Managing the Electronic Library

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A Practical Guide for Information Professionals

Edited by
Terry Hanson and Joan Day

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Foreword

The idea of the electronic library has been with us for a long time and whether we date the thinking from the seminal 1944 paper by Vannevar Bush (Bush, 1945) or earlier it is clear that the ideas are rapidly turning into reality. It may not be the reality of (all of) our dreams and predictions but the rapid progress of the last few years has taken us to the point where the terrain is becoming clearer and real products and services are becoming available in significant numbers. In particular the development and rapid adoption of the open World Wide Web protocol, with its simple hypertext navigation system and ability to handle multimedia, has been the platform on which much of this progress has been built.

In our previous book (Hanson and Day, 1994) we looked at how libraries were dealing with the management implications of an earlier stage of this evolution, the impact of CD-ROM. For the present work we continue with the management theme in the context of a more mature and far more complex electronic library situation. We are looking at how libraries cope with the enormous effects of new service

possibilities, with the constant re-definition of their role, and with the necessity to forge strategic partnerships on campus.

The general approach of the book is to take a comprehensive look at how libraries in a broadly similar situation grapple, theoretically and practically, with the transition to the electronic library. Though the issues identified in the book are universally applicable, across library sectors and countries, we decided, nonetheless, to concentrate attention on one sector in one country, UK academic libraries. This focused approach, with its clear basis for comparison between different libraries, will, we believe, be of greater value not just to the UK academic library community but also to academic librarians in other countries and to public and special librarians anywhere. International coverage is not entirely absent though with chapters describing experience in Cork and Connecticut.

The structure of the book is similar to the earlier work. The chapters have been commissioned on the basis of a designed structure. There is a mix of 'overview' papers which identify themes and issues, and practical case studies from individual libraries. Most sections have an overview and two case studies though the section on Management Issues at Campus Level has two overviews and four case studies while the Management Information section, as a new area of concern, has only the overview. In addition there is a section devoted to management of specific services, such as electronic reserve and geospatial data collections, and a final section devoted to general case studies covering all the issues from the perspective of individual libraries. In general the chapters have been commissioned with a view to providing a representative collection of universities by size, age and geographic location within the UK.

The main theme of the book is change. It is about how university libraries are responding to the rapidly changing higher education system in the UK with its increasing student numbers and their greater diversity and requirement for flexibility of access. At one level the response is, of necessity, political and strategic. It is about how libraries re-think their

traditional roles and see the value and necessity of re-positioning themselves on campus. At another level it is concerned with:

- the constant pressure to do more with less;
- the recognition of the potential for new service possibilities;
- the implementation of these services;
- the adoption of more flexible working practices and management structures;
- making a reality of end user empowerment;
- the effective management of the change process (for both staff and users).

There is inevitably much repetition, or reinforcement, as different authors emphasise some of the same fundamentals and acknowledge the same influences from their different perspectives.

In Britain the electronic library debate is informed by a burgeoning literature that includes major reports such as Dearing (NCIHE, 1997) at the general higher education level and Follett (HEFCE, 1993) which looks at the changing role of university libraries. Combined with these high-level contributions there have also been a number of key developments that have had an enormous influence on UK academic libraries.

At the strategy and policy level there has been a particularly active convergence debate in the UK and more recently, since Follett, this has been set in the context of the development of unversity information strategies. The latter has been promoted by Follett and Dearing and, as a practical requirement, by the Funding Councils' Joint Information Systems Committee (JISC), as a framework for the effective development of information resources, in all areas, in universities. After an introduction on the nature of the electronic library we begin the book with a section devoted to these strategic issues with overview chapters from Lynne Brindley on information strategies and from Derek Law on convergence. These are followed by four case studies looking at how individual universities have dealt with these issues.

