

Chapter 7

Information services, libraries and archives

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A WIDE AND DIVERSIFIED FIELD

The overall picture of institutions in this area is varied. Archives and libraries are usually owned and run – or at least strongly supported – by federal, state or local authorities. Information services, defined here as separate enterprises or as parts of a large organization, are usually privately owned. Some, however, may be public or semi-public organizations working under market conditions. There are also great variations in size, ranging from enterprises owned and run by one person, to small local, public and school libraries with tiny collections and a part-time staff member, to large multinational producers and vendors of information services and massive national archives and libraries with millions of documents and hundreds of specialized staff. Geographic and economic factors also add to the variations among institutions. These widely differing situations clearly have an impact on progress in the use of modern information and communication technologies (ICTs).

This chapter will examine different aspects of ICT – use in archives, libraries and information services sectors, where it is already well implanted. Such an approach allows for the study of problems already present in many institutions and likely to become problems for a much larger number of institutions in the near future. Professional and institutional rather than technical issues will be examined. The aim is to focus on the impact on professional principles and practices in a large majority of institutions, providing information services, and on their users.

IMPACT ON SERVICES

A problem as old as the sector itself is lack of space, because of the growth in the number of items in the collections. This is true not only of archive records and printed material, but also of various sound recordings, films, videos, etc. The problem has been solved, or attempts have been made to solve it, either by more compact arrangements of the collections,

weeding out or by reducing the size of the documents (using microfilm for example). Computer technology has opened up tremendous possibilities for reduction because of the storage capacities of computers in or outside the institutions.

Another feature of computer technology is the speed with which large quantities of data can be manipulated. This offers a possible solution to the problem of retrieving a small number of relevant documents from among the thousands available on the subject of interest to the user. The efficiency of communication channels means that the content of documents may be accessed in a very short time regardless of their physical location and the opening hours in different time zones. Later on, the problems of handling the large and growing quantity of information on the Internet will be examined.

The term 'information services sector' covers the whole field of archives, libraries and information services. While this sector is a clear candidate for their use, it must also be recalled that ICTs are driven by market forces. This is one of the factors which leads to the well-known imbalances in the use of ICTs between the developed and the developing countries, and within countries between sectors, for example, between those dealing with military matters, space research or business, and those devoted to artistic and leisure activities. This pattern of development has been characteristic since the introduction of the computer shortly after the end of the Second World War.

Another important feature of the ICTs is that they are more and more oriented towards individual use at home or at work. This contrasts in many ways with information institutions where services are basically collective and one book is read by many people. Individualization is obvious in the use of the telephone, whether traditional or mobile, and related services such as telefax. The same is true for television and information services, such as teletext, for sound recordings and for videos, and now for the computer which has become a 'personal computer' (PC). These

individually-oriented technologies and products can all be linked together via digital technologies and can be used wherever signals can be transmitted.

Historically, there have always been and still are shorter or longer transition periods during which technologies intended for individual use are used collectively. Even in countries with many telephones, there are telephone boxes for collective use and it is still possible to watch a football match on television, together with friends and strangers, in a local bar. The collective and individual use of books has existed for centuries, and the collective and individual uses of the more recent audio-visual technologies have co-existed during this century. In countries where the use of individual technologies is less advanced, it is clear that the most collective use possible will optimize scarce resources. This can cause problems, however, as will be seen later. It should also be added that some types of collective use, for instance in public libraries, are a part of the social functions of these institutions and should therefore be maintained regardless of the individualization of technology. As in all institutions and enterprises, the individually-oriented technologies are used by staff in the information services sector for internal and external communication. These aspects will not be analysed in detail here. The focus will be on the digital technologies used in computers and the related communication techniques used in the specific activities of the information services sector.

FREE OR FEE

In libraries there is an ongoing discussion about payment for services. Private suppliers of information in the form of either materials or services engage in no such debates, because market forces decide the prices. There are two ideological stances on payment for library services: one argues for equal and easy access to free services; the other insists that market regulation mechanisms favour payment. Access to free services is generally backed by the library environment and the political system.

Where computer technology is concerned, the question of payment takes on two further aspects. Firstly, it is possible to measure the individual use of the electronic services, which means that prices are much easier to set than for traditional, mostly collective library services. Secondly, institutions face economic problems. They must continue to provide traditional library materials and at the same time buy computer equipment and pay for licenses for electronic services and the use of the telecommunication systems. These developments have nourished the debate about user payment in many countries and the possibility of differentiating between basic services and value-added services, or even between printed and electronic information, has been raised. The high cost of developing hardware, software and data collection has created very strong monopolies or monopoly-like conditions. As a result, prices are high and cause payment problems for institutions in developing countries, but also for most libraries in other parts of the world.

