusion in presentations, but allow only very limited user input. They usually include limited boundary files, and sometimes limited thematic mapping capabilities. *eg AAG Map Sets*

Electronic Atlases and Census front ends integrate mapping software with tabulated specific census data. Often allow user defined mapping of census variables on screen, with application of thematic mapping capabilities to these datasets. Usually with a limited range of map design tools and limited export capabilities. *eg SCAMP CD*

Customised Map Creation Programmes include boundary files, worksheets of data and the capacity to link these in order to create user defined statistical graphics. Able to process a variety of import formats and different datasets and to export or create displays of different kinds. *eg Mapviewer*

Drawing packages offer a more sophisticated range of tools for the creation of desktop maps, but usually without the link to worksheets. Often incorporate vectorising modules, multiple layering, fonts, line, point and area symbologies, in order to allow sophisticated on screen desktop map design, and flexible import and export facilities. *eg CoralDraw*

Computer Aided Design CAD Systems for precision drafting, often used in automated production cartography and include basic analytical functions in addition to a sophisticated array of software tools for manipulation of vectors. *eg Autocad*

Geographical Information Systems with the capacity to collect, organise and analyse geographically referenced data, incorporating a sophisticated range of analytical database functions with mapping capability. Supports for instance features such as point in polygon, buffering, geographic query and Boolean searching. Flexible import and export capabilities. *eg ARC INFO*

From: PERKINS, C.R.: Leave it to the labs? Options for the future of map and spatial data collections. In: The Liber quarterly, Vol. 5, 1995, No. 3, p. 328.

Appendix 2

Edited description derived from *http:/www.blm.gov/gis/nsdi.htm*.

Metadata for ECOREGION
USGS Node of National Geospatial Data Clearinghouse
Last modified: 94-12-30.10:57:49.Fri

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1. Identification Information (*includes fields 8, 9 and 10*):

Citation Information:
Originator: Omernick, J. M.
Publication Date: 1987
Title: Aquatic ecoregions of the conterminous United States
Type of Map: map
Publication Information:
Publication Place:
Publisher: USEPA

Description:
EPA Ecoregion Map

Abstract:
Ecoregions are based on perceived patterns of a combination of causal and integrative factors including land use, land surface form, potential natural vegetation, and soils (Omernik, 1987). This is a copy of the ecoregion coverage of Omernik (1987) with some item names modified.

Purpose:
This coverage is intended for national-level studies of water resources.

Supplemental Information:

Limitations of Data:

Procedures:
The coverage was installed from an ARC/INFO.ARCE file supplied by EPA Corvallis. Some item names were modified and others were redefined to make the coverage more convenient to use and to conform to more conventional item names.

Reviews Applied:
The ecoregions were plotted on a terminal to ensure the .ARCE file was imported properly. No claims are made regarding the accuracy of the original data or linework.

Other Related Data Sets:

References Cited:
Omernik, J. M., 1987. Aquatic ecoregions of the conterminous United States. Annals of the Association of American Geographers, 77:118-125 (map scale 1:7,500,000).

Notes:

Other:

Time Period of Content:

Time Period Information:
Single Date/Time:
Calendar Date: 12/17/91
Currentness Reference: publication date
Status:
Progress: Open distribution. Data have been published by others.
Maintenance and Update Frequency: As needed
Spatial Domain:
Bounding Coordinates:
West Bounding Coordinate: -125.0000
East Bounding Coordinate: -66.0000
North Bounding Coordinate: 50.0000
South Bounding Coordinate: 24.0000
Keywords:
Theme:
Theme Keyword Thesaurus: None
Theme Keyword: Ecoregion
Access Constraints:
None
Use Constraints:
None
Point of Contact:
Security Information:
Security Classification: UNCLASSIFIED
Native Data Set Environment:
Arc/INFO

2. Data Quality Information:
Logical Consistency Report:
Polygon topology present.
Completeness Report:
(See Supplemental Information)
Positional Accuracy:
Horizontal Positional Accuracy: See Supplemental Information)
Vertical Positional Accuracy: See Supplemental Information)
Lineage:
See Supplemental Information for overview.
Process Step:
Process Description:
Rev. 1.0 Installed from.ARCE tape.
Process Date: 09/28/91
Process Step:
Process Description:
Rev. 1.1 Converted to Data General workstation.
Item redefinitions revised and documentation added.

Process Date: 12/17/91

3. Spatial Data Organization Information:
Direct Spatial Reference Method:
Vector
Point and Vector Object Information:
SDTS Terms Description:
SDTS Point and Vector Object Type: Point
Point and Vector Object Count: 3732
SDTS Point and Vector Object Type: String
Point and Vector Object Count: 8064
SDTS Point and Vector Object Type: GT-polygon composed of chains
Point and Vector Object Count: 3733

4. Spatial Reference Information:
Horizontal Coordinate System Definition:
Planar:
Map Projection:
Map Projection Name: Albers Conical Equal Area
Alber Conical Equal Area:
Standard Parallel: 29.5
Standard Parallel: 45.5
Longitude of Central Meridian: -96
Latitude of Projection Origin: 23
False Easting: 0.0
False Northing: 0.0

5. Entity and Attribute Information:
Detailed Description:
Entity Type:
Entity Type label: ECOREGION.PAT
Entity Type Definition: Polygon attribute table
Number of Attributes in Entity: 11
Attribute:
Attribute Label: AREA
Attribute Definition: Area of polygon in square coverage units
Attribute Definition Source: Computed
Attribute Domain Values: Positive real numbers
Attribute:
Attribute Label: PERIMETER
Attribute Definition: Perimeter of polygon in coverage units
Attribute Definition Source: Computed

Attribute Domain Values: Positive real numbers

Attribute:
Attribute Label: ECOREGION#
Attribute Definition: Internal feature number
Attribute Definition Source: Computed
Attribute Domain Values: Sequential unique positive integer

Attribute:
Attribute Label: ECOREGION-ID
Attribute Definition: User-assigned feature number
Attribute Definition Source: User-defined
Attribute Domain Values: Integer

Attribute:
Attribute Label: ECO
Attribute Definition: Full ecoregion code
Attribute Definition Source: Omernik (1987)
Attribute Domain Values: positive numbers are ecoregions

Attribute:
Attribute Label: PBMIN1
Attribute Definition: State code item used by EPA
Attribute Definition Source: Omernik (1987)
Attribute Domain Values: (FIPS)

Attribute:
Attribute Label: LWCODE
Attribute Definition: Land/water code.
Attribute Definition Source: Omernik (1987)
Attribute Domain Values: L = land, W = water, ZZ = missing

Attribute:
Attribute Label: COLOR
Attribute Definition: Working item for plotting
Attribute Definition Source: Local
Attribute Domain Values: numeric

Attribute:
Attribute Label: ECOREGION
Attribute Definition: Ecoregion code
Attribute Definition Source: Omernik (1987)
Attribute Domain Values: 1-76, -1 = none

Attribute:
Attribute Label: TYPICAL
Attribute Definition: Indicates strength of association in ecoregion

Attribute Definition Source: Omernik (1987)
Attribute Domain Values: 0 = most typical,
1 = generally typical

Attribute:
Attribute Label: FIPSST
Attribute Definition: State code
Attribute Definition Source: Omernik (1987)
Attribute Domain Values: (FIPS)

Overview Description:
Entity and Attribute Overview:
Ecoregions are based on perceived patterns of a combination of causal and integrative factors including land use, land surface form, potential natural vegetation, and soils (Omernik, 1987). There are 76 ecoregions, identified by the item ECOREGION.
The item TYPICAL allows a fuzzy logic whereby polygons identified with TYPICAL = 0 are "most typical" of the ecoregion they represent. Those identified by TYPICAL = 1 are "generally typical" any may not have all the characteristics.
The ecoregion coverage is superimposed upon a coverage of states. The state lines may divide polygons.
Entity and Attribute Detail Citation: See Entity and Attribute Information)

6. Distribution Information:
Distributor Contact Organization: U.S. Geological Survey
Distributor Contact Address: (Please use electronic mail.)
Distributor Contact Voice Telephone: Please use electronic mail.
Distributor Contact Electronic Mail Address: lanfear@usgs.gov
Resource Description: ECOREGION
Distribution Liability:
Although these data have been processed successfully on a computer system at the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the Geological Survey regarding the utility of the data on any other system, nor shall the act of distribution constitute any such warranty.
Standard Order Process:
Digital Form:
Digital Transfer Information:
Format Name: SDTS and ARCE
Files are compressed with the GNU-zip public-domain file compression utility.
Digital Transfer Option:
ECOREGION is available via Internet!
Select the "Load to Local Disk" option on your client software and choose one of these formats:

SDTS
Arc/INFO Export
Fees: None.
Available Time Period: Immediate.

7. Metadata Reference Information:
Metadata Date: 19941230
Metadata Contact: lanfear
Metadata Standard Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata Standard Version: 19940608
Metadata Time Convention: Local Time

European Research Libraries Cooperation:
The LIBER Quarterly, 6 (1996), 407-415.

The Role of a University Library in a Community Setting: Aberdeen University Library, Scotland

COLIN A. MCLAREN
Aberdeen University Library

The University of Aberdeen is one of the most ancient of Britain's 86 universities and the most northerly. It was founded in 1495 by William Elphinstone, Bishop of Aberdeen, with the active support of his king, James IV, and the approval of Pope Alexander VI. Its purpose was to provide a centre of learning for the people of the North of Scotland, who lived, wrote Elphinstone, 'in places separated from the rest of this kingdom by arms of the sea and high mountains,' and were, as a result, 'rude, ignorant of letters and almost barbarous.' The University has fulfilled this purpose for just over five hundred years, growing in the process from a single college of 36 teachers and students to occupy two large campuses with nearly 11,000 students (41% from the North of Scotland) in four faculties - Arts & Divinity, Social Sciences & Law, Science & Engineering and Medicine & Medical Sciences.[1]

The University's early statutes ensured that during the sixteenth and seventeenth centuries teaching and learning were

1 Jennifer J. Carter and Colin A. McLaren, *Crown and Gown, 1495-1995: An Illustrated History of the University of Aberdeen* (Aberdeen University Press, 1994).

confined behind its high walls and locked gates. In the course of the eighteenth century, however, it became more closely involved with the community outside, offering limited access to its library, remodelling its curriculum to meet the practical needs of the landed and commercial classes and pioneering extra-mural education for working-men. Today the University enjoys a close relationship with the community, enriching its intellectual life, contributing to its economic development and preserving its cultural heritage.

The University Library has an important part to play in maintaining and developing this relationship. With over a million books and journals on its six sites, including 150,000 volumes and 250,000 documents relating to its hinterland, it is well resourced to do so.[2] Its resources, however, together with its facilities and services, have recently been further enriched by a nationwide strategy to transform the academic into the electronic library.

The catalyst was the Libraries Review set up jointly by the three higher education funding councils of Britain in 1993 and chaired by Sir Brian Follett (*http://ukoln.bath.ac.uk/follett/follett_report.html*).[3] The first such review for thirty years, it paid particular attention to ways in which information technology (IT) could help to meet the needs of library users and library management. As a direct result, the years 1994-96 have seen the investment of money in British university libraries on an unprecedented scale. New initiatives include:

- A programme of library building and extension, notably among the newer higher education institutions (HEIs).
- The Electronic Libraries Programme (eLib) (*http://ukoln.bath.ac.uk/elib/*) which, with a budget of around £15m over three years, supports over forty

2 Colin A. McLaren, *Rare and Fair: A Visitor's History of Aberdeen University Library* (AUL, 1995).

3 *Joint Funding Councils' Libraries Review Group: Report* (1993).

projects in categories such as electronic document delivery, electronic journals, digitisation, on-demand publishing and access to network resources.

- The Pilot Site Initiative, developing with publishers an innovative method of licensing, giving greater access to journals, in both print and electronic format, at no extra cost to the HE community and without loss of revenue to the trade.
- The dedication of around £10m over five years to the support of specialised humanities research collections in 62 HEIs.

The Follett Review has not, however, been the only agent of change in the academic library. Money from the proceeds of the National Lottery (1995) is channelled through the Heritage Lottery Fund (*http://www.heritage.gov.uk/LOTTAPP.HTM*) to support, amongst other things, capital projects for the preservation and conservation of heritage resources, including printed and manuscript material. The government-chaired Millennium Commission (ibid) may also support proposals of this sort, if they are conceived on a suitably grandiose scale. In both cases IT applications - notably digital reproduction and networked access - have been a prominent feature of funded projects.

The Library has already profited from each of the Follett initiatives described above. In addition, it has applied for support from the Heritage Lottery Fund and is associated with projects seeking funding from the Millenium Commission. In each case the outcome promises to enhance its service to the community.

The community itself is spread over the North East of Scotland (formerly Grampian Region), the Highlands and Islands, and the Northern Isles - an area which amounts to one-sixth of the landmass of mainland Britain and contains some of its most sparsely populated districts. Until recently, its economy was largely based on primary and related manufacturing industries, and on tourism. All three sectors have contracted, however, and

the community now depends heavily on service-provision and on oil and gas - Aberdeen is the main offshore oil centre of Western Europe.

The Library's contribution to the community, in the past decade at least, has been the provision of current information, either freely or as a premium service moderated by a service level agreement, and the support of learning.[4] It has six main client-groups:

- *The general public*. The public consult Library stock on site without charge or borrow it by taking out external membership on subscription.
- *The business community*. A review of external membership in 1988 revealed that there was a particular demand for a service to business, notably to medium/small enterprises without their own information units. It was a demand which the Library, with its extensive legal collections and in its role as a European Documentation Centre, was especially well equipped to meet. A a result, a subscription service was offered for corporate membership; there is no cost for staff help with enquiries, but online searches are charged for on a cost-recovery basis plus a fixed rate per hour for staff time.
- *Health professionals*. External funding from the Grampian Health Board, distributed through local Health Trusts, supports services provided by the Medical Library for medical staff not formally associated with the University.
- *Other libraries*. The Library took a leading part in the creation of the Grampian Library and Information Plan (1990), and is a leading player in Grampian Information,

4 The following paragraphs are based heavily on reports and briefing papers compiled in Aberdeen University Library. I am grateful to colleagues who have allowed me to compress and cannibalise their work.

an organisation representing libraries and information providers within the region.

- *Distance learners*. The Library supports distance learning programmes run by the University's Centre for Continuing Education. It acquires and processes copies of core texts, makes material available on site to individual students, or fulfils requests by phone, fax or e-mail, at the student's expense. Much of the distance learning programme has hitherto been supported by learning packs, however, and the Library's involvement has been, as a result, restricted in scope.
- *Schools*. Close links have been developed with school library services by the Library's Schools Liaison Officer, who arranges open days for school librarians and for senior pupils working on course-related projects, and gives training in the use of the Library's OPAC (accessible to schools by dial-up). In addition, until 1994, schools had free consultation and limited borrowing facilities.

As the electronic library is only now moving from concept to realisation, its impact on these services to the community, is a matter of speculation rather than experience. At Aberdeen the outcome is promising, although it will involve, initially at least, additional cost.

- *Current information*. The Library's capability to meet business requirements for current legislation, statistics, directives etc, notably in the context of Europe and in relation to the oil, gas and engineering support industries, has already been greatly enhanced by access to bibliographic, statistical and full-text databases, online and on cd-rom. It will be reinforced by the opportunities for full-text retrieval of journal articles and on-demand publication foreshadowed in several of the eLib projects. There are, however, limits to its potential role as an

information provider to the community. As a HEI, the Library currently receives substantial discounts on its cd-roms and online services; it is bound by site-licensing agreements; and the eLib projects themselves are essentially for HE purposes. There are legal and statutory limitations, therefore, on the extent to which it can exploit its new capability off campus; it would certainly have to recover as much as possible of the increased costs incurred from the renegotiation of site licensing agreements through increased charges to its external customers.

- *Distance learning.* The Library has recently reviewed its role in this area, taking account of the mainlining of remote learning as a HE process and, specifically, proposals to develop locally delivered HE in the North of Scotland. It foresees a significant increase in the number of undergraduate and postgraduate remote learners, who will require to be treated on an equal basis with students on campus. They must have, for example, the opportunity, and the skills, to access and exploit the Library's OPAC and its electronic resources (online and cd-rom); and they will need mediated or end-user access to off-site resources and resource-centres, and facilities for on-demand document supply. It seems likely that these aims can be achieved using the Web, if necessary through a Z39.50 client, for access; e-mail for communication; Web-compatible versions of the Library's current computer-aided learning programs in library and information skills; and high bandwidth links to support (subject to licensing) full-text, electronic document delivery. Securing parity for distance learners in these and similar ways, however, will represent a markedly greater load than the Library has hitherto borne in support of distance learning and the

marginal costs of distance learners will be significantly higher than those of students on campus.

In its electronic form, however, the Library offers a further service to the community. It can provide virtual access to the written, printed and visual heritage of its hinterland. The Library has hitherto made its heritage collections available for consultation on site. Now, through digitisation, it can make them available on screen in local schools, colleges, public libraries and museums - wherever there is the technology to access them.

The Library began this process in 1995, supported by Follett funding for specialised collections. Its Humanities Research Support Unit has a four-year digitisation project, which will make available on the Web, using Photo-CD, a digital database of the Library's most heavily-used manuscript, printed and image-based collections, including the 40,000 glass negatives of the George Washington Wilson Photographic Archive, 1860-1914. A pilot project, the digitisation of the twelfth-century Aberdeen Bestiary, was completed in June 1996 (*http://www.clues.abdn.ac.uk: 8080/besttest/firstpag. html*).[5]

The Unit has a second, complementary project: to mount on the Web descriptive lists of all the Library's manuscript and archival collections. Metalevel descriptions of these currently appear on the Library's OPAC. Using the STATUS/IQ CLIO system, the Unit will publish the lists in full, enriched by images and offering unitary, batch and comprehensive search facilities.

The Library is continuing the process of virtual access with the creation of the Elphinstone Centre, to upgrade the storage of its heritage collections and to house facilities for disseminating them electronically. The Centre will have state-of-the-art environmental control; consultation, exhibition and performance space; a

5 The Bestiary URL will be changed in the course of 1996. Further details of this, and of other AUL projects described below, will be posted initially on Aberdeen University's home page (*http://www.abdn.ac.uk/*).

digitisation laboratory; and a teleconferencing suite. It will be closely associated with the University's Elphinstone Institute for the study of the history, languages and culture of the North of Scotland. The Centre has been costed at over £8m; a bid for funding is currently with the Heritage Lottery Fund.