At a more practical level it is important to mention major initiatives such as:

- the development, and continued improvement, of the universities' computer network JANET (Joint Academic NETwork);
- the evolution of what is now called the Distributed National Electronic Resource (DNER). This is an ongoing programme to collect together, by commercial procurement or by generation within the sector, scholarly information resources ranging from bibliographic databases (such as the ISI Citation Indexes via BIDS), statistical datasets (such as census statistics via MIDAS), geospatial datasets (such as Ordnance Survey Strategi via EDINA), other research collections such as the Arts and Humanities Data Service, and Internet Subject Gateways such as OMNI and SOSIG. The DNER is the responsibility of JISC's Committee for Electronic Information (CEI);
- the Electronic Libraries (eLib) Programme. This has been a very important development in British academic librarianship. It has provided, at just the right time, an opportunity for innovative projects to be supported and a focus for the entire community on the issues involved in the development of the electronic library. This has provided for a collective learning experience, with extensive participation across the sector. It has in fact illustrated the potential, and necessity, for national and international cooperation in the development of library and information services.

It is of course very difficult to say how this development process would have proceeded without the support and guidance of JANET, the DNER and the eLib Programme, but it is clear that these initiatives have been very influential and beneficial. This is made clear throughout the book, in both the overviews and case studies.

In the current, third, phase of the eLib Programme one of the two main themes is the development of 'hybrid libraries';

the notion of a mixed library environment incorporating large print holdings with increasing quantities of electronic information accessible via local and Internet sources. The book might perhaps be more accurately, if a little less snappily, entitled *Managing the Hybrid Library* as it is clear that all university libraries are in the midst of a long transition that will shift the balance between print and electronic sources, but which will never result in a purely electronic library.

Finally, we would like to thank all of our contributors for their readiness to share their thoughts and experiences. The general picture painted by the book is, we think, of an energetic sector keen to experiment and innovate and to meet the challenges of an uncertain but unquestionably exciting future. There has never been a more interesting time to be an academic library manager!

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SECTION 1

Introduction

CHAPTER ONE

The Electronic Library in Teaching and Research

Marilyn Deegan

The library world is currently undergoing a period of great change, and university and research libraries are finding themselves at the forefront of some exciting new developments. With the growth in the use of new technologies, the increasing availability of digital information in the form of electronic publications and networked resources, and the pervasiveness of the Internet, a new concept is emerging: the 'electronic (or digital) library'. This is a much discussed notion at the moment in both the USA and Europe; it has many enthusiastic proponents, and with the ubiquity of electronic networks and global connections, it seems likely to revolutionize the way academic libraries throughout the world deliver their information. Research monies are being spent on a plethora of electronic library projects, and some scholars and librarians are becoming alarmed at the rapid progress being claimed in the race to full digitization of scholarly materials. There are a number of different definitions of the electronic library which it might be useful to discuss and contrast, but first perhaps we need to think a little about the concept of the research library and its main functions. It is

something which librarians, scholars and students take for granted every day, but perhaps in a time of such great change it is useful to look at some of the assumptions we make and see how they are going to change in these new environments.

Most people in the academic world think of a library first of all as a defined place where they go to do some or all of their scholarly work. Indeed, many academics spend their lives, or certainly their summers, travelling around the libraries of the world consulting unique documents which make up the their holdings. In a recent article, Lynne Brindley (Brindley, 1993, p. 176) gives a list of libraries used regularly by one scholar working in a history-related discipline. This list includes thirteen libraries in the UK, as well as libraries in Moscow, St Petersburg, and Helsinki. We can regard this as a typical practice, certainly in the humanities. The library, therefore, is a central site to which information is brought, and if you want access to that information, you have to go to the site.

For many scholars and students, in the humanities in particular, the library is the prime location of research and scholarship: it is their laboratory. While one would not deny that the library is also an important source of information for scientists, they are less likely to use the range of legacy material which is still of vital use in the humanities. They are much more likely to need rapid access to the latest research results, the provision of which is one of the many areas where the electronic library might have significant advantages over the traditional library. In the humanities, it is not just a question of preserving information for a small and specialist band of researchers: the information which is preserved in libraries, and in other repositories such as museums and art galleries, is our culture, which must be secured from harm and obsolescence if we are to remain civilized. This culture is produced, enhanced and augmented through a complex, interdependent and rather mysterious set of processes, in which researchers in the humanities play an important role. The major activity of the humanities scholar is the sifting of information about cultural artefacts, which

include texts, images, objects, sounds, languages and performances. Some of the artefacts are the product of our material culture, and some are products of the imagination. In the study of these artefacts, each generation of scholars and students finds new meanings and new interpretations. These accretive layers of interpretation become themselves part of the meaning encoded upon the artefacts, and therefore part of the objects of study. This is a rather different process from that which takes place in the sciences, where new information generally replaces the old, rather than supplementing it.