The first organized reactions are now getting under way. Staff in universities, libraries and archives, who are important suppliers of information to scientific periodicals, abstract publications, and so forth, are becoming more active as actual producers of works such as electronic journals, leading to lower prices for these products. One example is the site known as the English Pilot Site Licence Initiative (PSLI), a consortium set up in 1996 to halt the trend of increasing prices of periodicals. Since January 1999 it has been continued as a new project, the National Electronic Site Licencing Initiative (NESLI) for three more years, and the aim is to include all higher education institutions in the United Kingdom into one consortium. After a European Union call for bids, the Swets and Zeitlinger company was appointed as the agent for the common interface and negotiations with publishers.

IMPACT ON TECHNIQUES

Preservation and storage

It is difficult to preserve all the different storage media, whether paper, tapes, video or discs, partly because knowledge about their durability (except for that of paper) is relatively limited. To this should be added the fact that the old media require some kind of playing device to access their contents, and these devices are disappearing from the market because there is less and less demand for them and spare parts cannot be found. Digitalization of print, images and sound provides new opportunities for preservation and storage, but the durability of the digitized media is also an unknown quantity. It is, however, possible to provide access to the contents of documents in archives via digitalization, thus avoiding the wear and tear on and possible damage to the original document. The digital media are really rather new, and no general regulations and standards for their use as preservation media have yet been established.

Searching tools

One of the first uses of computerization was for the compilation of library catalogues. At first computers were used as a part of the printing process, and later they entered into the process of designing on-line catalogues. Large indexes and abstract publications have followed a similar path, going from print, to print via computer, to on line and to CD-ROM. Computer technology has also led to the development of search tools such as citation indexes and concordances which are produced automatically. A number of search processes, such as Boolean operators, have been developed and refined over the last few years. They are very expensive, as are the connect-time prices for the databases. For many libraries the prices are prohibitive and one of the ways to solve the problem is to write contracts between the vendors and all the libraries in a country or with large groups of non-commercial institutions. Such types of negotiations, which also

Box 7.1 → The development of new information technologies for libraries

Computerization for libraries

Libraries were very quick to computerize their management systems. Since the invention of Machine-Readable Cataloguing (MARC) in the mid-1960s, many countries have adopted national versions of that format. Nearly all libraries in developed countries are now equipped with computerized management systems, particularly software for cataloguing and lending operations. Computerization is steadily eliminating card indexes in favour of Online Public Access Catalogues (OPAC). In the 1990s, with the development of the Internet and more recently of the Intranet, the distribution of catalogues on CD-ROM is tending to be replaced by direct access via those networks to constantly updated files.

Interconnection of catalogues

The adoption of sufficiently compatible cataloguing rules and formats makes it possible to interconnect catalogues via the Z39.50 (International Organization for Standardization, ISO 23950) common communication protocol. This protocol fixes a standard for communication between software programmes and controls dialogue between the requesting computer (client) and the answering computer (server). Such dialogue requires, among other things, the indexed fields to be defined in the same way in each system. When that is the case, a reader in any library may search catalogues functioning under that protocol anywhere in the world using the set-up and computer language with which he is fully familiar, those of his own institution.

Digital collections

In the last few years, major libraries have begun building up digital collections, either for purposes of conservation or in order to facilitate access to documents that are rare or national treasures. This trend is so powerful that sites devoted to digital collections have been created on the Internet. Indeed, the movement has recently been further stimulated by the G7 programme Memoria Universalis, in which both UNESCO and the European Commission are involved as observer members. (<http://portico.bl.uk/gabriel/bibliotheca-universalis/digit.htm>)

Among the flagship programmes are:

- The INIST (Institute of Scientific and Technical Information), a French documentation centre that was

the first to scan 1,500 international scientific journals systematically in order to computerize the procedures used in document delivery. The programme began in 1990 and is still continuing, processing 1.5 million pages per year. (www.inist.fr)