The projects of the Humanities Research Support Unit and the proposed Elphinstone Centre match closely three initiatives currently in progress at a national level:

- SCRAN (Scottish Cultural Resources Access Network) 2000 (*http://www.nms.ac.uk/scran/*) has received funding from the Millenium Commission to make electronically available collections held in Scottish museums and galleries.
- LAIRD (Library and Archive Integrated Resources Database) 2000, initiated by the National Library of Scotland and the Scottish Library and Information Council, aims to create a database of images, primarily photographs. The plan is - at present, anyway - to seek funding from the Millenium Commission.
- The Scottish Archive Network 2000, initiated by the Scottish Record Office, aims to create an 'electronic search room', giving online access to lists of its holdings and to those of other repositories, such as Aberdeen University Library, which are in a compatible format. It is currently seeking support from the Heritage Lottery Fund.

If the last two projects are as successful as the first, Scotland will have by the end of the century a unique array of three national, digital databases, complemented at a regional level by databases such as that in construction at Aberdeen. But if these are to receive maximum use within the community, however, local institutions, such as colleges of further education, museums, schools and public libraries, will need the facilities and the skills to access and exploit them effectively. Until comparatively

recently, these were lacking - in the public library sector at least. Things there seemed no better than in England, where a public librarian declared: 'Superhighway? We're on a B road!'[6] Neverthless, the achievements of Project EARL (*http://www.earl.org.uk/earl/*) and the aspirations of the Library Association's Millennium Project, to give but two notable examples, suggest that in England the situation is rapidly changing and that there and in Scotland the discrepancy may soon be made up.

6 Quoted in ASLIB, *Online and CD Notes* (September, 1995), p 3.

European Research Libraries Cooperation:
The LIBER Quarterly, 6 (1996), 416-434.

The Integration of Library Information into a Campus Wide Information System

JAN BRAECKMAN
Leuven University Library

Campus Wide Information Systems developed in educational institutions. This paper discusses the integration of (information provided by) the library in a CWIS. I heavily depend on my own experiences as a participant developer of the library pages in the CWIS at K.U.Leuven. The aim of this paper is to clarify some of the characteristics of a CWIS to a general library public. In this paper we will point to some of the consequences participating in a CWIS can have for librarians.

Campus Wide Information Systems

The history of CWIS's started when university computing centres provided access to information that was available for sharing inside the institution. Access was limited at that time to all workstations connected to a mainframe computer.

Computer staff took the first steps in the 1980s by creating a central access to the basic services on the mainframe computers. Those basic services could be directories of telephone numbers, e-mail addresses, etc. This primary CWIS development was most often the result of some personal initiatives without any institutional policy to support it.

In the late 1980s these services 'went public', people were informed about the existence of these services. The CWIS was

becoming a way of supplying information. The CWIS developers searched for information in order to increase the supply side of the internal 'information economy'. The use of the services was promoted and the group of users became more extended throughout the institution. This evolution coincided with the rapid growth of LAN's, WAN's. In this new environment a CWIS became an organised access point for information stored in the emerging network.

The spread of new and user friendly technology stimulated the third step of the CWIS evolution: the Internet communication protocols and particularly, at that time, the gopher protocol. CWIS's became the result of an information policy within the institutions, aimed at different 'audiences' inside and outside the institution.

Afterwards even more attractive technology began to spread: the World Wide Web. The simplicity of the Web technology, in combination with the attractiveness of its products, helped a lot in promoting the idea of the CWIS.

At this moment a fourth phase can be distinguished in the evolution of CWIS's as they actually evolve towards Intranets. WWW technology is applied to organise a consistent interface to different types of information, databases and services within an institution. The latest developments are the WWW servers via which you can query a database without leaving the web environment. Queries and query results are translated from the web environment to the specific database query language and vice versa.

The continuing development of web technology will allow even smoother access to very different types of information. The integration of Java for example will enable you to execute programs from within the Web environment in order to make information services even more attractive and more functional.

This way a CWIS can be characterised as the creation of a generalised, uniform means of access to sources of information

that are stored on different machines, using different software platforms, organised by different information providers. So, a CWIS is a centralised entry point within an institutional setting, to as much information as possible.

CWIS's are the result of a technology driven development. New technological means dictate how they develop, and even the way they are conceived is closely linked to the development of computer technology. The most important aim in developing CWIS's was organising a better access to information already available via other means in the university community.

The CWIS renders the searching of information independent from limitations of time or space.

A CWIS will of course only be effective if the university community on a whole invests in the necessary technological infrastructure. The university community needs powerful personal computers and software and networking. The university has to develop the skill to organise all this for a majority of its members, and has to distribute the knowledge of how to use these new tools effectively.

These characteristics of a CWIS make it an engaging instrument for librarians to provide information and services to their public. Participation of the library in the CWIS development enables the library to present information about itself, and organise access to its information sources for a broad public, eventually on all time and from different locations. Information becomes more accessible and can be of higher quality. Users can access the latest version of information; they can be informed of special events and of important organisational changes; they can be guided towards the information sources they need, etc. This new medium can promote the use of more information by more users.

At the K.U.Leuven

Although at K.U.Leuven the library made a first proposal for a CWIS, it was immediately conceived as a tool for organising information about the university as a whole. Looking at the predecessors in the United States the idea of the CWIS was promoted as an attractive way of making plenty of information available for the members of the university community.

During the two years of its existence, the organising structure of the CWIS developed a lot.

First there was the initiative from within the library to present the concept of a CWIS to a group of people working in different departments in the university. At that time these were departments delivering services to the university as a whole.

Next step was the creation of a pilot group who prepared a structure for the project. This structures still evolves and presumably will keep evolving as long as the CWIS itself changes and as long as the impact of the CWIS on the university as a whole increases.

The formal start of the experiment was given one year after the informal start. Another year later the experimental phase was concluded and the existence of the CWIS was officially announced.

At this moment three top level committees co-ordinate the CWIS:

1. The Co-ordinating Committee: including a representative of the university management; the actual co-ordinator of the CWIS (a professor in computer sciences); the director general of computer applications at the university; the director of computer applications; the director of the computer centre; the director of internal and external communication; the university consultant for faculty managers.

2. The Technical Task Force: including computer specialists working in: the computer centre, the division of computer applications, the library system, faculties and departments; the secretary of the Co-ordinating Committee.
3. The Task Force of Information Providers and Users: including all members of the Co-ordinating Committee; representatives of the faculties; representatives of general services of the university: general management, library, student services, social services; representatives of the students; the same secretary.

Underneath these top level groupings, several task forces are organised with varying work schemes depending on the needs of the university branches within which they reside. This extended organisation is necessary because a CWIS may be technically rather centralised, in relation to its contents it is very decentralised.

The Technical Task Force is mostly responsible for organising the infrastructure and the connection between the different parts of it. An other important assignment was the development of the K.U.Leuven Style Guide. It describes the rules all members of the university should follow to produce CWIS pages that are legitimate K.U.Leuven CWIS pages.

This task force also provided special courses in using Internet and World Wide Web. Tools were created to edit web pages conforming with the style guide. Al this was done to promote the use of the CWIS and stimulate active participation.

The Task Force of Information Providers and Users is where the community that uses the CWIS is represented. The major aim is to create input for the consecutive development of the CWIS. The different members of the university should motivate each other to provide new information and services on the CWIS. An important stimulus in this development was the definition of deadlines by which some major improvements had to be

established. Examples of such deadlines are: the start of another academic year and the arrival of thousands of new students; the participation of the university at a high technology fair, etc.

Although the development of the CWIS is based on the positive attitude and participation of all divisions of the university, it is considered important that the university presidency explicitly supports the project. This support is necessary to keep this heterogeneous group working together. This support mobilises extra energy throughout the university for developing this new information tool.

The presidency of the university is keen on the establishment of a CWIS because it can be a very important instrument for public relations inside and outside the institution. This same remark applies for the library.

The organisation of task forces in the library is less formal and evolved a lot an a short time. Two major initiatives are taken. Courses are being organised that focus specifically on library staff in order to make them acquainted with the Internet. The other initiative is the establishment of special task forces for realising focused objectives. These task forces are small, mostly 4 to 6 people. Some people participate in different task forces. A lot of the initiative grows out of informal communication between not more than 7 people.

The way these task forces proceed is by realising as fast as possible some exemplary services that can be adopted by other members of the staff in different branches or services of the library.

An important stimulus for the library staff is of course the Internet itself. I refer to the websites I present separately in this paper.

The organisational structure of the CWIS at K.U.Leuven assembles a rather heterogeneous group of professionals. They discuss the development of a system in which all have to agree on

how to satisfy the information needs of users and how the available expertise can be combined to deliver a better product.

Administrative and managerial staff provide their knowledge of the organisation and the way it works. For example: which information is public, which information is not; what are the organisational consequences of providing certain information; is their overlap in the provision of information; ...

Confrontation and Co-operation

In this multi-disciplinary environment the library staff is confronted with two other professionals in particular: the academic or subject specialist, and the computer specialist.

Academics who adopt computers and networking as a part of their new professional role are very prone to participate fully in these developments, including the CWIS. Especially younger academics will be enthusiastic to create their own CWIS pages. They will do it fast, using their many professional contacts and knowledge.

This enthusiasm could become problematic if they over stress their specialist view on information sources they provide within a CWIS. This relates to selecting the information as well as to the presentation of information.

However, not all academics are eager to use the new medium actively. A lot of them have to be instructed on how to be more than just passive information seekers. Academics can use CWIS's to innovate their professional work, but have to become information providers to do it well. Librarians can help academics by pointing out examples of others in the same discipline who are active on the Internet. Academics also can use some organisational support in order to provide information in a consistent way.

CWIS's developed in order to provide a central access to all information on the mainframe computers. This situation changed

completely with the arrival of all LAN's, etc. This evolution dispersed computer specialists throughout the university. Computer specialists are finding themselves in the same structural position librarians are keeping since long: a professional group closely linked (financially and physically) to its patrons.

Librarians on the other hand become aware of the fact that more and more of their professional tasks are being executed using computers.

Librarians and computer specialists will have to set up a dialogue. Both professions have a rich and diverse background to develop a complementary relationship. Librarians will have to initiate this dialogue because they (should) know what kind of services the university community is needing. Computer specialists can become allies in strengthening the position of the library within the institution. Still, librarians will have to convince computer people that they do have their own professionalism. It must be made clear that libraries are not becoming repositories of outdated media. Librarians not just add some more databases to the already available ones but provide unique information services.

The strength of librarians is their knowledge of their users and their needs. Their professionalism includes organising secure services for a present and future population with varying interests. It is in keeping an overall view on what kinds of information are available. Even more importantly, librarians have a vital role to play in the defence of access to information by redefining this access in a new and rapidly changing technological environment.

Innovative Internet Applications in *LIBRARIES*

This WWW site provides a convenient place to explore how libraries are using the Internet to improve service. Please send suggestions for the improvement of this site to Ken Middleton at kmiddlet@frank.mtsu.edu.

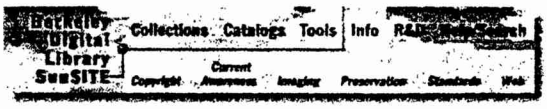
- ☐ Bibliographic Instruction
- ☐ Cataloging
- ☐ Celebrating Books [**NEW**]
- ☐ Collection Management
- ☐ Electronic Publishing & Related Projects
- ☐ Image Maps for Home Pages
- ☐ Librarians as Internet Resource Providers/Organizers
- ☐ Library Research Guides
- ☐ Library Tours
- ☐ Proceedings/Papers
- ☐ Public Relations [Newsletters, Promotions, etc]
- ☐ Reference
- ☐ Special Collections [exhibits!]
- ☐ Web Forms Interlibrary Loan | OPAC Searching

Library Science Resources | Todd Library Home Page

Ken Middleton kmiddlet@frank.mtsu.edu
Todd Library, Middle Tennessee State University

Figure 1.

Ken Middletons' Innovative Internet Applications in Libraries (frank.mtsu.edu/kmiddlet/libweb/innovate.html) This page is a very gratifying place to start discovering Internet. It leads you to very fine examples of what to do and to very good information on how to do it. It can be an on-line teaching course for every task group within the library or the university who is starting to integrate Internet in the organization of its services.



The Library Web Manager's Reference Center

The following resources have been selected to be of possible use to library Web managers. Many of them have been announced on the Web4Lib electronic discussion, or have come from frequently asked questions on that forum.

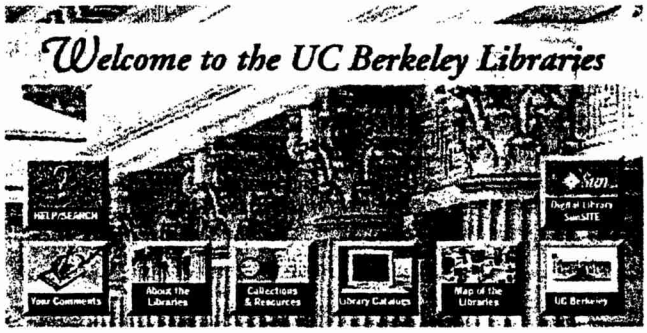
- Berkeley Digital Library SunSITE Web Information and Resources
  Documents describing and demonstrating basic and advanced HTML tags and a very select set of links to additional Web authorship resources.
- **The Best of Web4Lib**
  Messages with helpful information for Web managers, including:
  | "Bombproofing" Win95 User PCs | Booking Rooms via the Web | Netscape Timeout for Macs | Netscape Timeout for Windows | Search Engines Reference List | Web Document Capturing Software | Web Usage Statistics based upon a Web4Lib posting of April 1, 1996 | Z39.50 and the World Wide Web |
- Effective Bookmarks Management
  By Carole Leita, Berkeley Public Library. A very complete and illustrated online tutorial on managing Netscape bookmarks (although written for Windows Netscape 1.2, there is much that is applicable and useful to both Windows and Macintosh 2.0 Netscape.

Figure 2.

The Web4Lib Reference Center
(sunsite.berkeley.edu/Web4Lib/faq.html)
This reference site grew out of the 'frequent asked questions' of the Web4Lib discussionlist. Apart from scanning this Reference Center or participating in the discussions, you can also consult a very well organized archive of the discussions. Observing these discussions will demonstrate how intense librarians, computer specialists, and academics are working together to provide new information services using the Internet.

- Electronic Reserves Clearinghouse: Links and Materials on the Web
  By Jeff Rosedale, Columbia University.
- How to Edit Netscape for Public Access Computers
  By Carole Leita, Berkeley Public Library. Describes editing Netscape 1.2 for Windows 3.11 to disable certain features.
- Innovative Internet Applications in Libraries
  By Ken Middleton, Todd Library, Middle Tennessee State University.
- **Launching CD-ROM or Other Applications From a Web Browser**
  Documents that describe this procedure include:
  | Launching CD-ROM and Other Applications from a Web Browser, by Peter Gorman | Configuring Web Browsers to Launch Networked CD-ROMs by Robert Joachim | Launching Programs and CDs from Web Browsers by Larry Schankman.
- Libraries' Forms List
  A list of library web sites that offer forms for: ILL and document delivery requests, reference question submissions, literature search requests, acquisition recommendations, and other types of customer feedback. Maintained by Jim Robertson, Van Houten Library, New Jersey Institute of Technology.
- Libweb
  A directory of library-based World Wide Web servers by Thomas Dowling, OhioLink.
- Managing Bookmarks in Netscape 1.2
  A tutorial for managing bookmarks in Windows Netscape 1.2 by Randy D. Ralph, Mertys W. Bell Library, Guilford Technical Community College.
- School Library and School Librarian Web Pages
  By Peter Milbury, Chico Senior High School Library.
- Search the Web4Lib archive
  Want to quickly find answers to your questions? The archive of this electronic discussion for library-based Web managers is chock-full of great stuff. Put in a few keywords and let it fly!
- **Web Policies**
  Fend off those lawsuits by implementing the apropriate policies. Good collections of Web policy pages include:
  | Public Library Internet Access Policy Statements | Susan Brown's Collection | Stacey Kimmel's Collection |
- webCATS: Library OPACS on the World Wide Web
  A directory of library catalogs that are searchable from a Web client.
- The World-Wide Web and Mosaic: An Overview for Librarians
  An aging (1994) but still very informative overview of the Web aimed at librarians. Written by Eric Lease Morgan for PACS Review.

Figure 2. [cont.]



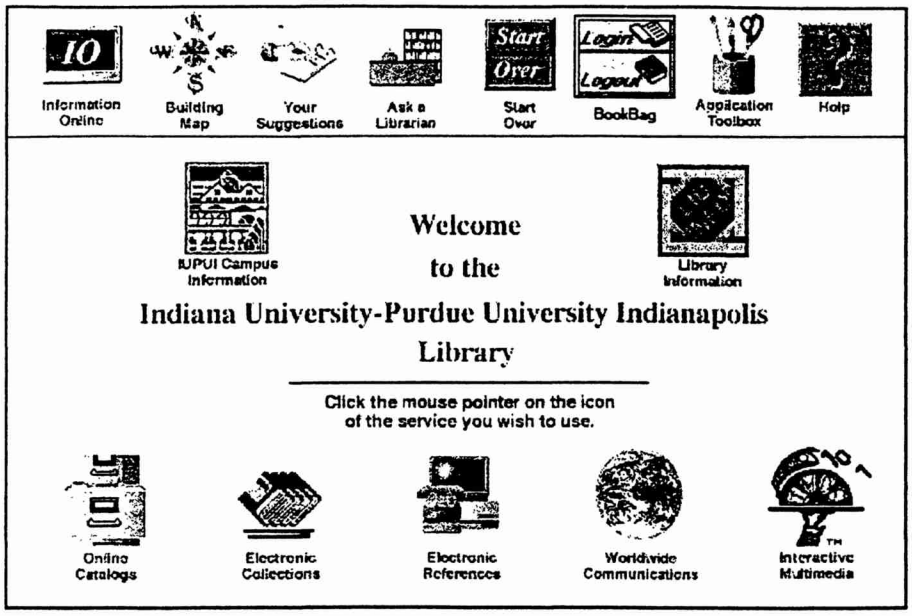
| Help/Search | Your Comments | About the Libraries | Collections & Resources | Library Catalogs |
| Map of the Libraries | UC Berkeley | Digital Library SunSITE |

Select specific library or Table of Libraries from list	Check to search document titles only:

Figure 3.