Librarians and libraries, of course, play an equally, if not more important role in cultural preservation and enhancement. Traditionally, they are concerned with the acquisition, preservation and organization of information. That is, they acquire documents, preserve them, and catalogue them so that they may be found and used by those who need them. This may seem very obvious, but it is important to descibe the function of a traditional library in order to understand the extent of the changes which are taking place. In the definitions given, organization is the key to distinguishing a library from other collections of documents: if you don't organize, you can't find things, and if you can't find them, you can't use them. The move from handlist to card catalogue to computerized OPAC is a revolutionary; one instead of finding holdings according to when you acquired them, or who wrote them, it is now possible to find holdings according to any of the structured parameters by which a document is described. With the card catalogue, if a reader wished to search by author, by title or by subject, then there had to be three catalogues, and searching by any other parameter was impossible. With the OPAC, redundancy of information is avoided: there is one catalogue containing information structured in such a fashion that it can be ordered from many different points of view. But, however sophisticated the management of digital information about the physical objects in a library may be, this is not yet an electronic library. The objects are just as they were, although they are perhaps easier to find. An electronic library, rather,

contains digital versions of the actual materials which the library holds and which the user needs. When a critical mass of material is held by a library in digital form, then that library is on the way to becoming an electronic library. One definition of the electronic library might be that it is a conventional library which has converted some proportion of its holdings to digital form, but there are significant properties of digitized media which could make the library more than that.

Digital documents are just a series of electronic impulses. Whether they are represented as searchable ASCII text or as bitmap page images, they are still in the same form at the lowest possible level. Of course, this does not only apply to documents, it also applies to anything which has been digitized or produced as digital from the start. So sound, video, images and text are all represented by patterns of bits. The implications of reducing all media to this set of digital patterns are that, firstly they can all be stored the same way (although there are differences of orders of magnitude in the amount of storage required by different media). Secondly, the boundaries are effectively removed between media, between institutions which hold the media, between countries, and between types of repositories. Whereas in the physical world there is a huge difference between a painting, a museum object (vase, sculpture, coin etc.), a document (book, manuscript, journal etc.), a satellite image or a medical image, there is almost no difference in the digital world: they are all represented by a pattern of bits and bytes, they need the same kind of machine to allow their display and manipulation and they can all be transmitted through networks. The main difference between digital representations of different media is size: searchable text is very compact; detailed images, sound and video are all very large. But that is a difference of degree, not kind. This means that the electronic library can therefore, in theory, integrate all the kinds of materials a researcher might need, and can transcend institutional and national boundaries. A student or academic could bring to his or her desktop a whole variety of media,

from different kinds of institutions and many countries, and integrate them on the screen of his or her personal workstation. What we have when this is possible is not just an electronic library, which might be a physically identifiable library with staff and facilities, but which delivers the information it holds through digital means, but a 'virtual library' which means that when one is virtually anywhere, one can be virtually everywhere. The 'virtual' library has an element of illusion about it: the searcher may think that he or she is retrieving information from a local source, when in fact it is being collected without his or her knowledge from all corners of the world and being integrated seamlessly at the desktop. The virtual library is therefore potentially enormous, as it could comprise all the electronic libraries in the world linked together. It is also potentially very small and personal, being the set of information which a scholar identifies and accesses as a personal virtual workspace. The purpose of libraries, even huge research libraries like the British Library, is shifting from acquisition to access: libraries are gateways to resources as much as they are custodians of some of those resources. Given these definitions, one might ask if Internet or the World Wide Web are electronic libraries. They are certainly going to be the means through which electronic libraries disseminate their information, but they are not themselves electronic libraries as they lack the organizational principles necessary for the delivery of scholarly information in a structured and economical fashion. In libraries, information is delivered to us by skilled professionals, and this is how it should be delivered in electronic or virtual libraries.