- The National Library of France has launched a programme for the computer storage of 100,000 works of French literature (30 million pages, essentially in image mode) and 300,000 illustrations. Documents in the public domain are made available on the Internet. (www.bnf.fr)
- The National Digital Library Project piloted by the United States Library of Congress began in 1995 and is scheduled for completion in 2000. It is a co-operative project involving numerous large research libraries. The aim is to store in digital form one million heritage documents (texts, photographs, sound recordings and films) relating to the history of the United States of America. These documents are made available on the Internet. (<http://lcweb2.loc.gov/amhome.html>)
- Archivo general de Indias is a programme launched in partnership with IBM for the computerized storage of ten million documents from the Seville archives. (www.mcu.es/lab/archivos/AGI.html)
- The computerized storage policy of the German libraries: the Deutsche Forschungsgemeinschaft (DFG) has been subsidizing programmes since 1997 for the storage of the collections of German university libraries in digital form. This national project assigns responsibility for digitization, by chronological period and by theme, to the various libraries in exactly the same way as the Sonder Sammel Gebiete distributes acquisitions by research field among the university libraries. In 1997, two technical centres for digitization were set up, one in Munich and the other in Göttingen (www.gvb.de), which test the scanners, develop technical standards in the field of library science, study computerized document management systems and issue recommendations for German libraries.
- On behalf of UNESCO, the International Federation of Library Associations and Institutions (IFLA) is carrying out a major survey of digitization programmes in libraries and other cultural institutions. (www.ifla.org/VI/2/p1/miscel.htm).

Scientific electronic publishing

In parallel with commercial electronic publishing, which has been gradually introduced over the last five years by major international publishers (Elsevier, Springer, Academic Press, Kluwer, etc.), research communities and university libraries are developing electronic publishing facilities for their own scientific production (preprints, theses, symposia) and for distance learning technologies (courses, educational software). These productions are processed in more elaborate formats than the image mode that was preferred for the digitization of paper documents. The formats are of the Standard Generalized Mark-up Language (SGML) type, in particular Hypertext Markup Language (HTML) and Standard Markup Language (SML). The Description of Type of Document (DTD) of the Text Encoding Initiative (TEI) is the basis for all recent operations aimed at classifying academic documents in the social and human sciences in America and in Europe. The Z39.50 protocol has now been extended so that a Standard General Markup Language (SGML) type structure can be used directly to search within documents. (See also Box 7.2.)

Acquisition of published electronic documents

The supply of electronic documents is currently posing a great many problems for libraries. Certain publications appear only in that form, and it is clear that libraries need to acquire them or at least to have access to them. However, the regulations now being introduced regard the acquisition of electronic documents as equivalent to a licence to use the contents, and require a bilateral contract. The legal issues are at present the centre of international attention (see Chapter 8). In essence, libraries set access to documents via the publisher's server or a service provider which may be a subscription agency (Swets, Dawson, Blackwell's, etc.) or a cooperative network (OCLC, Pica, etc.). The delivery of electronic documents to the local site of a university or consortium of libraries is still at an experimental stage, but seems to be the most promising solution for making use of published scientific literature.

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cover vendors of electronic periodicals and other products, will be of growing importance to the information services institutions in the future.

Use of full text documents, sound and images

The data storage capacity of computers has made it possible to store not only the bibliographic data on a publication, but the full text of the publication itself. Older, originally printed or even hand-written texts are scanned and digitized, thereby making the works of great authors available to all. The texts can be read page by page or, by searching with a combination of words, certain parts can be selected.

One of the major problems for the information services institutions in relation to full text documents, sound recordings and images is the complexity of copyright issues. In most countries, copyright regulations have developed over the centuries, and the use of printed material by libraries is adequately regulated for all parties. However, as far as the digital media are concerned, there are no such fixed practical

arrangements, not only because of the short time they have been in existence, but also because of the difficulties of protecting against unlawful copying. Huge sums of money are involved in this area and private copying is very easy and fairly cheap as the technique is rather simple. Recent developments in the area of copyright and neighbouring rights are discussed in Chapter 8.

Electronic journals

In the first edition of the *Directory of Electronic Journals, Newsletters and Academic Discussion*, published in 1991, there were 27 electronic periodicals, seven of which were peer-reviewed. The 1997 edition lists 2500 periodicals of which more than 1000 were peer-reviewed (see also Box 7.2, p. 110).