The University of Berkeley Libraries homepage
(www.lib.berkeley.edu)

Figures 3 and 4 are two very fine examples of library homepages. They can serve a short review of what the ingredients are of a good library CWIS site.



Line-Mode Home Page

Figure 4.

The Library homepage of Purdue university (www-lib.iupui.edu)

University of Maryland at College Park Libraries

Sociology

SCOPE: This guide is an annotated bibliography of the most useful general sources on the subject of sociology available in the UMCP Libraries and, also, over the Internet. Items marked with an asterisk (*) can also be searched via computer. Unless otherwise indicated, materials can be found in McKeldin Library.

Contents

Part I: Subject Headings

To locate books, search VICTOR, the UMCP Libraries' online catalog. Books in the VICTOR catalog are categorized according to **Library of Congress Subject Headings**, copies of which are located near the terminals. To find books on a concept you are interested in, use the subject heading which

Figure 5.

The Sociology Research Guide of the University of Maryland at College Park Libraries (www.wam.umd.edu/mchugh/guides/sociology.html) This on-line research guide is a good example of what kind of services librarians can offer their patrons. In fact it is an annotated subject bibliography containing reference works available in the libraries.

most closely describes that concept. If the term you search is too broad and results in the retrieval of an unmanageably large number of records, you may further narrow your search by adding additional subject headings to your original search. For example, if you searched the term "Organizational behavior" and found that you had retrieved more material than you could use, and if you were really interested in the narrower topic of organizational behavior in work groups, you could obtain a more useable amount of material by combining the term Organizational Behavior with the term Work Groups In general the use of relatively narrow and specific headings leads to the most fruitful results. Examples are:

Class consciousness
Homeless persons
Conjugal violence
Dual-career families
Ethnic attitudes
Gangs
Sexual division of labor
Sociology, Military
Urban poor
Victims of crimes

Part II: General Sources of Information

Bibliographies and Guides

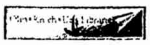
Aby, Stephen H. **Sociology: A Guide to Reference and Information Sources**. Littleton, Colo. : Libraries Unlimited, 1987.
CALL NUMBER. REF HM51.A38 1987
(HBK also)

This is an annotated bibliography which describes 659 of the most useful reference sources in the field of sociology. It is organized by topic with author/title and subject indexes at the back of the volume.

International Bibliography of Sociology. Annual. 1955- .
CALL NUMBER: REF Z7161.I594
(Shelved in the Behavioral/Social Sciences Alcove)

An international bibliography produced annually by UNESCO as one of the four parts of its **International Bibliography of the Social Sciences**. Each issue is an extensive non-annotated bibliography, in topical order, of books, journal articles, government publications and pamphlets published in a variety of languages. Access to the contents is enhanced by author, place name, and subject indexes at the back of each volume. As a separate series, this title begins with Volume 5. Volumes one through four were published as issues of **Current Sociology** (MCK STACKS Z7161.C8).

Figure 5. [cont.]



Library Research at Cornell: A Hypertext Guide

Seven Steps to Effective Library Research

Advice on Specific Aspects of Library Research:

How to Develop Your Research Topic

How to Find Background Information

How to Find Books

How to Find Periodical Articles

How to Use the Web to Find Internet Resources

How to Evaluate What You Have Found

How to Cite What You Have Found

Library vocabulary: Definitions of library terms

Question? Ask a Librarian

Return to Uris Library Web Resources

Return to Olin*Kroch*Uris Reference Home Page

Revised May 21, 1996
Michael Engle, moe1@cornell.edu
Division of Reference Services, Olin*Kroch*Uris Libraries
Cornell University Library
URL: http://urislib.library.cornell.edu/tutorial.html

Figure 6.

Library Research at Cornell: a hypertext guide (urislib.library.cornell.edu/tutorial.html) These 'Seven steps' show how librarians and academics together can work out a superior and attractive tool in an educational environment.

The Seven Steps of the Research Process

The following seven steps outline a simple and effective strategy for finding information for a research paper, writing the paper, and documenting the sources you find. Depending on your topic and your familiarity with the library, you may need to rearrange or recycle through these steps. Adapt this outline to your needs.

1. IDENTIFY YOUR TOPIC.

State your topic as a question. For example, if you are interested in finding out about use of alcoholic beverages by college students, you might pose the question, "What effect does use of alcoholic beverages have on the health of college students?" Identify the main concepts or keywords in your question.

2. FIND BACKGROUND INFORMATION.

Look up your keywords in the indexes to subject encyclopedias. Read articles in these encyclopedias to set the context for your research. Note any relevant items in the bibliographies at the end of the encyclopedia articles. Additional background information may be found in your lecture notes, textbooks, and reserve readings.

More suggestions for finding background information.

3. USE CATALOGS TO FIND BOOKS.

Use keyword searching for a narrow or complex search topic. Use subject searching for a broad subject. Print or write down the citation (author, title,etc.) and the location information (call number and library). Note the circulation status. When you pull the book from the shelf, scan the bibliography for additional sources. Watch for book-length bibliographies and annual reviews on your subject; they list citations to hundreds of books and articles in one subject area. Check the standard subject subheading "--BIBLIOGRAPHIES," or titles beginning with Annual Review of... in the Cornell Library Catalog.

Detailed instructions about finding books.

Try Searching the Online Catalog

4. USE INDEXES TO FIND PERIODICAL ARTICLES

Use periodical indexes and abstracts to find citations to articles. The indexes and abstracts may be in

Figure 7.

The Seven Steps of the Research Process.
This is the first step: reading a little bit more about each step as shown in Figure 6, enhanced with links for making the next ones.

print or computer-based formats or both. Choose the indexes and format best suited to your particular topic; ask at the reference desk if you need help figuring out which index and format will be best. You can find periodical articles by the article author or title by using the periodical indexes in the Cornell Library Catalog. When you have recorded or printed out the citation from the index, locate the library that owns the periodical you want by looking up the title of the periodical in the Cornell Library Catalog. For the periodical indexes directly linked to the Cornell Library Catalog, you can locate the periodical by entering HOL on the command line.

Detailed instructions on finding and using periodical indexes at Cornell.

---

5. EVALUATE WHAT YOU HAVE FOUND

See How to Critically Analyze Information Sources and Distinguishing Scholarly from Non-Scholarly Periodicals: A Checklist of Criteria for suggestions on evaluating the authority and quality of the books and articles you located. If you have found too many or too few sources, you may need to narrow or broaden your topic. Check with a reference librarian or your instructor.

---

6. WRITE YOUR PAPER

Here is an annotated list of books to help you organize, format, and write your paper.

---

7. USE A STANDARD FORMAT FOR YOUR BIBLIOGRAPHY

* Format the citations in your bibliography using examples from the Modern Language Association (MLA) or American Psychological Association (APA) standards.

* Citing an electronic or Internet resource in your bibliography? See MLA-Style Citations of Electronic Sources for examples.

* If you are writing an **annotated bibliography**, see How to Prepare an Annotated Bibliography.

RESEARCH TIPS:

WORK FROM THE GENERAL TO THE SPECIFIC.
Find background information first, then use more specific and recent sources.

RECORD WHAT YOU FIND AND WHERE YOU FOUND IT.
Write out a complete citation for each source you find; you may need it again later.

TRANSLATE YOUR TOPIC INTO THE SUBJECT LANGUAGE OF THE INDEXES AND CATALOGS YOU USE.
Check your topic words against a thesaurus or subject heading list.

Need help clarifying your topic?

Figure 7. [cont.]

Need ideas about where to look next?
Want to be sure you're using a reference source effectively?

Ask a Librarian

Return to Library Research: A Hypertext Guide

Return to Olin*Kroch*Uris Home Page

Go to Resource Guides and Bibliographies

Michael Engle, moe1@cornell.edu
Division of Reference Services, Olin*Kroch*Uris Libraries
Cornell University Library
Revised January 31, 1996
URL: http://urislib.library.cornell.edu/skill1.htm

Figure 7. [cont.]

European Research Libraries Cooperation:
The LIBER Quarterly, 6 (1996), 435-451.

Preservation of Digital Materials for Libraries

JOHN MACKENZIE OWEN
Senior consultant, NBBI

Introduction

How can we guarantee that information published in digital form will be available to future generations? Many people in the library and archival world are beginning to understand the significance of this question. It is highly likely that within a number of years most information will be published in digital form over networks. It is highly unlikely that the originators of these publications will maintain them on their network servers for centuries or even decades. It is time to think about preserving the digital intellectual record.

Two recent studies have identified the problems of digital preservation and point towards solutions. One such study has been carried out by a Task Force on archiving of Digital Information commissioned by the Commission on Preservation and Access and

the Research Libraries Group in the United States[1]. The other has become known as the ELDEP-study[2], carried out by NBBI in the Netherlands for the European Commission at the suggestion of CoBRA, a group established under the aegis of the Conference of European National Librarians. This paper draws on the findings of these two studies in order to clarify a number of issues which relate tot the future role of libraries in ensuring the continuity of access to digital materials.

Libraries and archiving

It is rapidly becoming common practice to refer to libraries as 'digital archives'. For traditional librarians, this sounds rather strange. They have become used to regarding the library as something entirely different from an archive. From this traditional viewpoint, archiving is concerned with 'unique' documents, i.e. documents of which one or only a small number of copies exist. Archiving is primarily the responsibility of the originator of a document, and its main function is to store and preserve documents after their primary use. Libraries, however, acquire and store publications (of which many copies exist) in anticipation of use, and they have their own responsibility for preservation beyond that of the originator.

It is interesting to see how the concepts of libraries and archives come together in the light of networked publishing. Digital networked resources are unique documents in the sense

1 Preserving digital information: report of the Task Force on archiving of Digital Information commissioned by the CPA and the RLG: final report and recommendations. - May 1, 1996. This report is available at [*http://www-rlg.stanford.edu/ArchTF/*], [*http://www.rlg.org/ArchTF/*] and [*http://ukoln.bath.ac.uk/mirror/archtf/archtf.html*].

2 Mackenzie Owen, J.S. & Walle, J. v.d. - A study of issues faced by national libraries in the field of deposit collections of electronic publications: final report. - Luxembourg: European Commission, 1996.

that they are not distributed in multiple physical copies. In fact, there is often only a single source from where they can be obtained. As we shall see, libraries may only be allowed to acquire and store such documents after a certain period of time, i.e. after their primary use as sources of income for their originators. Whereas in the archival world storage of documents in multiple locations is usually impossible, in the world of networked libraries it is unnecessary. In summary, storage and preservation of resources published over the networks is becoming an archival task.

There is currently some debate as to whether there is any need at all for digital archives. Would it not be better to leave the responsibility for archiving with the originator (e.g. the publisher)? There are several reasons why this is not the case, and why libraries (or other archival bodies) should take on this task:

- Originators have a short-term (economic or other) interest in storing documents for access over the network. When that interest ceases to exist, they will remove them from the network. There is a need for archives which have a specific responsibility for long-term availability and continuity of access, and which have the funding to do so.
- Long-term archiving is correlated with extremely infrequent use (or 'access' in network terms). This is best served by technical and organisational solutions which differ from those required for frequent use. Dedicated archives can provide the most efficient modes of storage and access for this task.
- Archiving is more than storage, it also implies active preservation. As we shall see, preservation of digital materials is a difficult and expensive issue which can only be carried out by specialised centres.

An important mechanism for performing the archiving task, at least in Europe, is the legal deposit mechanism. This implies that digital publications are acquired by a national digital archive (the

deposit library) responsible for preservation and continuity of access. It is our view that the digital deposit library could serve as the archival backbone for future electronic libraries. If national libraries do their job well, other libraries can focus on providing access to their users with little or no concern for creating local collections and for storing and preserving digital publications.

Digital publications and preservation

What kind of digital publications should concern us in the context of long-term preservation? One has to understand that preservation really is a long-term affair, concerned with maintaining the availability of publications over a period of centuries. In this context it does not make sense to pay much attention to short-term issues. It is clear that future digital publications will be dynamic, networked, multimedia digital objects. This means that they will be distributed over networks, will be subject to frequent changes during their economic life-time, and will contain text, images, sound and often a high degree of interactivity. In our view off-line media such as CD-ROM and CD-I are of limited future interest. What can be done on such media can and will be done much better in networked form. Many off-line digital publishers are already considering a move to on-line networks. The key source of publications for the digital archive will therefore be the network, in whatever form it may develop over the years.

In this context, preservation acquires a distinct meaning. It is concerned with:

- maintaining access to the intellectual content and functionality of digital objects, and
- preserving the content structure of the network.

Preserving functionality, in addition to intellectual content, is important. Digital objects as published on the network are increasingly capable of performing integrated functional tasks, e.g.

performing calculations, offering digital simulations, allowing browsing and search tasks, etc. Preserving functionality is a major challenge to preservation, since it is always based on current information technology which may not be available at a later point in time.

Preserving the content *structure* of the network is important because networked objects are becoming more and more interlinked, forming a close web of information where the meaning of an individual object is partly defined by the context provided by a large number of other documents. It is not sufficient to preserve individual objects. One has to preserve them within this structural context.

Issues for digital archiving

As already indicated, the major concern for digital archiving is preservation. We cannot take for granted that that we can guarantee availability of digital objects for future generations just by storing them in a safe place. Before discussing specific aspects of preservation, it is important to point out that the issue of preservation requires an integrative approach, taking into account the entire process from selection to long-term storage. Preservation influences all aspects of digital archiving: decisions taken at earlier stages (selection, acquisition, pre-processing, cataloguing etc.) have implications for the cost-effectiveness of preservation.

This is not a trivial statement. Digital archiving involves many issues which we as yet do not fully understand. The ELDEP-study, for instance, has identified the following issues for deposit libraries:

- **Acquisition**
  - acquisition methods
  - supplier relationships
- **Pre-processing**

  - installation, verification, documentation
  - cataloguing & indexing
    - original cataloguing
    - shared cataloguing
    - embedded metadata
  - standardisation
    - format
    - medium
- **Storage**
  - off-line objects: original form *versus* mass storage; accompanying materials
  - networked objects: level of linking
  - dynamic objects: refreshing / snapshots
- **Access**
  - legal aspects
  - service level
  - continuity of network access

The ELDEP-study discusses these issues in far more detail than can be done here, and points to possible solutions. The point to be made here is that long-term preservation of digital resources is extremely complicated and far beyond the capabilities of most so-called digital libraries.

Digital preservation

Let us now look at digital preservation as such. If we consider a digital archive that has obtained a digital publication, what makes preservation more than storage? The answer lies in the fact that it is not sufficient to store a digital object in its original form as received, if we wish to guarantee continuity of access. It is therefore necessary to convert it, and to continue doing so for as long as it remains in the archive. There are three main reasons why conversion is necessary:

- *Physical deterioration of media.* Digital objects are stored on digital media. Any digital medium currently known to

us has a limited life-span, after which it cannot be used to store the data safely.

- *Obsolescence of the technical environment.* Digital objects, on whatever medium they are stored, depend on specific hardware and software for their use. This combination of hardware (readers, computers) and software (operating system, database software, browsers, viewers etc.) is often referred to as the 'technical environment' under which an object can be accessed. When the technical environment changes chances increase that the object can no longer be used. The current rapid development of information technology means that the life-span of the technical environment is often less than ten years.
- *Economic and management considerations.* It is usually not feasible for a digital archive to handle all types of media, formats etc. on which digital objects are distributed. In view of cost considerations, available skills and the technical resources of the archive, some objects may have to be converted to standardised formats.

The need for conversion leads to the requirement for the digital archive to develop *migration strategies*. This is not an easy task, because we know very little about future technical developments and about the cost involved in migrating large volumes of information. In general one can choose from the following set of strategies:

- *Medium refreshing:* transferring the data to a new medium of the same type.
- *Medium conversion:* transferring the data to another medium with better preservation characteristics.
- *Format conversion / re-standardisation:* transfering the data to another format which is easier for the archive to handle.
- *Migration of the technical environment:* transfering the data to be accessed under new hardware and software.

- *Emulation of the technical environment:* re-creating the original technical environment in a new technical environment, making it unnecessary to migrate large numbers of digital objects.

The uncertain world of digital archiving

The number of uncertainties involved in planning for digital archiving is overwhelming, They include:

- *Cost factors:* what are the important cost factors and how should they be calculated? There is a need for cost models and for the creation of cost data, based on actual experience in order to evaluate these models. Very little work has as yet been done in this area.
- *Cost development:* very little is known about the future cost of obtaining items for archiving and the cost strategies of publishers (e.g. costing per article instead of per journal title). Also, and more importantly in view of migration, it remains unclear whether the current cost of technology (e.g. the cost of storage) will continue to decline at the current rate.
- *Volume of networked publications:* although it is certain that networked publishing will eventually become the normal mode of distribution, it is not clear at what rate the shift from print and off-line publishing to networked publishing will take place.
- *IT-change rate:* will the rate of technological change (leading to the need for migration) continue at the current levels?
- *Emulation technology:* will emulation technology become available and help to avoid the high cost of technological migration?
- *Legal issues:* copyright legislation is evolving rapidly and could have unforeseen consequences for preservation.

This affects both the right to archive and provide services, and the right to convert publications for preservation reasons.

- *The future of the commercial publishing industry:* will the commercial publishing industry survive the move towards digital networks as a publishing channel? Will alternatives (e.g. institutional publishing) allow for effective archiving?
- *Strategic co-operation between libraries and publishers:* will libraries be able to establish satisfactory relationships with publishers to perform their function as digital archives?
- *Inter-library co-operation:* will the library world succeed in setting up a cost-effective way to organise digital archiving? Will the national (deposit) libraries develop a role as an archival backbone?
- *Preservability of dynamic networked digital objects:* finally, there is growing uncertainty as to the intrinsic preservability of dynamic networked digital objects. Perhaps the nature of these objects will make it impossible to preserve them effectively over time.

There are no easy answers to these questions. Digital archiving is a question of trial and error. However, clear thinking and the ability to discard traditional ways of organising information services are required in order to achieve the goal of long-term preservation of the intellectual record.