Electronic periodical services were offered by the large agents in 1997. Swets and Zeitlinger has already been mentioned as the agent in the United Kingdom project; Blackwell is also offering such services, as is Reed Elsevier, the largest publisher of scientific periodicals, but only for its own periodicals. The

Electronics Collections Online full text database of the On-line Computer Library Centre (OCLC), also introduced in 1997, is a Web-based service containing more than 1000 periodicals from 30 publishers.

Records management

All administrative routines in the information services institutions can be automatized. Both documents and users can be identified with pin-codes; documents can be ordered automatically and bills for on-line searches are printed out by the computer. All these operations have an archive-related dimension, as institutions need to be able to trace historical data in their files, and public institutions are usually obliged to keep their records for some years before transferring them to the archive system. There is thus a certain demand for back-up systems and for safety copying, in the case of electronic processing. Even the selection of books and other material for library collections is done electronically. Archives must make appropriate choices concerning delivery formats for data, the media on which data are stored and the principles for selection.

THE INTERNET

The use of computers is revolutionizing working processes in libraries and archives, and the network of computers known as the Internet, is a revolution of similar importance. It is now possible to retrieve information independently of time zones and geographical location, and to obtain the most up-to-date information, because the printing and editing processes are either no longer necessary or have been considerably reduced.

The system of e-mail provides a communication facility which, to a great extent, replaces the traditional mail and fax systems formerly used by institutions, thus saving time for the user. The World Wide Web (WWW) can be regarded as a huge reference base, with all types of information available, either as metadata or full text, sound and images. Issues related to the illegal use of information technologies,

more particularly the Internet, are discussed in Chapter 8.

The World Wide Web, which is one part of the Internet, is useful in many daily activities involving the transmitting of information which in the past could be found only in print or by teletext and – as can be seen in Chapter 2 – there are many kinds of useful sources of information for education and research on the Internet. Such activities can be said to have laid the foundations for the worldwide electronic information and communication networks. Individual institutions also have the opportunity to create their own Web sites to inform users about their services and to guide them through the organization. Different Web sites are linked together so that one entry or access point will lead on to several others.

Libraries and their catalogues can also be accessed via the Internet. The most recent Online Public Access Catalogs (OPAC) Directory, published in 1998, which is a guide to catalogues on the Internet, contains 1434 entries worldwide, but 888 are from the United States and most of the remainder from Australia, Canada, New Zealand and Western Europe. Developing countries and Eastern European countries have few or no entries. The information in the guide was collected in the spring of 1996, and since then the number of libraries with Internet-accessible OPACs has grown considerably in Western Europe and Canada. Denmark, for example, had 11 entries in the 1998 guide, all of them university libraries. At the end of that year, there were more than 125 libraries with OPACs in Denmark, and among them, 75 public libraries.

The Internet has made new activities possible. Electronic conferences or informal discussion groups can be arranged with limited or open access, and surfing on the net has become the equivalent of zapping on the television or browsing through the shelves in the library.

The Internet uses sensitive and vulnerable techniques, so there are many possibilities for malfunctioning to occur. This is particularly threatening

Box 7.2 → Electronic publishing in science

Electronic journals create added value in publication that has great appeal to scientists and publishers, and the number of electronic journals in science, engineering and medicine – refereed and unrefereed – has increased dramatically in recent years. But electronic publishing, with its greater flexibility and variety of presentation, challenges conventional norms and practices. How will the existing culture and practices associated with publication in science be affected? What standards should apply in the electronic environment?

To explore these and related questions, an international workshop was organized from 12-14 October 1998, under the auspices of the American Association for the Advancement of Science (AAAS), the International Council for Science (ICSU), and the United Nations Educational, Scientific and Cultural Organization (UNESCO) to examine the application of electronic methods to the publication of scientific journals with a view to encouraging the development of internationally recognized practices and standards. The Workshop was intended to build on the work of the international conference of 'Experts on Electronic Publishing in Science' that was convened by ICSU Press and UNESCO in February 1996. A major recommendation emerging from that meeting urged the convening of a forum involving scientists and their organizations 'to formulate codes of ethics and of conduct for electronic publication which would spell out the reciprocal obligations of the scientist and the community on such matters as peer review, citation, integrity and authentication of material and archiving.'

Wide variations in the practices and traditions of scholarly publishing across disciplines suggests caution in attempting to construct generalizations intended to apply broadly. Nevertheless, the Workshop was able to identify a number of issues that merit attention by the scientific community at large. They are the following:

→ Defining a Publication. Digital processing facilitates the production and preservation of several public versions of a document or scientific paper, and the Workshop recommended that each publicly available version of a document carry a full specification of its status laid out

in a visible and readily understandable manner.

- Citation. Because of the possible existence of multiple versions of a document, the Workshop recommended that the scientific community become involved in the development of standardized citation practices that are friendly to science, include appropriate metadata, are capable of automatic assignment and are easy to use.
- Peer Review. The ease of publication in electronic media reinforces the case for adequate quality control in terms of both the scientific content and the presentation. Scientific societies and/or journals should therefore establish and distribute guidelines in order to maintain the quality and integrity of the review process.
- Scientific misconduct. Any reduction in the controls applicable to electronic publication increases the opportunities for scientific misconduct, such as the falsifying of results and plagiarism, although the technical features of electronic publication (such as the ease of automatic scanning and searching for similarities) raises the chance of detection. Research into the application of electronic methods for the detection of scientific misconduct should therefore be encouraged.
- Open Access. The Workshop considered the conflict between the needs of scientists for ready access to large databases and collections of scientific observations, and the requirements of the aggregators for commercial reward for their endeavours. The results of publicly funded research should be clearly recognized as a 'public good', and full and open access to the data collected was essential for scientific advancement. This does not necessarily mean 'free' access by research workers, since the part played by publishers, aggregators, librarians and other facilitators merits adequate recompense if they are to continue in their valuable roles (see also Chapter 8 on this issue). The Workshop recommended that the attention of the scientific community, funding agencies and legislators be drawn to the fact that the scientific enterprise is crucially

dependent upon the ability of research workers to make use of collections of facts and observations and that measures that limit access to such material are contrary to the public good. Legislators are urged to provide for a mechanism permitting 'fair use' of large databases in order to promote full and open access to critical data for scientific research and education with little adverse effect on the commercial interests of the owner.

- Privacy. It is now possible for journal editors and publishers to collect detailed information on the nature of the material accessed and the usage, and to compile author/user profiles. The kind of information being collected should be clearly stated by journal editors and/or publishers, as well as the use to which it is being put. Specific information relating to individuals should not be divulged to anyone without the permission of the subject.
- Archiving. A major factor restraining the adoption of electronic methods of publication was the lack of

archiving facilities, for there is currently little assurance for authors and publishers that, with the advancement of technology, material issued electronically will remain available and readable in the decades and centuries to come. The establishment of archives, for the long-term preservation of electronic publications, should be encouraged as fundamental to scientific and cultural development.

- Developing Countries. Electronic publishing represents a unique opportunity for developing countries to promote the advancement of their scientific communications. It has the potential for improving access to the world literature, for filling gaps in local collections and for improving the visibility of their own scientific contributions.

Source: AAAS/UNESCO/ICSU Workshop on Developing Practices and Standards for Electronic Publishing in Science, Final Report, www.aaas.org/spp/dspp/sfrrl/projects/epub/report.htm

for institutions serving a great number of users or involved in large and expensive programmes, such as mass digitization, but can also have catastrophic consequences in small institutions. The traffic on the Internet and the number of Web sites are growing exponentially and this leads to problems with queuing and unacceptable answering times.

For the library and archive professions, there are other aspects of the World Wide Web which give rise to problems. The central issue with all electronic documents is that of authenticity (see also Chapter 11). Is there any certainty on the Internet that the document has in fact been produced by the author/organization that claims to have done so? Is the text today the same as it was yesterday and will it be so tomorrow? A thesis using references to electronic documents, without printing them out, runs the risk that they may be changed at a later date or even cancelled. These problems are being dealt with by

specialists who are developing standards for electronic documents.

The second problem is that of searching in large quantities of data, because a search based on one or a few keywords easily leads to several thousand addresses. The search can be refined by using the tools developed for this purpose, such as Boolean operators, language or geographical limitations, provenance, etc. Problems will remain, however, because the Internet is, from this point of view, completely anarchic. Large parts of it are unedited and there are no general rules about the use of vocabulary. Searching in the areas of education and research may result in a large number of opinion papers with no academic quality control whatsoever. Published material in print and other media have usually been through an academic, professional and economic selection process, but this is not true of individual home-made 'information' products.

Much development work needs to be carried out by the information profession to address the concept of selectivity. This, however, raises the problem of censorship versus confusion and uselessness. Chapter 11, on the Internet, discusses some of these issues from a more general point of view.