The cost of digital archiving

One of the most difficult issues for digital archives is the assessment of the future cost of preservation. It has already been mentioned that there is a need to develop -and test cost models. What is clear however, is that the cost of digital archiving and preservation will be high. Too high, in fact, to be carried by

individual libraries. Digital archiving will therefore have to be organised at a higher level, either on a national basis (e.g. by national deposit libraries), or on an international scale through European or global domain-based digital archives.

A large number of cost factors have to be taken into account in order to estimate the full cost of long-term preservation. These include:

- Organisational costs e.g. of co-operative archiving schemes
- The cost of selection, if we concede that it is impossible to archive all materials distributed over the network
- Acquisition costs, i.e. purchase or license costs for digital materials
- Cataloguing and indexing, taking into account the handling of embedded metadata in digital objects
- The cost of conversion to standard media and formats
- Annual storage cost (incl. accompanying materials for off-line materials)
- The cost of maintaining an access infrastructure
- Maintenance cost for preserving continuity of access (including the cost of media preservation and of migration to new technological environments)

Our current understanding of the cost issue can be summarised in just few points:

- Under current conditions, the cost *per access* of digital archiving is roughly the same as that of paper archiving. Electronic publishing may be a cost-effective solution for information distribution compared with print publishing. It certainly is not a cost-effective form of long-term archiving.
- Migration costs could lead to substantially higher per-item costs for digital preservation. The cost of migrating large volumes of digital objects to new technological environments could well prove to be prohibitive.

- Investment in standardisation can lead to future cost savings, because it can lead to significantly lower migration costs.
- The cost of digital preservation compared to print storage depends mainly on the organisational model for the electronic library. Duplicating the long-term storage and preservation of digital objects in many libraries is unnecessary, and therefore unnecessary expensive.
- The most cost-effective approach tot digital preservation is based on a co-operative model for the digital library in which digital archiving is carried out by a limited number of large centres to which other libraries provide access.

The latter point can be illustrated as follows. Under the present system, based on print publishing, many libraries acquire and store the same publications. In the networked world, any object stored in a single location can be accessed over the network; there is no need for multiple storage on a large scale. Libraries could therefore agree to co-ordinate storage, each library archiving a small, mutually exclusive sub-set of published information. Library users would then obtain materials either from the local archive, or from one of many other archives. However, this is not a cost-effective solution. The overhead cost for management and co-ordination, and for maintaining a meta-directory would be extremely high, and it is unlikely that duplication could be avoided to a sufficient extent. Moreover, it would require that a large number of libraries maintain the specialised skills and technical means for long-term preservation. By far the most cost-effective solution would be to set up specialised archival services (e.g. deposit libraries or domain-based archival centres) which maintain the archival collection for the library world.

Co-operation between libraries and publishers

An issue which needs to be discussed here is the relationship between libraries and publishers. In the traditional world of printed publications, the library acquires materials at a certain cost from the publisher, usually as soon as they are published. Publications are held 'in print' by the publisher as long as they generate sufficient revenue, after which publication is discontinued and the title goes 'out of print'. The library stores the publication, often indefinitely, in order to maintain 'continuity of access', i.e. to keep it available for future use, long after it has gone out of print. (cf. figure 1). This 'archival' role is one of the main functions of the traditional library. This is possible because long-term archiving of printed materials is relatively cheap. It is also necessary to a certain extent, since access is more difficult if the item is not available locally. The need for local archiving has, however, diminished over the past decades due to computerised union catalogues, interlibrary lending schemes and document delivery services. Nevertheless, most libraries are still 'collection-based', i.e. archival in nature.

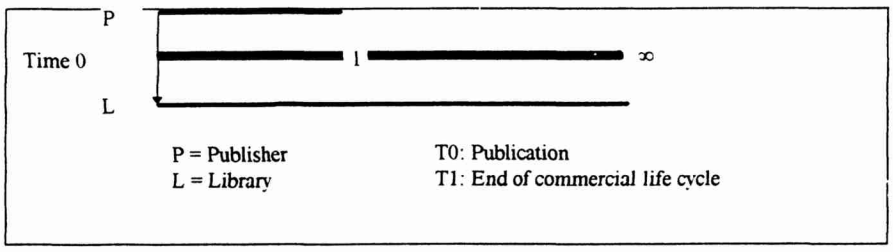


Figure 1

It is now becoming clear that publishers will not use this model for networked distribution of publications in digital form.

In spite of a number of experiments where publishers deliver electronic versions of journals in digital form to libraries, where they are made available to users and stored on digital media - a perfect digital parallel to print distribution - this will not be the way things are done in future. Publishers will store their publications on their own 'digital repositories' rather than distribute them to libraries for local storage and access. License agreements between publishers and libraries will allow users to access the publisher's repositories, either directly or through library-based systems. This brings many advantages to publishers, besides being a far more efficient solution in a world where network access makes large-scale multiple storage a thing of the past.

From a preservation point of view however, this model creates a problem. Publishers can only be expected to store information in their repositories (at least in a way which allows user access) during its 'economic life cycle', i.e. for as long as it is profitable for the publisher to do so. After that, the publication goes 'out of print' , i.e. it becomes inaccessible and may not be stored and preserved for future use. At this point in time, the need for digital archiving arises. What is necessary, therefore, is that publishers and libraries agree that items will then be transferred to a digital archive maintained by the library world in order to guarantee continuity of access for future generations (cf figure 2). Such an agreement would preserve the archival role of the library world, although not necessarily (as argued above) of most individual libraries.

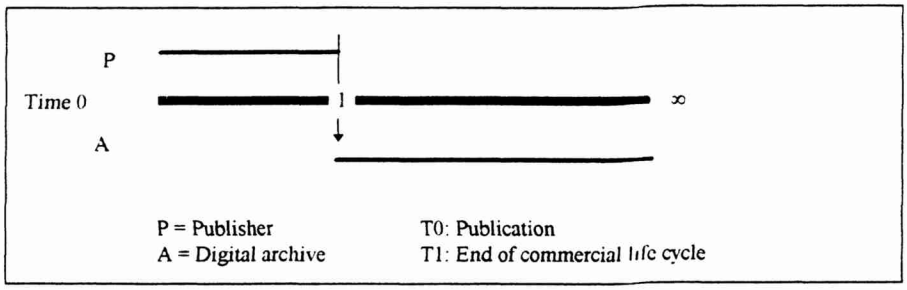


Figure 2

It should be noted that this solution already exists, although in a slightly different form. In most European countries national deposit libraries obtain a copy of digital publications from the publisher under deposit legislation, and national libraries are already setting up mechanisms for handling, storing and preserving the national digital output. Digital archives are therefore already under construction on a national basis. Access to this archive is, however, limited in order to safeguard the publisher's copyright. This means that access is only available on-site under restricted conditions, or at the most over the network to registered users of the national library.

What is needed, therefore is agreement between national libraries and publishers that unrestricted access will be allowed after the economic life cycle of the publication. This could be done in a generic way (e.g. after a certain number of years), or on a per-item basis. Using the deposit library as the future digital archive for published materials would make good use of the existing infrastructure, facilitate negotiations between publishers

and the library world, and offer guarantees for more or less complete coverage of the intellectual record.Although domain-based approaches to digital archiving have certain advantages as well, the ongoing development of digital deposit libraries at the national level in practice could well turn out to be the best solution, especially in the European context. The major challenge for national deposit libraries is to gain acceptance of this important role in the library world at large.

Conclusions for the digital library

We can summarise the issues described in this paper as follows:

- Preservation requires an integrative view of the entire library process.
- Preservation of electronic publications equals preservation of dynamic networked multimedia.
- The large number of uncertainties makes long-term planning of digital preservation extremely difficult.
- The cost of preservation depends primarily on:
  - development of technology (storage cost, need for migration)
  - co-operation between libraries and publishers
  - inter-library co-operation
- Cost reductions can be found through:
  - standardisation
  - emulation as an alternative to migration
  - co-operative organisational models
- Long-term preservation is a specialised task, to be performed by a limited number of digital archives

The conclusions to be drawn from our analysis of the preservation issue and - in a wider context - digital archiving for the future of libraries are easy to understand, but may not be welcomed by librarians used to more traditional ways of thinking.

The first conclusion is that in the long run, the main source of library materials will be the network. To be more precise: users will acquire their information in digital form from networked sources, and libraries will be no more (and no less) than intermediaries, helping the user to identify, locate and access information.

In the relationship with publishers, libraries will manage the access by users to copyright materials stored by the publisher based on license agreements. Libraries will no longer acquire and store current materials from publishers.

Long-term storage and preservation - digital archiving - will no longer be a task for most libraries[3]. This function will be handled by specialised digital archives, either national deposit libraries or domain-based archival centres on an international scale.

The library world is facing major challenges, quite similar in scale to those faced by other organisations in the information chain such as publishers.[4] Digitisation and networking are revolutionising the publishing industry, and will do the same to the library world. One of these challenges is to develop efficient modes for long-term archiving in order to preserve the digital intellectual record. This will involve major changes in the concept of a library. If the library world wishes to serve the future needs of information users, it will have to accept these changes and move towards more centralised archiving. Long-term storage of digital

3 Note that this refers to *long-term* storage. Whether libraries have reasons to store digital publications for current, short-term use is a different matter. The cost-effectiveness of this depends on the expected volume of use. For long-term storage, frequency of use is expected to be sufficiently low to justify networked access to centralised digital archives.

4 An overview of developments towards new models for libraries can be found in: Mackenzie Owen, J.S. and Wiercx, A. - Knowledge models for networked library services. - Luxembourg: European Commission, 1996.

information will not be a normal function of the library of the future.

European Research Libraries Cooperation:
The LIBER Quarterly, 6 (1996), 453-464.

Enduring Access to Digital Information: Understanding the Challenge

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Introduction: Preservation in the new realm of digital information

The role of libraries as repositories--places for safekeeping--is well established in society. Libraries, together with museums and archives, are charged with society's mission to preserve its accumulated knowledge and culture. In the context of the material world, this mission and its importance are well understood by librarians and the communities they serve: libraries must make accessible books, manuscripts, and other artifacts for use long into the indefinite future. However, information in its virtual form, digital information, presents a new context in which to undertake the library's traditional mission of safekeeping. In this new world, many old assumptions no longer hold, known techniques do not apply and unanswered questions abound. Preservation of digital information is a challenge we do not yet know how to meet.

[*] Based on the Report of the Task Force on Archiving of Digital Information

Digital information differs fundamentally and conceptually from print on paper in three ways that are relevant to developing preservation strategies. First, in preserving print on paper, we are seeking to create a more permanent medium from the fragile medium of paper. We do this either by conserving the paper object, or by reformatting information on to a more permanent medium such as microfilm. When we confront digital information, medium is of much less concern. Instead the challenge is impermanent technology. Digital media are, of course, not long-lasting, and require a continual process of reformatting. But more important is the short life of the software and hardware that are necessary to translate digital information into usable form. The techniques for preserving technology are more complex and less well understood than those for preserving media; they present a new challenge.

A second new challenge is also related to the difference between preserving a physical object owned by a library and preserving virtual content that a library has licensed for use. When a library preserves a book or a manuscript it owns, it has the legal right to preserve that object. Copyright of the content of the book may limit the multiple reproduction or distribution of its preserved version, but there are no further restrictions on use of the preserved object than there were on the original. In the digital world, libraries increasingly are licensing online content from publishers. In some cases, a physical magnetic tape or optical disk is acquired; increasingly, the licensed information is made available by the provider online via a network and no material object is accessioned by the library. In both cases, the library does not have the legal right to maintain the database in perpetuity; in the latter case, it also does not have the operational means to do so. The role of the library as repository is no longer clear in the world of licensed networked information.

The third new challenge libraries face in preserving digital information is that the lifecycle of this information is, as yet,

unknown. Digital publication has only a short history and libraries have limited experience in handling it. Preservation requires a commitment to provide access into an indefinite future, and we cannot yet predict the cycle of activity and expense that such preservation will require.

The Task Force on Archiving of Digital Information

Recognizing that preservation of digital information presents such fundamentally new challenges, two American research library organizations formed a task force and charged it to develop a report that would frame the key problems engendered by digital preservation, define the critical issues that inhibit resolution of these problems, and develop strategies for addressing them. In December of 1994, The Commission on Preservation and Access (CPA) and The Research Libraries Group (RLG) formed the Task Force on Archiving of Digital Information. The charge to the Task Force is shown below. (Brief descriptions of RLG and CPA are shown in the Appendix.) Membership included representation from research libraries, library and information organizations, archives, technology corporations and the publishing community. A draft report issued in August 1995 elicited much thoughtful, proactive comment, especially from the international community. The draft report stimulated new work in the UK and in Australia, and related closely to work concerning deposit of electronic publications undertaken by the European Union. The extent of activity and comment related to the draft has demonstrated the need for ongoing international communication and coordination in addressing this enormous and complex new challenge. The final report of the Task Force was issued in May 1996, and is available on the Research Libraries Group website, *http://www.rlg.org*.

The report, and hence the summary presented in this paper, focuses on three essential questions:

1) What does digital preservation entail?
2) How do we organize ourselves to do it?
3) What steps should we take to move forward?

What does digital preservation entail?

Preservation, in both the paper and digital realms, includes: preserving the content, or substance, of information; preserving the context required to understand and interpret the information well into the future; and providing the means to access and use the information. In each of these functions, preservation of digital information is analogous to preserving traditional media, but presents new sets of problems.

Preserving content

The first act of preservation in any environment is identifying or selecting material that merits preservation activity. The principles and judgements required to predict the future need for information in various disciplines are as complex and varied in their application to digital information as they are to more familiar media. The fluidity and dynamic nature of digital data, however, add some new dimensions. The choice of version to retain is more difficult since many more versions of a resource are likely to exist. Interactive and dynamic databases, which change from moment to moment, can only be "preserved" through samples and snapshots; no commonly accepted body of practice yet governs such choices and little experience exists demonstrating the future usefulness of different sampling techniques. Hyperlinked files add further layers of decision-making, as the extent to which linked resources should also be selected and included for preservation must be determined.

The fluidity of digital information and the ease with which it can be changed introduce the need for authentication of the

version that is selected for preservation. A repository of digital information must protect information from tampering and must employ techniques for ensuring users that the information held is actually what it is represented as being. A variety of techniques for protecting and authenticating data exist, but their employment is not yet widespread and easily put into production.

In the short term, any provider of digital information must store the data and provide the systems management and engineering to maintain and deliver it, such as back-up, maintenance of redundant files, etc. Longer term retention of files requires additional techniques. Initially, media must be "refreshed" to maintain usability and conform to new formats. Because digital files are dependent on software and hardware to use them, these too must be kept active. Maintaining a museum of unsupported hardware and software platforms is not practical; data must be migrated to work on new platforms. If data are stored in "flat files", i.e., files in which the data content is easily separable from software to use it, then this migration is not necessarily difficult. However, increasingly, content and functionality are inseparable, and both must be preserved. Migration then becomes an increasingly complex systems engineering task. One potentially important technique for migration is emulation, that is, development of software that can emulate the environment in which the original software operated. New systems designs and technologies are needed to facilitate this work. To the extent that major software vendors are encouraged to maintain backward compatibility as they develop new versions, the task of migration will be greatly facilitated.

The challenges presented by migration illustrate the fundamentally different conceptual bases that distinguish preservation as it applies to digital rather than analog media. Archival preservation via migration requires a commitment to unknown future activities with unpredictable future costs. This essentially requires libraries to change their definition of archival,

and their understanding of the commitments and resources necessary to function as a repository.

Preserving context

The issues involved in preserving context are conceptually the same for digital and traditional formats, but it is important to be aware of the new options introduced by the characteristics of digital information. The concept of fixity in selecting and maintaining a version of a digital resource is related to understanding its context. How and why was a version selected, and how does the preserved version relate to those that no longer remain? Provenance is important contextual information; the provenance of published books can be adequately documented by publication information, but digital resources have no such conventions. The history of reproduction and migration is essential for digital objects that document phenomena, such as reproductions of artistic images, scientific data, etc., as the layers of translation and transformation for digital resources can be enormously complex. Maintaining the original "look and feel" of a digital resource, or at least documenting it for the future, will be increasingly challenging as dynamic documents must be sampled for preservation and as objects migrate to new platforms.

Preserving access

There is little use to preserving a resource unless those who need it can easily discover its existence and make use of it. Network discovery and retrieval tools may make cataloging and indexing of digital resources easier, but it is the responsibility of a digital repository to ensure that access is adequate. Once a resource is discovered by a potential user, an infrastructure for delivery and use is required. Thus a repository must maintain adequate network connectivity; must provide software for

retrieving, viewing and, if appropriate, manipulating digital information; must maintain a reliable system for referencing and locating the resources it holds; and must maintain systems for protecting the security and integrity of the data it holds and for implementing any restrictions placed on access by the owners of the intellectual property. Since these access requirements are not specific to long term preservation, but are necessary as well for short term use of digital information, there is a large community of publishers and information providers interested in developing economical techniques for all of these functions. Libraries and other repositories will not be alone in their efforts to maintain access.

How do we organize ourselves to preserve digital information?

Because there are so many kinds of individuals and organizations interested in providing access to digital information, the roles of information providers versus those of libraries and other repositories are not clearly defined in this new environment. In the world of material information, the distinction between preservation and use is quite clear. The more an object is used, the more it is subjected to wear and tear; use and preservation are not only different activities, they may be antithetical to each other. In this world, only libraries and archives have become concerned with long term preservation.

The boundaries between roles in the digital environment are, at present, less clear. Use keeps digital objects alive. If they are in-demand, the activities that enable their use--e.g., access, systems engineering, refreshing--are the same activities that will ensure their continued functionality. Digital objects that sit unused will become unusable. These blurred boundaries between immediate and long-term use have led many information providers to view themselves as the archival keepers of their data. They see no need for intermediaries, such as libraries, to provide archival functions.

Their interest in maintaining archival control is related to their interest in maintaining intellectual property control over their information. As noted earlier, the focus of digital preservation is on content, not on objects, and content owners do not wish to lose control over their property.

In an ideal environment, content developers, publishers and libraries would work closely together in developing interdependent roles. Those who create digital information would design digital resources with access and long term use in mind, e.g., by providing needed metadata, using standard formats, documenting software, etc. Those who publish digital information would deposit it with appropriate repositories and develop agreements for long-term preservation and access. We need to strive for this ideal environment. However, there will be cases where digital information has not been created and deposited with such foresight, and libraries will need the legal basis to acquire and aggressively rescue files that have essentially been abandoned by those who created or published them.

Our greatest challenges are organizational rather than technical. As the report of the Task Force on Archiving of Digital Information notes, our most important objective is "Organizing ourselves over time and as a society to maneuver effectively in a digital landscape... Building ... the deep infrastructure that will enable us to ... move our cultural records naturally and confidently into the future." We currently lack the infrastructure of practices, standards and organizations that is needed to support preservation of digital information. Elements of the infrastructure that we need to begin to build include the following:

Legal bases for deposit and rescue. In individual countries and internationally, legislation and agreements are needed: to encourage legal deposit of electronic resources with archival repositories, to enable rescue of abandoned resources, and to facilitate access and use of archival files.

Standards for description. Current library cataloging standards are not sufficient to describe access and contextual information about digital resources.

Standards for design and formats. Migration on a broad scale is only feasible if standard formats and platforms are widely used.

Backward compatibility. Software manufacturers need to be educated and encouraged in the importance of maintaining the usability of older versions of their products.

Accepted best practices for systems engineering and migration. Information about these techniques is not widely shared across professional communities.

Enabling technologies. Functions such as migration, emulation and access can be facilitated by new systems design and technological development focused on these issues.

Guidelines for archival principles and practices. The expected operational requirements to serve as a responsible repository for digital information are not well understood. Guidelines need to be articulated and promulgated, perhaps even through a certification process, so that organizations can develop themselves to meet the needs.

Processing centers. Many libraries and archives will not have the technical capabilities or specialized expertise to maintain and migrate digital files, even though they may have the appropriate mission and skills to identify and take responsibility for files to be preserved. In a manner similar to vendors that provide services for microfilm production and storage, processing centers could provide operational services for digital preservation.

Models for cooperative arrangements. Digital preservation is complex and expensive; it can only be practically undertaken on a distributed basis. Cooperative agreements will be essential to future use of digital files.

What steps does the Task Force recommend?

The Task Force developed a tripartite strategy for creating the support environment and gaining the knowledge we need to effect preservation of digital resources:

Identify existing best practices

Conduct pilot projects that test new models and techniques.

Develop the legal and organizational support infrastructure.

Best practices

Although digital resources are relatively new in the long history of communication media, they have been with us for some thirty years, and many have already been preserved. This work has been done in specialized sectors, such as social science survey data repositories and scientific observatories, and the practices used in each sector have not been shared across disciplines. As libraries begin to face the preservation of digital files created by mass communication and electronic publishing, they can learn from practices elsewhere. The Task Force recommended that the Commission on Preservation and Access commission cases studies of successful work in areas such as: design of digital files, mass storage, resource description and migration paths.

New models and techniques

The best way to gain experience and learn about new approaches is to encourage and fund pilot projects. The Task Force identified three areas in which funding programs should be developed--most likely through government agencies-- to stimulate projects.

Cooperative efforts to rescue files. There are digital files now in need of aggressive rescue. Several well defined efforts could be developed in which libraries share in the rescue and maintenance of selected files.

Sponsored digital archives. Repositories, information creators and publishers will need to collaborate to create digital repositories. Funding programs that require collaboration often stimulate new partnerships and approaches.

Research and development in new technologies. Technology developers have been interested in products with commercial applicability, such as rights management systems that serve commercial needs. Programs of sponsored research could target efforts at technologies that facilitate archival practices, such as migration, emulation and authentication.

Support structures

Developing the needed organizational and societal infrastructure for digital preservation will require strategic initiatives in several areas. The Task Force recommended that The Commission on Preservation and Access and The Research Libraries Group develop implementation plans to achieve the following objectives:

- Make preservation a explicit goal of the US Federal Government National Information Infrastructure initiative.
- Articulate and lobby for the legal principles that will facilitate digital preservation.
- Develop criteria for organizations that wish to serve as digital repositories.
- Educate scholarly societies about the importance of digital preservation and engage them in preserving the information they produce.
- Maintain international coordination.

The issues and strategies identified by the Task Force are not specific to the United States, as the nature and extent of international comment on the Task Force report has demonstrated. The preservation panel at the May 1996 LIBER meeting continued the international discussion, and the process must be ongoing. The challenges of preserving digital resources are large and complex; meeting them will require many approaches and many perspectives. Strong, active national libraries across the world have a special role to play, as do research libraries, archives and a variety of specialized repositories. We will need to share information about best practices and new technologies across a wide spectrum of communities that have not worked together in the past. Digital preservation has emerged as a new, critically important field of interdisciplinary and international activity.

Appendix

The Research Libraries Group, Inc. (RLG) is a not-for-profit membership corporation of universities, archives, historical societies, national libraries, and other institutions devoted to improving access to information that supports research and learning. RLG owns and operates databases and software to serve the information access and management needs of both its members and non-member institutions and individuals worldwide. RLG's address is: 1200 Villa Street, Mountain View, CA 94041-1100.

The Commission on Preservation and Access (CPA) is a private, non-profit organization acting on behalf of the nation's libraries, archives, and universities to develop and encourage collaborative strategies for preserving and providing access to the accumulated human record. The Commission's address is: 1400 16th Street, NW, Suite 740, Washington, DC 20036-2217.

European Research Libraries Cooperation:
The LIBER Quarterly, 6 (1996), 465-471.

Digitisation and Preservation in the French National Library

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In the French national library, digitised documents offer more than an opportunity for experiments: they are now part of everyday treatments and play an increasing role in library management. The electronic library is under construction.

The digitised documents come from two main sources: one is a special collection created within the new library, the other is legal deposit. Another possibility for the future will be a digitisation service available to the reader on demand. Each of these new options raises specific problems of access, conservation, and organisation. I would like to deal here with the more prominent aspects of the matter, while emphasizing the interfaces with preservation. Generally speaking, as we shall see, the Bibliothèque nationale de France currently considers digitisation more as a means of giving access to a great wealth of documents not readily accessible until now, rather than as a preservation technique in its own right. Nevertheless, preservation problems must obviously be dealt with right from the start.

1. The electronic library

Giving access to digital collections is a major component of the Bibliothèque nationale de France project. The aim is to digitise 100 000 books, 300 000 pictures and 1 000 hours of listening, and make all these data available by the end of 1997. The basic idea is to develop reference collections which can be remotely accessed.

With the exception of the digitising operations which are subcontracted to private companies, the whole process is taken charge of by various categories of library staff : selection of documents, cataloguing and description in a database by librarians, taking photographs in the library workshops. Quality control of photographs and digitised documents are the responsibility of a special team which belongs to the data processing unit.

In the case of printed material (books and periodicals) about 44 % of the titles were published during the nineteenth century or earlier, most of them in European languages, mainly in French. The digitised collection, in particular ancient and rare documents, comes mostly from the National library, either from originals (40 %) or from microfilms. Text rather than bit-map format was chosen for digitising on account of the higher efficiency and lower cost. In the aggregate a page in bit-map format costs four times as much as it does in text format.

The same scientific criteria rule the acquisition of pictorial documents. Photographic proofs which are the main source for digitising come mainly from the library but also from museums or agencies.

2. On demand digitisation

In the autumn of 1997, when the research library in Tolbiac is due to open, we plan to offer on demand digitisation also. Though

the technique differs, the organisation of work is very similar to that of microphotography. The digitising workshop includes a camera, a model holder and a floodlighting system. Technicians can copy either from books, periodicals or microfilms. One workshop produces about 2200 original documents (250 pages each) a year. It also copies files retrieved from the already digitised collections.

3. Legal deposit

Since June 1992 software and databases published in France are given to the national library through legal deposit. Beyond these theoretical categories we receive a great variety of digitised products. There are no technological rules or limitations, which means that librarians are faced with many practical questions:

- is the operating system available in the library ?
- is the product in good condition and comprehensive ?
- are we able to maintain this database management system and for how long ?
- are we able to maintain the digitised data ? For instance some of them are stored on a magnetic media and we have no guarantee concerning their service life.

The most urgent problem is not long-term conservation but making sure that readers will be able to access the documents in the coming years. Considering the great disparity of all these digital data and software the decision was taken to transfer them to optical disks (CD WORM). The use of our information system also implies that we create special links and indexes to access these documents sometimes through emulations. In other words original documents are not the medium we use to give access to data. They will always be transferred to other media, sometimes converted. The first priority is given to content and access.

4. Access to the electronic library

The creation of an electronic library aims at achieving several major objectives:

1) To prevent the wear of collections brought about by the increase in readership;
2) To make a wider array of documents more easily accessible to the greatest possible number of readers;
3) To offer readers a very high level of service;
4) To give access, through remote retrieval, to the documents themselves, and no longer merely to references by way of a catalogue.

In summary, what digitisation offers here is a way of accessing proxy documents. It is thus also a means of preserving our common heritage.

The electronic library will be stored on optical disks (CD WORM) and retrieved on PC terminals using the ATM techniques. The same machine will allow readers to access the on line catalogue, to identify references and then to consult digitised texts or pictures. Texts will be available in graphic format in the TIFF standard. Pictures will be stored in the JPEG standard. The electronic library will be hosted on a dedicated server and integrated in our new information system.

In order that readers may simultaneously access digitised books and digitised pictures and use word-processing software we will need a powerful server. According to our estimates, the electronic library requires at least 100 gigabytes to accommodate 100 readers at the same time.

For technical reasons, video and sound are digitised without data compression, and stocked on a separate server. Document retrieval will be accomplished by means of dedicated terminals which readers will be able to use in the audio-visual department.

5. Use of digitising for preservation ?

Digitised documents in the Bibliothèque nationale de France are surrogates of originals. Compared to microfilm, digitisation offers new possibilities like fast retrieval. For sound, digitisation is the only way to prevent premature wear.

As far as long-term preservation is concerned, we continue to recommend 35 mm microfilms. In fact optical memories do not yet offer sufficient guarantees.

There are indeed a lot of contraindications:

- lack of permanent standards;
- indefinite number of storage media;
- indefinite number of writing and reading techniques;
- lack of reliable permanence of the media: in the best possible conditions some optical disks could be preserved for 25 to 50 years, while microfilm can last a hundred years.

Moreover the differences in cost plead in favour of reprography: microfilm is cheaper than digitisation.

6. Preserving digitised data

Even if we continue to use microfilm for the preservation of printed material, we will in any event have to deal with preserving digitised documents.

A lot of methodological work was accomplished by the task force on the archiving of digital information commissioned by the Commission on Preservation and Access (CPA) and the Research Libraries Group (RLG). But although we know that optical memories like CD ROM and CD WORM are probably part of the solution, no practical recommendation can be made at the moment.

We may summarise the situation as follows:

1) We are very much dependent on the fluctuating market of technologies not only for the choice of storage media but also for that of data compression methods or database standards. The expanding market of digital video has brought about enormous pressure to increase considerably the capacity of optical memories. So it is that the libraries may store more and more information against smaller and smaller investment. Higher quality and longer service are not however the primary objectives of manufacturers. As in other industries the idea is not to reach for the best quality but to ensure an adequate level of performance. Such a standard may be insufficient for long-time preservation.

2) The consequences of this situation are that we must prepare to transfer the digitised data, to move from one information system to another and if possible choose non-proprietary equipment. The preservation of digitised data must be active and evolving.

This situation has many consequences for library management: increase in preservation costs, organisational change, new ways of sharing responsibilities, etc. Preserving digitised data and indexes can be compared with maintaining a database or an information system. It requires a close co-operation with the data processing department which will henceforth have a crucial role to play in ensuring preservation.

In conclusion, I suggest that we wait no longer for the right solution to our preservation problems. Digitised data cannot wait until tomorrow: they must be preserved now, without further ado. As far as the preservation of documents is concerned, the future is in some respects within the present !

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Maintenance and Preservation of Large Databases

DENISE LIEVESLEY
UK Data Archive

Introduction to the UK Data Archive

The UK Data Archive is the leading national library of electronic data in the broad fields of social and economic science. The Archive was established in 1967 and is located at the University of Essex. It is core funded by the Economic and Social Research Council and the Higher Education Funding Councils. The Archive incorporates a number of different organisations namely the Economic and Social Research Council Archive, r-cade (the Resource Centre for Access to Data on Europe), the History Data Service (which is part of the Arts and Humanities Data Service) and the Virtual Psychology Laboratory.

The Archive is part of the Institute for the Social Sciences at the University of Essex which has recently been designated a large scale facility in the social sciences by the EU. This is one of only two in Europe. It will provide a centre with good computing facilities together with technical support and most importantly access to the rich data resources of the Archive where researchers from across Europe can come to work on comparative social research.

Functions of the Data Archive

The Archive exists in order to promote wider and more informed use of data in teaching and research and to preserve these data so that they continue to be accessible over time. Data are not only provided to the academic community but may be distributed more widely depending upon the conditions specified by the depositor of the particular dataset. The Archive comprises about 7000 datasets and is increasing at the rate of one dataset per working day. About 6000 datasets or sets of documentation were distributed last year

The staff have expanded in numbers quite considerably over recent years and now have reached almost 40. To learn more about the organisation send an e-mail to archive@essex.ac.uk or read the home page http://dawww.essex.ac.uk/

The main functions of the archive are as follows

- establishing user needs
- negotiation and acquisition
- validation of data and documentation
- supplementing documentation
- preservation
- cataloguing and indexing
- reformatting and delivery to users
- promoting use and supporting users

Communities serviced by the Archive

The role and value of data archives are expanding due to an explosion of electronic data and the increasing cost of primary data collection, as well as the burden on respondents to provide further information, which makes the use of secondary data an economically attractive proposition. The culture has changed in many disciplines too which means that secondary data analysis is not seen as an inferior method. There is an increasing recognition

of the value of getting data used and of making research transparent and enabling others to replicate or extend one's research. Importantly too as the amount of electronic data has increased so has an awareness that its management has to be active if the data are to be readable in the long term. Specialist skills and equipment are needed for data preservation.

Two communities are served by data archives

- users of data - teachers and researchers
- data producers, owners and funders

The benefits to the users are more obvious. They obtain expensive resources cheaply ; high quality research is promoted as a result of this access; it encourages the re-analysis of data from a different perspective; and the access to data in electronic form permits a level and depth of analysis which cannot be undertaken with published material.

Depositors comprise a wide range of different individuals and organisations and it is more difficult to generalise about the benefits of archives to them since they might have very different aims and requirements. Data are received at the UK Data Archive from the following categories of depositor:

- national and local government departments and agencies
- other public bodies
- non-governmental organisations
- individual academic researchers and academic centres
- independent research units
- commercial sector including market research organisations
- other data archives worldwide

The benefits to depositors of depositing their data can be extensive. One of the most convincing arguments is that their own data will be preserved and will be available for their own use, since few data collecting organisations understand how to manage electronic information over time. As a result of deposit in an archive which actively promotes the use of data, their data will

obtain wider usage and this should result in more citations and a higher profile for those who were responsible for collecting or funding the data. If the depositor requires it then it is possible to give feedback on the use of data and a relationship between user and producer may be facilitated. On the other hand if the depositor prefers, the archive can act as a buffer protecting him from questions from users about the data, which can often anyway be answered by reference to the documentation or are a reflection of the user's inexperience and he or she can be helped by archive staff. The quality of data will often be improved by the checks which the archive may carry out and similarly documentation may be supplemented and sometimes value may be added, say by combining different datasets or adding information on quality. The UK Data Archive operates a policy of allowing the depositor to specify which categories of people may have access to the data and whether royalty payments are to be levied- though at a minimum there must be free access for academic research. Finally an argument in favour of sharing electronic data is that of altruism. The availability of more extensive and higher quality electronic data should result in better trained researchers and a more discriminating user community. Too often university courses are taught using dummy or simulated datasets which results in students having little appreciation of the richness or conversely the limitations of real data.

Delivery of data

The mission of the Data Archive at its most basic level is essentially twofold: to preserve machine-readable social science research data for posterity and to provide these data to researchers. Enabling access to its holdings is, therefore, of primary importance to the Archive.

The Archive provides deposited data and machine-readable documentation in a variety of formats and media to users who

have received the necessary permission from the depositor. Most archived datasets are held in a variety of formats, the most popular at the moment being SPSS, SAS, SIR and STATA. The Data Delivery section translates datasets into different formats and different platforms (Macintosh, DOS, UNIX) for users as needed, and will provide subsets of large datasets when requested. We provide data on a variety of media, ranging from floppy disk to CD-ROM to exabyte and DAT tape. We also have the facility for lesser known media, such as a portable SCSI drive, quarter-inch cartridge and even the old large magnetic tapes. Becoming ever more popular is provision of data by ftp (file transfer protocol) which involves no physical medium at all, but a computer-to-computer transfer.

Over the last three years, the Archive has processed an average of 126 orders per month. This includes access orders, orders requesting direct access via another UK facility, and orders for paper documentation only, all of which take time to process. The orders for data range in size and complexity from requests for one small dataset on floppy disk which can be completed in a matter of minutes, to CD-ROM versions of every single year of a large government data series in a custom-made format which may take several days. The Archive works with depositors to ensure that the documentation which accompanies data is comprehensive and relevant to users. Guidelines evolve as the range of data types increases.

Fast data delivery is an important issue for some users whereas others have a more relaxed timetable and our systems accommodate both with the facility for prioritising urgent orders.

Control of data

The need to control access to data introduces constraints in their management. The ethos in Europe is not in general one of data sharing and there is little recognition of the fact that data can

be viewed as a public good and that not to use data incurs expense (in terms of less efficient decision making). Indeed increasingly data is being treated as a commodity and sales are used to raise badly needed revenue. The sharing of information internationally can change the perspective of both data users and data providers.

One aspect of the need for control of data means that several different versions - say anonymised and unanonymised versions - have to be managed and good records kept to control distribution rights.

Preservation of data

It is vital that we preserve electronic information in a way that permits them to be useable over time. The Archive holds many unique copies of datasets which we must be able to read despite changes to hardware or software configurations or even more fundamental changes to the generation of computing technology. Because of the lack of facilities for electronic data preservation at the UK Public Record Office we have become the de facto official archive for many large Government datasets.