THE VIRTUAL LIBRARY

The vision of gathering all human knowledge together in one place is very old and has existed in many civilizations: one example is the library of ancient Alexandria, and another the great encyclopaedic enterprises in the Arabic, Chinese and European civilizations. The aim is to achieve a total overview of the recorded knowledge, as with the Universal Decimal Classification system, or by means of one large computer. Recently and due to the growth of the Internet, this vision has manifested itself once again in the form of 'the library without walls', or the virtual library.

The assumption is that everybody will obtain instant access to all recorded information in the world through the nearest library. This phenomenon has been described in several ways, and the term 'electronic library' has often been used. Unfortunately, this expression could equally well mean a large database or further developments in library automation, or applications of hypertext on the World Wide Web. The preferred term within the profession is the digital library, which is not just a name for a collection of digitized media. First of all, the term refers to a library, which is not necessarily in a particular building, but a systematic organization where various professional operations, performed by a professional staff and directed towards specific user groups, are carried out. The collection or parts of it might be digitized and access to electronic and other networks provided. One of the most important items in the digital library is *metadata*, which describe the contents and attributes of the library collection. They are important to the process of searching among

millions of documents. The most prominent example here is the so-called 'Dublin Core' which defines fifteen core elements to be used by authors as well as intermediaries. Another problem is naming, which means strings of characters that uniquely define digital objects and therefore form a part of the documents' metadata. A system of naming must be permanent, and this means that a name cannot be bound up with a specific location. The creation of such a naming or identifier system is organizational, not technical, and different systems have been suggested. Examples are Persistent User Requirement Languages (PURLs) developed by the On-line Computer Library Centre (OCLC), where a server looks up the corresponding Uniform Resource Location (URL) in a database; the Uniform Resource Name (URN) developed by the Internet Engineering Task Force (IETF) but still not in operation; and the Digital Object Identifier system (DOI) developed by the Association of American Publishers and the Corporation for National Research Initiatives. They all provide methods by which digital objects can be identified and accessed. Issues concerning the management of the intellectual property right have given impetus to the development of these systems.

National bibliographies are the cornerstones of the library system and they are facing many problems with electronic documents. Such documents do not have a permanent existence, and a hyper link may lead to an empty address. In principle, a similar problem can occur with printed material, when a card catalog refers to a document which has been lost or stolen. But the problem takes on a completely new dimension on the Web because of the large number of hyperlinks and the very transient nature of Web pages. A recent pilot project in Sweden aims at testing methods of collecting, preserving and providing access to on-line electronic documents in a way that allows them to be regarded as published. This is done by taking a 'snapshot' of the relevant Hypertext Markup Language (HTML) pages, but concerns only

static electronic documents. The Internet is not the virtual library, but constitutes an important part of it. In the library environment a slogan during recent years has been 'from collection to connection'. This is certainly a very precise description of the development, but the vision of the virtual or the digital library must include 'collection' as well as 'connection'.

WORKFORCE AND EDUCATION

The main reason for defining an information services sector is that there are several similarities in the tasks of the institutions therein and in the work of their staff. Archives preserve documents for future use; these items range from a unique rare manuscript to samples of mass documents such as census forms and tax reports. To this end, statistical sampling methods have been developed so that the number of items preserved is sufficient for various research purposes. The intellectual, technical and administrative work and the classification and filing of documents have merged so that this profession has extended its range and expanded its systematic approaches. The person carrying out this work is usually called a records manager. Libraries, for their part, are collectors of printed material and have developed systems for retrieval through catalogues and classification systems. Library work also includes selection, when purchasing or weeding out. With a growing focus on users, networks such as union catalogues and inter-library loan systems have been developed. Such systems have been further developed by the use of ICTs. The third group, information service enterprises, has its roots in the documentation movement from the beginning of this century, and services to decision-makers in business and industry are their main task. They use basically the same tools as libraries, but are highly focused on speed in the delivery of information; the use of ICTs responds very well to their needs. All types of personnel in the three groups perform similar tasks in the management of their institution or enterprise.

The common characteristic of the three areas, their institutions and their professionals, is that they are acting as intermediaries between documents (printed or electronic) and users. The ICTs have blurred the borderlines between the different types of documents. Computers are used for administrative purposes, and electronic networks have become more extensive, so that other types of institutions such as museums are also performing similar activities. This leads to professional specialists being replaced by generalists capable of mastering the ICTs, or by new professionals such as designers of home-pages and webmasters, who combine different specialities, which may include both aesthetic and information training. A general trend in the development of relevant education for the sector is to put more emphasis on the ICTs, first of all on their use, but in several educational institutions on programming and technical skills as well. Computers are used in education and research in all fields, and students through their e-mail addresses and Web sites become adept in the regular use of technology and the opportunities it provides.