The Data Archive prides itself on being able to handle almost any format and media type for the deposit of data and, on the rare occasion that problems do occur, Archive staff will work with the depositors to reformat the data. The main software dependent formats of data received are SPSS, SAS, SIR, STATA, Paradox, Dataease, Microsoft Access, Microsoft Excel, Microsoft Word and WordPerfect. Many are in simple ASCII format. The Archive maintains a suite of conversion tools in order to move data to current preservation standards. Occasionally the Data Archive assists in projects to retrieve old electronic data. This is not always successful thus demonstrating the importance of archiving data correctly at the time they are produced.

When data are received in the Archive they are processed with an emphasis on ensuring that all files are present, readable

and, importantly, in accordance with the documentation. At this stage any confidentiality problems will be identified and clarified with the data owner. The structure of the data will be examined and data processing staff will ensure that the documentation reflects the structure correctly and fully. User services staff and those staff with responsibility for data delivery are informed of any possible problems which might be encountered in reformatting or delivering these data to users. Attention is also paid to the documentation of derived variables since these are often overlooked by those creating the documentation.

The data and documentation must be sufficient to enable a secondary user to understand and analyse the data, without any major discrepancies in the dataset. However, the data will not necessarily be perfectly clean and the Archive cannot take responsibility for the errors in the data. If problems cannot be reconciled at this stage or if they occur later - say, when a user identifies a discrepancy - then supplementary documentation will be attached to the dataset so that future users are alerted to the problem. User records ensure that those who have already received the faulty data can be contacted.

The Archive's preservation policy and practice ensures:

- the physical reliability of digital data
- the security of the data from unauthorised access
- the usability of the data
- the integration of the data, where appropriate, into - information and dissemination systems
- the maintenance of effective data documentation

The system is flexible in order to meet the demands of changing technology and in order to meet the evolving needs of the user community.

In terms of the **physical reliability** of data, the Data Archive has migrated data through several changes of computer systems. Four years ago, the data were moved from a ½ inch tape based system to one based on a jukebox of optical platters. At present,

the data are being migrated again onto DLT tapes to improve capacity and enable the integration into more advanced database systems for dissemination and searching. At the same time, data will be maintained on at least one, and normally two additional media. For example, the data are being stored on optical media (either CD-ROM or optical read write) and two types of cartridge backup. These copies are in physically separate places, with a copy being kept in a fire vault on another part of the campus. Additionally, one off-site copy is currently maintained in London.

In terms of the *security* of the data, the Data Archive has a strict policy of ensuring that only authorised users within the organisation can have direct access to the data. In addition, the data writing capacity is restricted to one carefully controlled account. The growth of networking means that external access is being further controlled and monitored by the installation of a firewall, using the latest and most secure technology.

The *usability* of the data is ensured by storing the data in ASCII as well as common formats. The ASCII version ensures that any future system will be able to read the data easily. It does, however, have implications for the functionality of the data, as some features of the data may be difficult to reconstruct from this version. In the absence of internationally agreed standards for data description it is important to maintain this lowest common denominator. Additional formats of the data are kept in cases where there is concern about the complex structure of the data and in cases where a large number of users will require the data in a common format, and this has been the policy in recent years. Such formats contain more detailed descriptions of the data and are stored in a system portable version wherever possible. These procedures ensure that the data will be easily portable across systems. Typically, these formats correspond to the format in which the data were received. However, this is not always possible, for example if the data were deposited in a rare or redundant format, and in these cases the data are integrated to

the nearest corresponding but widely used format. Thus the Archive's emphasis has been on standardisation and migration rather than emulation of past systems.

The physical evolution of the storage system which is in progress at present will enable the Data Archive to carry out a logical restructuring of the whole data collection. We have created a common system for the data in order to exploit automated management tools. For example, the various validation and testing programs developed by the Data Archive can be implemented more systematically and without the same need for manual intervention as a result, facilitating the *integration* of the data into information and dissemination systems.

It is essential too that the preservation of documentation is taken seriously. In order to improve the storage of documentation and its delivery to users, and to take advantage of new technological ways to integrate data and documentation, the strategy of the Archive is now to hold documentation in digital form. Where possible documentation is acquired in digital form - usually as a word-processed document - but when this is not possible documentation is being scanned. The Higher Education Funding Councils have provided funds to enable the scanning of paper documentation for the retrospective collection. Digital documentation is being stored in image format. Adobe Acrobat format is being investigated since it maintains the documentation structure and appearance. In addition, it is planned to use optical character recognition software to convert priority documentation to text-based versions. As for data files, conversion to other formats is kept under continual review and will be employed when it is deemed desirable.

Challenges for the future

A number of challenges face us in the attempts to improve the service to users. Data are increasingly being deposited in a

software specific format which cannot be disentangled without destroying the usability of the data. On the other hand many users want the data in software specific format and thus there is a tension between the archival service and the provision of access to researchers today. Data are rarely static, even if they are not continually updated it is likely that usage will result in changes to them, and this raises problems as to what should be preserved. It can also raise problems of authentication - who is permitted to make changes?- and of version control.

It is going to be increasingly important to address issues of quality and the related problem of liability in delivering information. Since quality is defined as fitness for purpose and users by definition may be carrying out a wide range of different sorts of research, it is extremely difficult to know what is relevant to tell them about data quality and thus more research is needed into the needs of users for information about quality. In fact great improvements generally are needed in the form and content of data documentation. Data producers are the best people to create most of this but they need guidance and encouragement. The increased use of the Internet for data delivery provides challenges as to how we can integrate the data and documentation for ease of access, as well as exploiting the documentation as a resource in its own right to a greater extent.

Most of the data we hold at the Archive has already been anonymised before being deposited with us in order to protect the identity of individuals and thus maintain pledges of confidentiality. However as a result of this the full unanonymised versions are not being preserved for posterity. A further problem is that the procedures to anonymise data are not straightforward and different systems may be best for different usages.

Improvements to our work

I should not end on a pessimistic note about the challenges which face Data Archives. In fact there are a large number of improvements which will make our work much easier in the future. To name a few as examples:

- there are major improvements in the longevity and reliability of optical storage media.
- developments in optical storage and retrieval devices enable improved data management and access
- there are better interfaces between software and more use is being made of standards
- improved data encryption techniques are helping in data authentication
- I could have chosen many more examples of ways in which technological advances and sharing of information are aiding the work of preserving and distributing electronic data. Data archivists and librarians who manage electronic resources share many of the same problems and do have a great deal to learn from one another.

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Libraries in the Mediterranean Region: the current situation

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The Mediterranean region is one of a handful of regions where civilization as we know it now was given its shape. Learning, scholarship and documentation developed in many of the areas bordering it from Syria and Israel in the East to Spain in the West. Ancient Greece and Ancient Rome and their colonies in Asia Minor and North Africa, and Ancient Egypt were celebrated, among many other things, for their libraries and archives, while in the Middle Ages the libraries of Moorish Spain and the monastic libraries of Italy and Greece were crucial for the preservation of thousands of texts from the Ancient World.

The royal and princely libraries of Renaissance Italy and Spain, some of them forerunners of today's national or state libraries, and the libraries of great universities like those of Bologna, Barcelona and Valencia maintained the region's fame for the quality and size of its libraries, but from the 17th century leadership and innovation in library management was lost by this region to the countries of northern Europe - to France, Germany, and Britain, a leadership shared later by Scandinavia, the Netherlands, and Belgium.

There are both historical and cultural reasons why in recent centuries Mediterranean librarianship should have lost its impetus in some countries or failed to develop in others. One important reason is, or, in some cases was until fairly recently, without doubt the tendency in Mediterranean countries to impose the dead hand of their often cumbersome State bureaucratic systems on academic and public libraries, often stifling the spirit of enterprise in individual institutions, and a tendency to regard libraries as of some importance, yes, but not essential like, say, schools. One disconcerting aspect of this philosophy in the past, one that has still not disappeared though it has certainly diminished, was a readiness by politicians in power and their bureaucratic appendages to allocate untrained people, who are misfits for mental or physical reasons, to posts in libraries. There, it is argued, they can do little harm either to themselves or to the readers.

1. Library profession and education

The past reluctance, now considerably weakening, of politicians and even heads of educational institutions to accept librarians as professionals in the way teachers have long been considered to be professionals, has been largely responsible for the weakness and sometimes dearth in the region, of long-term programmes for the training of librarians and documentalists. Until fairly recently the librarian was either a scholar, a bookman, who was expected to run a library efficiently because of his scholarly wisdom, or else he was a technician who could pick up the techniques he required as he went along. Israel is the great exception with its efficient library schools at the Hebrew University of Jerusalem, the University of Haifa and Bar-Ilan University. Large countries like Spain and Italy have only a

handful of institutions specialising in library education: the Universities of Madrid, Barcelona and Granada in Spain, and in Italy, the University of Rome "La Sapienza" and those universities, such as Udine and Viterbo, which offer degrees in Conservation of cultural materials, one of the options being library and archival materials.

Some of the smaller countries are better off, relatively speaking. Turkey, for instance, has three library science departments, two of them in Ankara universities, and the third in Istanbul, which offer programmes even at doctoral level; Tunisia's Institut de Presse et des Sciences de l'Information has been offering a two-year undergraduate programme since the early Eighties. Algeria and Morocco also have training facilities, unlike Albania which has none. Greece has recently produced a graduate-level traning programme at the Ionian University, but existing library staff members are mainly equipped with diplomas from Technological Education Institutes. Only 24% of library staff have received formal education in librarianship of any kind. Malta acquired its first ongoing programme at diploma level offered by the University of Malta in the late Eighties, while Cyprus with its new University in Nicosia appears to be headed that way too.

The truth is, however, that a good many training programmes are hampered by curricula of a traditional nature and suffer from a lack of flexibility. Few of them are built round contemporary concepts of management and offer comprehensive programmes of hands-on training in automated techniques. The result is that too many libraries in the region are staffed by librarians who are only vaguely in touch with contemporary library science and in not a few cases are completely out of touch with it. Speaking of Middle East librarians, a recent author says "Library education may have to take some of the blame for the poor image of Arab librarians and their corresponding

poor state" and speaks of "the lack of adequate tools, materials, and faculty expertise" in library schools.

Although some of the library schools in the region were founded a few decades ago, they have rarely produced the right number of trained personnel for the various countries' libraries. Moreover, such is the poor esteem in which librarians are often held, that even qualified librarians are often tempted to jobs away from libraries, where they can achieve higher status and higher salaries. In the Arab countries, and to some extent in Mediterranean non-Arab countries, most of the top jobs in academic and national libraries go to academics who have no library qualifications. This is one of the greatest reasons why staff morale tends to be so low.

2. Academic Libraries

Throughout the region school libraries and public libraries, those engines of educational and democratic development, have a much smaller importance than they have in Scandinavia or the United Kingdom, or even France. The result is that when young people go up to University or to some other institution of tertiary education, they are frequently unaccustomed to using libraries systematically, and often graduate without having acquired the habit of turning to libraries for the information they need.

Academic and research libraries tend to be the ones receiving the greatest financial support from the State or from parent institutions, often at the cost of neglecting national libraries and special libraries in departments of State. The astonishing expansion of tertiary level studies is a phenomenon of Southern Europe, North Africa and the Middle East as much as it is of Northern and Central Europe, so many countries in the region have had to create new universities,

polytechnics and so on, and have devoted more resources to library provision for them than for other libraries supported by State or by local governments, even if in several or even most cases this support has not sufficed to make them sturdy enough pillars of teaching and research at their parent universities.

In Spain there are no fewer than 53 universities served by central libraries as well as by a large number of departmental and institute libraries. Most of Egypt's universities have been founded since 1960, many of them being overcrowded and having insufficient library resources to cater comfortably for their large or sometimes huge student numbers e.g. 95,000 at Cairo and 92,000 at Alexandria. Most of Greece's universities are also fairly recent, the old universities being those of Athens and Thessaloniki respectively. Its rival Turkey, which is a much larger country, has 29 universities, including several young ones. The smallest countries in the region, Cyprus and Malta, have one university each, Cyprus's being a very recent one, whilst Malta's dates back to the 18th century.

Young university libraries face the grave problem of building up sometimes from scratch collections sufficiently strong and comprehensive to enable their parent institutions to function satisfactorily. Several of them in our region, however, have not received the extraordinary financial support needed in the first years to lay the foundations firmly, and so have had to struggle hard for several years. Some of them have never overcome this initial handicap.

Egyptian university libraries in the provinces are often badly off for books and periodicals in foreign languages, including English, but they are lucky in that Egypt has a strong publishing industry, so literature in Arabic can be acquired cheaply. The scarcity of foreign journals and of reference books of all types is a serious problem

especially for the researcher. For this reason the well-stocked American University in Cairo and the old university libraries in Cairo's two universities are continually being resorted to by academics from the other universities.

Egypt's problems are to be found more or less in the other North African countries and Turkey, all of which have insufficient foreign exchange for the purchase of foreign library materials. Israel's galloping inflation has not prevented most of its university libraries from developing at a good rate, partly because of the great support most of them receive from Jews in countries round the world.

Italy has retained its economic strength despite its interminable political problems, so both its old and its newer universities have been able to acquire stocks of library materials, Italian and foreign, which are often of high quality. Malta and Cyprus can afford to give their universities relatively much higher resources than their Middle East and North African neighbours, but there is a great limit to what small countries, even fairly prosperous ones, can afford to buy. These two countries are finding it difficult to meet the mounting needs of research workers for current periodical literature, especially in the fields of science and technology, and ironically enough the growing capacity of Cypriot and Maltese libraries to access databases and library catalogues in scores of countries is making it more difficult for them to persuade financial authorities to increase their funds for subscriptions to periodicals.

3. **National Libraries**

National libraries in the region mostly do not play the dominant role of their counterparts in, say, the United Kingdom, France or Denmark. Even countries like Spain, which has a large National

Library with very rich collections, and Italy, which has two central national libraries (in Rome and Florence respectively) have no strong sense of direction for their library and information systems coming from the centre. In Italy leadership tends to come from a separate institution, the Istituto Centrale per il Catalogo Unico delle Biblioteche Italiane which was and remains responsible for the important SBN (Servizio Bibliotecario Nazionale) network, but I should add that the Florence and Rome national libraries were amongst the first libraries to link up with SBN.

In Spain and indeed in most Mediterranean countries leadership tends to come from groupings of academic libraries or individual libraries in their category. Throughout the region national libraries, with the exception of those e.g. the National and University Library of Croatia in Zagreb, which also function as university libraries, tend to be somewhat badly off for funds and to lose their best-qualified staff to the academic sector.

Most of the national libraries in the Arab countries round the Mediterranean are fairly young, only Egypt and Algeria having national libraries founded in the 19th century, while those of Libya, Syria and Tunisia were founded as recently as 1950, 1984 and 1985 respectively. All these libraries have an intimate connection with their parent countries' assertion of national identity and see themselves as custodians of their countries' written heritage. They also publish the various national bibliographies, so in this respect they do play a significant part both nationally and internationally, and the large collections in the national libraries of Algeria, Egypt, Morocco and Tunisia serve as important backups for the poor collections in many of these respective countries' other libraries. The national libraries of Egypt and Morocco, like others e.g. Malta, in the region are also responsible for the national archives. The Egyptian,

Moroccan and Syrian national libraries also act as public libraries, following a tradition common to most developing countries.

Arab national libraries, and likewise the National Library of Greece in Athens or the much younger National Library of Malta have rarely been influential in the technical aspects of their countries' librarianship. One of the few exceptions was at one time the Egyptian National Library which produced a code of cataloguing rules in 1938 widely followed in Egypt and in some other Arab countries, while in more recent times it has played some part in the further development of these rules. Turkey's National Library has been even more influential from time to time. Its recent automation of its catalogue and of its two main bibliographical publications, the National Bibliography, and the Bibliography of articles published in Turkish periodicals since 1952, has been valuable not only for Turkish libraries but also as its contribution to UBC.

4. Cooperation

Whether in future it comes from the national libraries or, as is likelier, from specially set up bodies like Italy's Istituto Centrale per il Catalogo Unico or else from groupings of e.g. academic or special libraries, it is essential that there should be a much higher degree of inter-library cooperation, both national and international, in this region to make possible the bridging, partial if not total, of the gap between most Mediterranean countries and Western Europe. Hitherto formal schemes of cooperation, well-established and well-regulated networks of any sort, have been uncommon, especially in the Eastern Mediterranean and North Africa.

Italy and Spain, however, have given a lead in their creation of some schemes. The former's Servizio Bibliotecario Nazionale, set up

some years back in the face of a certain scepticism, is proving to be very successful, and by now a few hundred libraries, including most of the research libraries, are linked to it, making available to all member libraries records for millions of monographs and serials. The effect on cataloguing as well as on interlibrary lending has been greatly beneficial: the libraries in SBN now do original cataloguing of just 50% of the documents they acquire. Again, the Rome Group of libraries, using the Conspectus tool, is aiming to cooperate in the acquisition of expensive materials in law, history and government publications. The arrival of the Internet and the World Wide Web has now been the catalyst for those schemes of regional cooperation which have hitherto been defeated by Italian individualism.

In Spain it is the university librarians who have shown the way forward to the many librarians who desire to cooperate with others but need both ideas and leadership. Since 1987 a number of surveys of these libraries have been carried out, such as the 1988 report Situacion de les Bibliotecas Universitarias (dependientes del M.E.C.). Moreover, networks such as DOCUMAT and REBION have been set up.

DOCUMAT is a network of mathematics faculty or departmental libraries which consists of a union catalogue, shared cataloguing, cooperative acquisitions and exchange of information regarding preprints, while REBION, a network of 15 university libraries, has already published on CD-ROM a union catalogue, and organizes training courses each summer. Other networks include RUEDO composed of twelve university libraries which use DOBIS-LIBIS.

In fact, membership of the EU appears to have speeded up the modernization of Spain's academic libraries which are showing an even greater interest in the applications of contemporary management theory, and have even started thinking seriously about

earning at least part of their income by charging for certain services to their users.

In other Mediterranean countries, with the important exception of Israel, cooperation is all too rare. In Croatia, the National and University Library in Zagreb is beginning to take on a leadership which will, perhaps in more peaceful and more prosperous times than the present, bring forth fruitful cooperative schemes. Further south, in Greece of the just over 200 libraries within the country's 17 universities only 25% carry out some form of cooperation with other libraries, nearly all of these cooperative arrangements being informal, and only 10 cooperate in some way with foreign libraries. Even one of the most basic forms of inter-library cooperation, interlending, is far from flourishing and in some cases libraries lend material only on a personal basis to a known member of another library, rather than to the library or institution, and in most cases interlending is not one of the library's regular activities.