Bibliography courses used to focus on printed bibliographies, supplemented with on-line data-bases. Now the situation has been reversed. Professional education also puts the emphasis on theory and methodology rather than practical skills, because developments are so rapid that the reality will change between the beginning and the end of an educational programme. Methodological knowledge for its part has longer durability and produces a more versatile workforce.

User friendliness is an important aspect of the ICTs, but there is still a strong need for user-education in libraries. Users must improve their skills in the digital systems and the different OPACs should be designed not only for the professionals but also for ordinary users, whether they visit the library or have electronic access from their home or workplace. The changes in professional work and in the educational

programmes are illustrated by the labels and titles used. For example, 'librarianship' has changed to 'library science' and further to 'library and/or information science' to 'information systems and information management', and those seeking employment in this area include Webmasters and Web designers.

A number of new jobs have been created in the private and public sector for professionals who are capable of mastering ICT use. Moreover, their traditional background with its systematic approach is an advantage. Software developers, designers of information systems for all types of enterprises and organizations, consultants on Internet issues, specialists in teaching and training and in marketing and sales, who work in the information institutions, are all a far cry from the traditional archivist or librarian. The general trend is very much in favour of the information professions, but of course economic recession, whether local or more widespread, can call into question such optimistic future perspectives. It is nevertheless clear that the rapid development of ICTs will require the information professionals, like professionals in many other fields of activities, to commit themselves to lifelong education and require educational institutions and professional associations to develop adequate programmes and facilities.

A PARADOXICAL FUTURE

The growth in the use of ICTs has some built-in paradoxes. On the one hand, access to information and communication is becoming easier, and PCs are better, faster and cheaper. These factors may be considered as a global trend in democratization. On the other hand, the development of technology, software and data processing requires more and more capital investment, and this is leading to global monopolies among producers and vendors.

Another paradox stemming from the enhanced access to ICTs is the emergence of a new type of illiterates, those who have not grown up with the technology and are therefore at a disadvantage on the

employment market. From this point of view, the use of a PC may be compared with the mastery of a foreign language which requires regular practice. Libraries can play an important role in fighting this form of illiteracy by giving all users access to PCs and to the networks. In some Western European countries, there is an ongoing discussion about whether public libraries should give free access to the Internet to all users.

The development of ICTs has taken place principally in the capitalist world and within the framework of capitalist economies. In this context, one driving force is the substitution of relatively expensive labour by machines, leading to reductions in the costs of production and services. However, developments are so rapid that there is a general lack of qualified personnel. This gives qualified groups of professionals opportunities for very good salaries and working conditions. As the ICTs spread to other parts of the world, such as Eastern Europe and developing countries, there will also be a lack of professionals in these regions and the situation may well get worse, if market forces tempt qualified personal to move to Western Europe and North America. Another issue here is that American English may achieve a more dominating position in international communication, as has been discussed in Chapter 3.

The quality of information raises the problem of retrieving relevant and accurate information among the millions of documents available on the Internet. Some years ago, large databases were already nicknamed GIGO-systems ('garbage in/garbage out') and the problem has become more acute with the linking of 'all' databases. This is one of the main issues which the information professionals of the future will have to tackle. The changeability of electronic documents presents the profession with further difficulties. Authenticity must be defined if solutions to the problems of filing, retrieval and intellectual property rights are to be found.

Digitization means that all forms of information,

whether print, image or sound, are stored and transmitted in the same physical form (see Chapter 10). This convergence is also reflected in convergence among institutions and professions, since all those working in this environment deal with media stored and exchanged in identical ways. In the future, there may well be convergence between information producers and the intermediaries.

REFERENCES

- CLEVELAND, G. 1998. Digital Libraries: Definitions, Issues and Challenges. IFLA UDT Core Programme Occasional Papers, No. 8.
- FEATHER, J. 1998. *The Information Society: A Study of Continuity and Change*. Second ed. London, LA Publishing.

Articles on new developments may be found in periodicals such as:

Records Management Journal
The Electronic Library
International Journal on Digital Libraries
Internet Research

And last, but not least, see the Web sites of the organizations and enterprises in the field.