Like most other forms of cooperation, interlending whether within individual countries, or with countries within the region or without the region, is still most unsatisfactory in North Africa. For instance, in Algeria it is described as being carried out in a voluntary and disorganised fashion. In 1988 only 15 titles were borrowed by Algerian libraries from other libraries in the country, and 55 from other countries. Again, Moroccan libraries are badly off for interlending facilities for until fairly recently their country had no national centre and national system despite an experiment made between 1974 and 1977 by its Centre National de Documentation (which is looked upon as a national clearing-house of bibliographical information) with a group of libraries dependent on the Projects and Planning Ministry. There is, however, an interlending scheme limited to four University libraries falling under the Ecole des Sciences de

l'Information, in Rabat, while University libraries throughout the country have a scheme for the exchange of documents. It is unfortunate that the Bibliotheque Generale et Archives, the national library, does not lend any of its stock, and supplies photocopies of only certain categories of documents.

4. Information Technology

During the past few years, automated networking has left its mark on Italy which is now shedding its image of a country with splendid library resources hampered by a somewhat conservative library professions and shackled by a cumbersome bureaucracy. Few libraries of any importance have not automated all, or at least most, of their functions and many of them are linked to the SBN while some belong to Gruppo Armonizzazione Reti per le Ricerca (GARR) the Italian research network with its Network Information Service (NIS). This last has recently come up with an Opac Directory which offers Web, Telnet and gopher access to Italian OPACs. Again, CILEA (Consorzio Interuniversitario per l'Elaborazione Automatico) has developed for universities in Milan a Virtual Library which covers five subject areas ranging so far from Architecture to Radiology.

The important developments in the use and applications of Information Technology have not gone hand in hand with similar developments in the introduction of managerial theory, despite the fact that Italian industrial managers are among the foremost in Europe. Spanish librarians, though hampered like the Italians by the burdens of bureaucracy, appear to be moving much faster towards the kind of managerial setups and philosophy familiar, say, to British librarians. The setting up of the Conferencia de Directores de

Bibliotecas Universitarias y Cientificas, following the IFLA meeting in Barcelona in 1993, has provided a forum for the discussion of current problems affecting academic libraries, not least of them managerial ones. Some librarians have, for instance, started charging for services given to certain categories of readers. Spanish libraries are trying to solve the problems presented by the failure of library staff to grow at the same rate as the university bodies that they serve. This is a problem faced by librarians right round the Mediterranean littoral.

Greek librarians, even university ones, have been relatively slow in automating, but by now most university libraries have introduced the computer to some extent, and some of them e.g. Crete, Patras (Central Library) and Thessaloniki (a number of departmental libraries) have by now considerable experience.

Thessaloniki has now benefited for some years from an exchange programme with Kent State University, Ohio, while a few like Patras have made much progress through participating in the E.U.'s Libraries Programme. Patras and other University libraries are now hoping to obtain substantial funds from the Greek Ministry of Education out of the so-called Delors Packet.

In North African libraries automation progress has been on the whole slower. In Egypt, for instance, the national library has been automating its catalogue since 1983 but the progress is sluggish, and until fairly recently it was still without an OPAC. A similar situation prevails in some of the university faculty libraries. The Tunisian national library still lacks an OPAC though it has been generating the database for the new Arab Maghreb Catalogue. Like most other Tunisian libraries, the university libraries have not moved much ahead in the field of automation because of financial constraints and also because of a dearth of staff trained in computer applications for

libraries. In fact, in this country and in a number of other Mediterranean countries, there is a tendency for library staff experienced in automation to leave after a while for much better paid jobs in business or industry.

Some North African libraries, such as that of the Tunisian Ministry of Agriculture or the National Documentation Centre in Rabat, Morocco have been using MINISIS software which was Arabised by ALDOC, the Arab League Documentation Centre, in the 1980s. Many of them have dipped their toe in the ocean of library automation by going in for CD-ROMs but they are finding a lack of Arabic information sources.

Of the other Mediterranean countries, Croatia is working hard to create a national bibliographic database through its National and University Library in Zagreb which uses ORACLE applications for all its main functions, but is facing the problem of so many libraries partially or totally destroyed during the recent war, while the Croatian Ministry of Sciences has developed CARNet, a research network. Malta and Cyprus both have university libraries with integrated library systems. Malta, moreover, has just started automating its National Library as well as its public library system.

A region as culturally complex as the Mediterranean and having such economic inequalities is bound to produce a pattern of unequal development in the library and information field. If these widely different levels are to be corrected, not only must the various national governments allocate a larger slice of their national budget to the information infrastructure, and development of library and information institutions, but more aid especially in the provision of knowhow needs to be supplied from outside the region. Greece's recent progress has been due to handsome aid programmes provided by the European Union, programmes from which Malta and Cyprus

may be able to benefit when in all likelihood they join the EU before the end of the century. Until then these two countries, together with others like Turkey, Syria and the North African countries can only benefit from funds channelled through the Med-Campus Project of the Coimbra Group which has already organised one training project for some of these countries, and is about to embark on a second and more ambitious one.

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Ligue des Bibliothèques Européennes de Recherche

The Division on Preservation

MIRJAM M FOOT
British Library, Collections & Preservation

Since my report in the *LIBER Quarterly*, 5 (1995), pp 69-71, in which the aims and objectives as well as the areas of work of the Preservation Division were set out, a number of projects have got off the ground and some of the work proposed in the workplan has been carried out.

The development of a preservation strategy for European research libraries is one of the Division's main aims. In order to assess whether such a strategy is at all feasible, the Division conducted a *survey into the existence and effectiveness of preservation strategies in LIBER member-libraries.*

The first results of this investigation were presented to LIBER during the annual conference in Malta. It was interesting to note that almost all national libraries have fully developed preservation policies. However, there is no obvious correlation between the existence of a written preservation policy and activity in this field. Indeed, in many cases informal policies appear to steer effective preservation programmes. Similarly, there is no statistical correlation between the existence of a written policy and the budget available for preservation, the latter varying from less than 5% of the overall library budget (in the majority of cases) to over 31% in two Italian libraries. A surprisingly high number of

libraries (over 75%) have purpose-built accommodation for their general collections and most libraries are able to monitor the environmental conditions in their storage areas, although many fewer can actively control these conditions. Most libraries have staff specifically responsible for the management and implementation of preservation policies and well over half have an in-house bindery; just under half have a conservation workshop, while over 85% of the libraries use commercial binderies. Not surprisingly, the factor that most severely inhibits preservation and conservation work is lack of money, while perhaps more surprisingly, lack of security appeared not to be a major concern.

It was clear from some of the replies that not all libraries had interpreted the questionnaire in the same way and the answers will have to be tested. Further follow-up work will be undertaken by the Division and the full results will be published in due course.

Another element in the Division's workplan is *the consideration of Information Technology to disseminate information on a wide range of preservation and conservation topics* and to this aim on-line discussion groups have been organised under the following headings:

1. Preservation and digital imaging;
2. Disaster planning and response;
3. Education and training;
4. Mass Deacidification;
5. Paper, parchment, microforms; and
6. Others.

Members of LIBER, their institutions and their staff can discuss preservation issues, raise questions, exchange experience and present new ideas by consulting the Home Page of LIBER on the World Wide Web (*http://www.kb.dk/guests/intl/liber/forum/*) and an archive of the latest messages can be found on the World Wide Web at http://www.kb.dk/archives/liber/. All that is needed to participate is an e-mail address.

Training is an issue in which many members of the Division have expressed an interest, and in conjunction with the European Commission on Preservation and Access, we have obtained the promise of funding from the Council of Europe for the planning of a series of training seminars for those who initiate, plan, administer and implement preservation and conservation programmes in libraries and archives. Specific training for preservation administrators does not exist in Europe and there appears to be a real need for information and guidance. This need varies from country to country and, as an initial step, a workshop to assess the training needs in a variety of countries (with special attention to Southern and Eastern Europe) will be organised jointly by the LIBER Preservation Division, the ECPA, and the Marburg Archivschule in November of this year.

The workshop will cover two general aspects:

1) *Training and preservation planning*, encompassing such diverse issues as budgeting and financial management; conducting conservation surveys and setting priorities for preservation; environmental control; staff management; and issues such as access *versus* preservation, content *versus* format, in-house conservation *versus* contract conservation; and disaster planning.
2) *Training the trainers*, which will focus on questions such as how to raise awareness of preservation issues, both for staff in and for users of libraries and archives; how to set up training programmes in storage, handling and general good housekeeping practices for professional and non-professional staff. The emphasis will be on preventive measures and low-cost options.

In order to accomplish what may turn out to be a rather ambitious programme of training seminars, the ECPA and LIBER's Preservation Division have applied to the European Union (DG X) for additional funding.

During the year, time and effort were spent on organising the session "Digitisation: Preservation support or impending disaster?" that took place during the LIBER Annual Conference in Malta. The success of this session owed everything to the extensive knowledge and enthusiasm of the speakers, who managed to make their - often highly technical - expertise accessible to a largely non-technical audience, and who nicely balanced their points of view, supplementing each other's approaches.

In many library circles digitization is seen as the great way forward: unlimited access to information, the opening up of the world's knowledge, the way to produce high quality surrogates thereby safeguarding precious original material, the answer to all problems. Others take a different view and whisper dark threats of a surfeit of unstructured information obstructing the quest for knowledge, the start of a never-ended preservation problem as unstable carriers and quickly obsolete hardware and software demand on-going programmes of reformatting or migrating, a glutton swallowing up all available resources, a life devoted to running as fast as one can in order to stay in the same place.

The conference session looked at the possibilities and problems presented by the digital library from the point of view of the need to archive and preserve electronic or digital material, with the aim to achieve a better understanding of where the balance lies between the prophets of the digital paradise and the prophets of digital doom.

Two general papers, by Drs. John Mackenzie Owen and Dr Carol Mandel were both based on the results of recently conducted studies, one in Europe the other in the U.S.A. Both papers looked at the principles and practices that guide the preservation of digital material, at technical and organisational issues encountered in the archiving and long-term preservation of this material, and at the implications for libraries and archives.

After a vivid discussion of a wide range of general policy, organisational and financial issues relating to digital material and

its long-term preservation, the next two speakers, Monsieur Daniel Renoult and Professor Denise Lievesley, looked at two specific areas of experience: that generated by the large and ambitious digitising project at the Bibliothèque Nationale de France and that gained in England at the Data Archive, the British National electronic archive of social and economic data. All four papers are published elsewhere in this issue of the *LIBER Quarterly.*

During the Annual Conference there was opportunity for the Division to discuss its plans for the coming year and much importance was attached to further work on assessing the existing preservation policies in European Research Libraries and to the proposed training programme for preservation administrators. Both topics will be the subject of the Division's next report.

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Ligue des Bibliothèques Européennes de Recherche

Access Division

SUSANNE BERKE
National Széchényi Library, Budapest

Annual Meeting of the Access Division, University of Malta Library, Msida, Malta, 23 May 1996

Present: S. Berke (acting chair), National Széchényi Library, Budapest; A. Agheno, Bibliotheca Nazionale Universitaria Torino; I. Boserup, The Royal Library, Copenhagen; J. Braeckman, Katholieke Universiteit, Leuven; M. Colomb, Université Catholique de Paris, Paris; J. Germain, Université Catholique de Louvain, Louvaine-la-Neuve; C. Marandion, Ministère de l'éducation nationale DISTB; C. McLaren, University of Aberdeen, Aberdeen; A. Regent, Katholieke Universiteit, Leuven; M. Reial, The National Library of Estonia, Tallinn; J.E. Roed, Universitetsbibliotek i Oslo, Oslo.

At the beginning of the meeting it was found that there were no representatives of the Divisional Committee present except Mrs Susanne Berke, who was therefore asked by Professor Mittler to chair the meeting. After the meeting Professor Mittler reported on the meeting at the Annual General Assembly.

1. Committee membership

It is difficult to get an exact overview of all Access Division members. An updated list was made by the LIBER secretariat, but it may be incomplete, because not all institutions have answered the questionnaires in which they were asked to give the names of the representatives for the respective divisions.

Mrs. S.V. Panyella resigned as chair of the Access Division, because she accepted a political appointment in Catalonia. Mrs Birgitta Lau also resigned from her post as secretary. LIBER thanks both for their work on behalf of the Division. Dr A.C. Klugkist was elected as the new chairman at the Annual General Assembly. Mrs Berke will act as secretary. Mr J.E. Roed (University of Oslo Library) was elected as a new Committee member.

2. Enquiry on access in European Libraries

At the meeting of the Access Division in Leuven in July 1995, it was decided to make enquiries about access in European libraries. A questionnaire was distributed to the Division members. Unfortunately only five questionnaires were returned, so it was impossible for Mrs Berke (who was prepared to accomplish that task) to analyse the data.

3. Meeting in Leipzig

Mrs J. Dubois, chair of the Collection Development Division and Professor Mittler, Vice-President of LIBER, propose to organize a joint meeting with the Collection Development Division in Leipzig on the occasion of the Leipzig Book Fair in 1997. The aim of the meeting will be to establish closer contacts with publishers in order to promote professional library and information activities. Mrs Berke said that she will try to find a publisher who is willing to give a report on the situation of

publishing in Eastern Europe or in Hungary by the given time. The possibility was discussed to hold an extraordinary general assembly of the Access Division during the Leipzig meeting.

4. Possible points for discussion with the Preservation Division

During the meeting some questions (such as: what is the best way to make information available via the INTERNET, how can we share our experiences on the INTERNET, how can we support learning and teaching through the INTERNET, how can we foresee future developments) were raised as possible points for discussion with the Preservation Division. No concrete arrangements have yet been made.

1 August 1996

European Research Libraries Cooperation:
The LIBER Quarterly, 6 (1996), 506-515.

Rezension

Die unendliche Bibliothek. Digitale Information in Wissenschaft, Verlag und Bibliothek. Hg.: Börsenverein des Deutschen Buchhandels e.V., Die Deutsche Bibliothek, Bundesvereinigung Deutscher Bibliotheksverbände. Wiesbaden: Harrosowitz Verlag, 1996 (Gesellschaft für das Buch; 2). 120 S. ISBN 3-447-03785-7 - DM 38,00

Der Band dokumentiert die Vorträge eines Symposiums, das im November 1995 in Bonn stattfand. Generalthema dieser Veranstaltung waren die Folgen, die sich aus der zunehmenden Digitalisierung für die (wissenschaftliche) Informationsinfrastruktur ergeben. Prominente Vertreter aller daran beteiligten bzw. davon betroffenen Gruppen - die Wissenschaftler als Produzenten und als Konsumenten, die Verlage und die Bibliotheken als Anbieter und Vermittler sowie die öffentliche Hand als wesentlicher Investor im Forschungs- und Wissenschaftsbereich - nutzten die Gelegenheit, um ihre Vision der zukünftigen Informationswelt zu entwerfen und wesentliche Voraussetzungen oder auch Hindernisse zu deren Realisierung zu benennen.

Folgt man den einzelnen, in der thematischen Weite, dem Anspruch und der Ausführlichkeit durchaus heterogenen Beiträge, so bleibt als gemeinsamer Grundgedanke die Überzeugung einer im Entstehen begriffenen, umfassenden Veränderung der "Informationskultur" bzw. die Entwicklung einer "Informationsgesellschaft" durch die zunehmende Vernetzung der Informationsmedien festzuhalten. Hinsichtlich der Tragweite dieser globalen Revolution, die Wolfgang Frühwald in seinem Beitrag (*Gesellschaftliche und kulturelle Folgen der Informations- und Medientechnologie*; S. 83 - 91) mit Beispielen aus der Arbeits- und Konsumwelt anschaulich vor Augen führt, besteht zwischen den

Autoren über weite Strecken Übereinkunft, hinsichtlich der daraus sich ergebenden Handlungsstrategien dagegen weniger.

Der den Band eröffnende Beitrag von Werner Gries (*Zukunftssicherung durch Innovation: Perspektiven für den Wirtschafts- und Wissenschaftsstandort Deutschland*; S. 9 - 24) akzentuiert die volkswirtschaftliche Bedeutung der Informationswirtschaft insbesondere für den Wirtschaftsstandort Deutschland. Im Jahr 1992 wurde etwa ein Drittel der Wertschöpfung in Deutschland im Dienstleistungssektor erreicht. Die Tendenz dürfte steigend sein, besonders im Bereich der sog. "intelligenten Dienstleistungen", d.s. jene, die umittelbar mit der Expansion des Informations- und Kommunikationsmarktes einhergehen, und deren Ausweitung mithelfen soll, das Beschäftigungsproblem zu lösen (S. 10). Der Markt für Information und Kommunikation mit seinen Teilbereichen Informationsinhalte (z.B. Druckerzeugnisse, Medien), Informationsübermittlung (z.B. Kommunikationsnetze) und Informationsverarbeitung (z.B. Kommunikationstechnik, Software, IV-Dienstleistungen) ist der weltweit mit Abstand bedeutendste, durch die Anwendung der neuen, "strategischen" oder "kritischen" Technolgien induzierte Markt. Seine Wachstumsfähigkeit und -geschwindigkeit ist letzlich an die Innovationsfähigkeit des Wissenschaftssektors und damit wesentlich an die Leistungsfähigkeit des Forschungssystems gebunden. Im direkten Vergleich mit anderen, führenden Wirtschaftsnationen anhand ausgewählter Indikatoren (Forschungsaufwand, Patentzahlen, Publikationsvolumen, Exportanteil u.a.) ist das deutsche Forschungssystems international durchaus wettbewerbsfähig, was aber "in Zukunft durch die mangelnden Investitionen in diesem Bereich gefährdet ist", so Gries in seinem Fazit (S. 20).

Funktion und Bedeutung der digitalen Medien im und für den Forschungs- bzw. Innovationsprozeß behandeln die Beiträge von Jürgen Mittelstraß (*Der wissenschaftliche Verstand und seine Arbeits- und Informationsformen*; S. 25 - 29) und Wolfgang Glatthaar (*Wissenschaft braucht Kommunikation: wissenschaftliche Kommunikation in einer digitalen Welt*; S. 30 - 37). Mittelstraß weist darauf

hin, daß - jedenfalls im geisteswissenschaftlichen Bereich - eine nicht mehr zu bewältigende Informationsmenge eher forschungshemmend als forschungsfördernd wirken kann und stellt im Anschluß die provokante Frage: wer oder was entwickelt die Köpfe, die diese Informationen produktiv und innovativ verarbeiten sollen ? (S. 29). Verbreitete, auf der Illusion methodologischer Gradlinigkeit und rein kumulativer Wissensanhäufung basierende Annahmen über den wissenschaftlichen Literatur- bzw. Informationsbedarf verkennen, so Mittelstraß, die explorative Rolle des "Unvorhersehbaren" in der wissenschaftlichen Arbeit (S. 28) und sollten gerade vor dem Hintergrund des zunehmenden Einsatzes der modernen Informationstechnologien überprüft werden. Auch verbreitete Thesen wie die vom Ende des Gutenberg-Zeitalters oder der papier- bzw. bibliothekslosen Zukunft sollten, so Mittelstraß weiter, angesichts des offenbar diachronen Entwicklungsstandes von Informations- und Forschungswelt relativiert werden, das Buch ist analog dem "gesunden Konservativismus" der geisteswissenschaftlichen Arbeitsformen die "noch immer optimale Form" (S. 27). Demgegenüber betont Wolfgang Glatthaar die aus seiner Sicht zahlreichen Vorteile, die mit der zunehmenden Digitalisierung der Wissenschaftswelt einhergehen, so z.B. die Beschleunigung des Informationsaustausches, die Verknüpfung bislang inkompatibler Medien in der Multimediaanwendung, die standortungebundene Kooperation in experimentellen Forschungs- und Entwicklungsarbeiten u.a. Auch die Probleme des Informationsmangels ("wo finde ich, was ich brauche ?") und des Informationsüberflusses ("wie schütze ich mich vor dem, was ich nicht brauche ?") lassen sich, so Glatthaar, unter den veränderten Bedingungen der digitalen Informationskette optimaler lösen. Andererseits verweist Glatthaar auch auf Probleme, die durch diese Entwicklung evoziert werden oder zumindest mit ihr einhergehen, so z.B. Probleme im Urherrecht und bei der Langzeitarchivierung. Angesichts der Vielzahl von Datenformaten fordert Glatthaar "eine für die jeweilige Dokumentklasse verantwortliche Archivierungs-Instanz",

eine Aufgabe, die er primär den Verlagen - und nicht etwa den Bibliotheken - zur Lösung aufgibt (S. 35). Ein Beispiel sowohl für die Rolle, die die Wissenschaft und hier besonders die Informatik für die Lösung der anstehenden Probleme übernehmen kann, als auch für die Notwendigkeit umfassender Kooperation zwischen Verlegern, Wissenschaftlern und Forschungsförderung ist das MeDoc-Projekt. Im MeDoc-Projekt (offizieller Titel: "Entwicklung und Erprobung offener volltextbasierter Informationsdienste für die Informatik") sollen innerhalb von zwei Jahren ein grundlegender Bestand an Informatikliteratur, technischen Berichten u.ä. als elektronische Volltexte gespeichert und die zur effizienen Anwendung im Wissenschaftsbereich erforderlichen Such-, Zugriffs-, Abrechnungs- und Archivierungsroutinen entwickelt werden. Das Projekt, vom BMBF gefördert, wird von der Gesellschaft für Informatik, dem Fachinformationszentrum Karlsruhe und dem Springer-Verlag gemeinsam geleitet, beteiligt sind außerdem mehrere Universitäten bzw. Forschungseinrichtungen.

Vom Umfang her nimmt der Beitrag von Martin Grötschel und Joachim Lügger (*Neue Produkte für die digitale Bibliothek: die Rolle der Wissenschaften*; S. 38 -67) eine zentrale Stellung ein. Nach ihrer Meinung hat das Medium Papier "seine Systemgrenzen erreicht" (S. 42), weil es das Dilemma zwischen Informationsflut (die Menge wissenschaftlicher Publikationen verdoppelt sich alle 10 bis 16 Jahre) und Informationsmangel (die finanziellen Rahmenbedingungen lassen der Erwerb und die Aufbewahrung derartiger Literaturmengen zunehmend illusorisch werden) nicht zu lösen vermag. Ihr Lösungsvorschlag lautet daher: das wissenschaftliche Publikationswesen muß auf elektronische Basis gestellt und in einer globalen "digitalen Bibliothek" über offene Informationssysteme mit Internet- bzw. WWW-Schnittstellen zur Verfügung gestellt werden. Diese digitale Informationsversorgung soll nicht nur den freien und ungehinderten Austausch wissenschaftlicher Information ermöglichen, sondern gegenüber dem Transport von Informationen in Papierform auch ganz erheblich (um Faktoren 300 bis 1.000) kostengünstiger sein (S.

53). Die Progression der Leistungsfähigkeit der Computer bei gleichzeitiger Degression der Kosten lassen die "Informationsexplosion" beherrschbar erscheinen. Die "Offenheit" der Systeme, die die Autoren eher gesellschaftlich denn technologisch verstanden wissen wollen (S. 56), avanciert somit zum kritischen Erfolgsfaktor, in dessen Folge sich auch die klassischen Rollenzuteilungen aller am Publikationsprozess Beteiligten ändern: denn prinzipiell kann jeder im Internet publizieren, archivieren, annoncieren, ohne über die tradierten institutionellen Bindungen verfügen zu müssen. Die neuen Technologien führen über die Entwicklung neuer Produkte und der Ausbildung neuer Distributionsformen schließlich auch zu veränderten Informations- und Kommunikationsformen, so z.B. durch multinationale Simultankonferenzen oder Echtzeitübertragung experimenteller Meßdaten über das MBone (Multicast Backbone) im Internet. Überhaupt ist das Internet für Grötschel und Lügger Motor und Maßstab der digitalen Revolution, da es "fast alle Charakteristiken einer globalen Infrastruktur" aufweist, "ubiquitär, universell und preiswert" ist und sich "mehr und mehr zu der globalen digitalen Bibliothek entwickelt" (S. 64). Bei aller Euphorie für die neuen Technologien und ihren Potentialen übersehen die Autoren aber nicht die Probleme, die mit der zunehmenden Bedeutung der digitalen Medien einhergehen, etwa bei der Langzeitarchivierung, der Qualitätskontrolle, der Authenzitätsprüfung und im Urheberrecht, allerdings bleibt es hier bei kurzen Hinweisen. Etwas an der Oberfläche bleibt die Charakterisierung der Aufgaben, die sich aus Sicht der Autoren den Bibliotheken und den wissenschaftlichen Verlagen zukünftig stellen, denn "eine Sammlung digitaler Informationen allein ist noch keine Bibliothek", wie völlig zurecht vermerkt wird (S. 65), und Wissenschaftler bzw. Forschungsinstitutionen sind trotz der Publikationsmöglichkeiten im Internet noch längst keine kompetenten und wettbewerbsfähigen Verleger. Der gutgemeinte und zweifellos sinnvolle Appell zur Zusammenarbeit zwischen Wissenschaftlern, Buchhandel, Bibliotheken und Fachinformationseinrichtungen greift zu

kurz, wenn man sich die anstehenden Probleme in aller Deutlichkeit vor Augen führt.

Dies zeigt sich z.B. in dem Beitrag von Dietrich Götze (*Die Rolle des Verlags*; S. 68 - 72). Für Götze ist "der uns bevorstehende Übergang vom Papier in die elektronische Welt" ungleich "dramatischer" als alle technischen Veränderungen in der Buchherstellung der letzten 100 Jahre, und er stellt die These auf: "In dieser neuen Welt sind Autoren und Verlage völlig ungeschützt" (S. 71). Dies sind provokante Worte, die in dieser Pointierung sicherlich zu einseitig sind. Der polemische Ton in Götzes Ausführungen wird durch Thesen wie die, daß das deutsche Urheberrecht "eine partielle Enteignung von Autoren und Verlage gesetzlich sanktioniert", woraus sich "eine neue, staatlich subventionierte Kopier-Liefer-Dienst-Industrie in den mit öffentlichen Mitteln unterhaltenen Bibliotheken entwickelt" habe (ebd.), noch weiter verstärkt. Zur Versachlichung empfiehlt es sich, den instruktiven Aufsatz von Gerhard Schlitt zum (insbesondere deutschen) Urheberrecht ergänzend heranzuziehen (*Urheberrecht: Gebühren und Lizenzen*; S. 102 - 108). Schlitt vertritt die Ansicht, daß das deutsche Urheberrechtsgesetz von 1985 grundsätzlich einen ausreichenden Schutz des geistigen Eigentums auch unter den veränderten Bedingungen digitaler Speicherung und Übermittlung der Daten bietet und darüberhinaus auch die Handhabung von Gebühren und Lizenzen bei der Nutzung elektronischer Medien vom Ansatz her umfassend regelt. Wichtig ist dabei, so Schlitt, daß der Begriffs des "Werkes" im UrhG nicht an ein bestimmtes Medium gebunden ist, woraus allerdings dann auch folgt, daß für die Übermittlung aus elektronischen Medien spezielle Gebühren analog zur Zahlung der Kopiergebühren an die VG Wort entwickelt werden müssen (S. 108). Dies dürfte ein zukunftsweisender Ansatz sein, dessen technische Realisierung derzeit noch aussteht (Schlitt schlägt eine Bindung der Gebühr an das übertragene Datenvolumen vor) und der auch die Interessen der Verleger nicht außer Acht läßt. Für Götze allerdings ist mit der technischen Möglichkeit, auf zentral installierten Servern Originaldokumente nur einmal

vorzuhalten, der Unterschied zwischen Original und Kopie hinfällig geworden und in der Folge "jede Nutzung ein Vervielfältigungsvorgang zu einem Original" (S. 72). Er plädiert daher für die Einführung eines "Produzentenschutzrechtes", um die Interessen der Produzenten von Datenbanken und Multimedia-Produkten rechtlich besser abzusichern.

Unter einem anderen Gesichtspunkt befaßt sich Klaus G. Saur mit ökonomischen Aspekten der globalen Digitalisierung (*Die Kosten der elektronischen Information*; S. 92 - 101). Saur schätzt, daß "im Laufe der nächsten 20 Jahre maximal 20% der bisherigen Papierproduktion elektronisch angeboten und in Papierform verschwinden werden" (S. 93). Bezüglich des Volumens und der Geschwindigkeit dieses Substitutionsprozesses zeigen sich bei näherer Betrachtung zwischen den amerikanischen und den deutschen Verhältnissen signifikante und aufschlußreiche Unterschiede. So wurden 1994 auf dem Online-Markt in Deutschland nur etwa 5% des amerikanischen Umsatzes erreicht (100 Millionen DM gegenüber 2 Milliarden DM), und obwohl die Zuwachsrate in Deutschland mit 10 bis 20% etwa doppelt so hoch wie in den USA ist, wird diese auffällige Divergenz noch lange bestehen bleiben. Gründe dafür sind, so Saur, in den deutlich unterschiedlichen, kostenwirksamen Rahmenbedingungen zu sehen, insbesondere in den Telefonnetzkosten, die in Deutschland (noch) vier- bis achtmal höher sind als in den USA, den wenig marktgerecht operierenden Fachinformationsanbietern und den fehlenden, kostenreduzierenden Rahmenverträgen zwischen Hosts und Wissenschaftseinrichtungen in Deutschland. Anders ist die Situation dagegen auf dem klassischen Buchmarkt; hier liegen deutsche und amerikanische Verhältnisse (18 bzw. 25 Milliarden DM Umsatz in 1994) sehr viel näher beinander. Allerdings schätzt Saur, daß von den etwa 20.000 wissenschaftlich relevanten (Print)Zeitschriften mehr als die Hälfte in Auflagen von unter 1.000 Exemplaren erscheint, was vom Kostenaufwand her kaum noch zu rechtfertigen ist und u.a. zu der bekannten, desaströsen Preisexplosion (auf dem

mathematisch-naturwissenschaftlichen Sektor ca. 350% in den letzten 15 Jahren) geführt hat. Saur ist überzeugt, daß durch die Umstellung auf elektronische Publikationsform im Internet enorme Kosteneinsparungen möglich sind. Allerdings entstehen durch eine Publikation im Internet Kosten an anderer Stelle, nämlich bei den Endnutzern, die aufgrund der unzureichend erschlossenen Informationsflut zunehmend auf professionelle Hilfestellung angewiesen sind. Obwohl diese Art von Informationserschließung und -vermittlung zu den originären Aufgaben von Bibliotheken zu zählen ist, ist es durchaus fraglich, ob die Bibliotheken aus (Personal)Kostengründen dauerhaft konkurrenzfähig sein werden (S. 98). Wichtig ist in diesem Zusammenhang Saurs Hinweis auf die fehlenden Bedarfs- und Kostenanalysen der Informationserstellung, -vermittlung und -benutzung, in deren Folge erst eine Gesamtbetrachtung des komplexen Themas möglich sein wird (S. 101).

Aufgabe und Selbstverständnis der Bibliotheken in der zukünftigen, digitalen Informationswelt ist der Gegenstand des Beitrags von Elmar Mittler (*Die Rolle der Bibliothek*; S. 73 - 82). Auch für Mittler ist die Rolle der Printmedien im Wissenschaftsbereich keineswegs beendet, für intensive Lektüre werden sie seiner Meinung nach weiterhin bevorzugt werden. Aufgrund der Änderungen im Herstellungsprozeß - Texte entstehen beim Autor bereits heute ja in aller Regel als digitale Medien - stellen sie aber nurmehr eine (Ausgabe)Form digitaler Daten neben anderen dar. Der "Forschungs- und Kommunikationsarbeitsplatz ohne Medienbruch" (S. 76) hat sich als - allerdings derzeit noch weitgehend utopische - Idealvorstellung effizienten Arbeitens etabliert. Für die Bibliotheken ergeben sich daraus eine Reihe von Konsequenzen, ohne daß ihre traditionellen Aufgaben - Erwerben, Erschließen, Benutzen, Bewahren - sich zwangsläufig grundlegend ändern. So müssen für die Bibliotheken die Erwerbung, Erschließung, Bereitstellung und dauerhafte Sicherung von elektronischen Medien genauso selbstverständlich werden wie im Fall der Printmedien. Auch die "Retrodigitalisierung" älterer, besonders relevanter Printmedien in

elektronische Form gehört hierher. All dies setzt eine geeignete Infrastruktur und normierte Standards voraus, die schon aus Kostengründen gemeinsam von Wissenschaftlern, Verlegern, Buchhändlern und Bibliothekaren entwickelt werden sollten (S. 81). Um die verschiedenen Interessenlagen der an diesem Prozeß beteiligten Parteien ausgleichen zu können, insbesondere das ökonomische Interesse der Verleger und den freien Zugriff für Forschung und Lehre, plädiert Mittler für einen "Burgfrieden in Urheberrechtsfragen" (S. 80): in einer Experimentierphase sollen Buchhandel und Bibliotheken mit Unterstützung der öffentlichen Hand effektive und konsensfähige Verfahren zur Finanzierung und Abrechnung digitaler Publikationsformen entwickeln und erproben (S. 82).

Auch Hermann Leskien (*Von der Notwendigkeit der Differenzierung*; S. 109 - 117) ist der Meinung, daß die durch die Digitalisierung der Information herbeigeführten Änderungen in der Publikationskette zwar zu Modifikationen, nicht aber zur Eliminierung einzelner Beteiligter führen; für die tradierten Aufgaben der Selektion, Aufbewahrung und Ordnung vermutet er "in einer Zeit der Informationsüberflutung sogar eine Renaissance" (S. 113). Allerdings gehen diese Änderungen auch mit der Übernahme neuer Aufgaben einher, z.B. im Fall der Bibliotheken mit Publikationstätigkeiten (Print-on-demand) oder der Konvertierung (S. 114). Eine genauere Ausdifferenzierung der zukünftigen Problemstellungen und Aufgaben für die am Informationsmarkt partizipierenden Klienten ist aber schon deshalb schwierig, weil, so Leskien, der Informationsmarkt selber keineswegs einheitlich ist und bei näherer Betrachtung eine Vielzahl von teils divergierenden Interessenlagen erkennen läßt. So sei das Ideal einer universalen, für alle Zwecke gleich optimalen Medienform obsolet und durch das pragmatische Konzept eines ergonomischen Managements verschiedener Medienformen zu ersetzen (S. 115). Leskien warnt in diesem Zusammenhang nachhaltig vor Pauschalierungen, die nach seiner Ansicht die gesamte gegenwärtige Diskussion um die Zukunft der Informationswelt zu stark prägen. Um die neuen Technologien wirklich effektiv und nachhaltig einset-

zen zu können, sei zunächst eine präzise, marktnahe Bedarfsermittlung erforderlich, deren Ergebnisse durchaus zu Lösungen neuen Typs führen können. Für eine solche "differenziert nach Bedürfnissen und Märkten" fragende Diskussion plädiert auch Klaus-Dieter Lehmann, Initiator des Symposiums, in seinem kurzen Nachwort (S. 119).

In dem mittlerweile seit dem Bonner Symposium vergangenen Zeitraum sind die angesprochenen Probleme zwar nicht gelöst, aber in einigen Fällen der Lösung nähergeführt worden. So hat die Bundesregierung mittlerweile ihr Programm "Information als Rohstoff für Innovation" für die Jahre 1996 bis 2000 veröffentlicht, in dem auch einige der im vorliegenden Band angesprochenen Themen aufgenommen wurden (z.B. die Förderung von Modellprojekten zur Entwicklung neuer Erschließungs- und Navigationsinstrumente in Bibliotheken). Auch im Urheberrecht sind auf europäischer Ebene durch ECUP bzw. ECUP+ (European Copyright User Platform) erste Erfolge auf dem Weg zu den dringend erforderlichen Absprachen zu verzeichnen. Solche Ergebnisse können und müssen durch Zukunftsszenarien ergänzt und erweitert werden, und das Bonner Symposium kann - auch und gerade wegen der Berücksichtigung vordergründig so unterschiedlicher Interessenlagen - dafür als nachahmenswertes Beispiel gelten.

Der Text der Vorträge ist auch in digitaler Form über den Informationsserver Der Deutschen Bibliothek verfügbar (*http://www.ddb.de*).

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