One question we might consider is the status of the book in the digital world, and, related to this, the role of the publishing industry. The book, some say, is dead. Others, notably Sven Birketts (1994) in his lament for the book '*The Gutenberg Elegies*', plead for the familiarity of the physical object which offers an immediacy of experience unmediated by the interposition of technology. The book, a medium which encourages depth and reflectiveness, is posed against

the computer and the Internet, which offer speed and shallowness. But between those tolling the death knell for the book and those who regard technology as the spawn of the devil is a middle way, in which we can consider the appropriateness of a particular medium for a specific task. Encyclopaedias and large dictionaries such as the Oxford English Dictionary, for instance, are probably best delivered electronically. Large corpora of art-historical images, too, which are prohibitively expensive to print, can be digitally delivered to the desktop for a fraction of the cost. A number of electronic library projects are currently engaged in building large image archives: the HELIX project, for instance [funded by the Electronic Libraries Programme (eLib)] which, during 1998, will be delivering more than 50,000 images of art objects, furniture, ceramics and early photographs, among other things; and the Joint Information Services Commitiee (JISC) Image Digitization Initiative which is working with 16 archives in UK higher education to provide a large number of diverse images. Studies of film technique too, which offer the opportunity to view film clips as part of the argument rather than read a description, offer a valuable enhancement to the subject. Perhaps, though, the latest novel, or a volume of verse, are best in the traditional book format.

Academic journals are an interesting case perhaps for dual delivery: the electronic version for the speed with which issues can appear, crucial in some subjects – physics or medicine, for instance; and the paper version for archiving – at least for the present while there is still uncertainty about the long-term preservability and stability of the digital media. There is an interesting debate in progress in some academic circles on the role of the publisher in the production and dissemination of scholarly findings now that it is possible to carry out most of the attendant processes electronically. The argument advanced is: the university pays the academic to do the research and write up the findings. The academic publishes a journal article or monograph, which the university then purchases. Is the university then paying twice for the same thing, and would there be a way to cut out the

intermediate stage? Several proposals have been advanced to remove publishers from the loop. It has been suggested that universities should act as publishers of materials produced by their own employees, keep the materials on their own servers, and charge for access to them from outside. Another idea which is being tested is electronic journals which are entirely managed and controlled within the academic world. In physics, for instance, the Los Alamos National Laboratory Electronic Preprint Archive for physics literature, started by Paul Ginsparg in 1991, is now used globally by researchers in most areas of physics, and is estimated to have captured over 70 per cent of the current physics journal literature. This archive has succeeded in dispersing the stereotype which dismisses electronic publishing as an inferior publishing medium: most authors in physics now routinely substitute their Los Alamos preprints with electronic versions of the final, refereed, published versions of their articles. There are two examples later of electronic journals in the UK which are produced without any paper cognates. On the other hand, while academic books and journals are expensive to purchase from publishers, perhaps there would be losses, some unforeseen, if we were to dispense with publishers entirely. The processes of editing, refereeing, book design, marketing, etc. are more complex, time-consuming and therefore expensive than many assume, and there is several centuries' worth of experience in the publishing industry. There need to be many changes in the era of electronic publication, but we should be wary of any attempts to get rid of babies along with the bathwater.

The move from the print world to the electronic world, though beneficial for some of our materials, is a difficult, time-consuming and expensive process. We should also not be carried away by the possibilities of digitization: just because we can digitize resources, doesn't mean that we must. It has been calculated, for example, that it would cost billions of pounds to digitize all the holdings of the British Library, and so we perhaps need to be selective in what we choose to digitize, at least in these early stages. A note of

caution should be sounded here however: there is a danger that only very popular texts and other artefacts will be made available, and this will reinforce a narrowly canonical approach to scholarship. Another point which also needs to be made is that there is a difference between retrospective conversion, and the provision of originals in electronic form or in simultaneous printed and electronic form. In the matter of text, because books, journals, etc. are now being produced by computer, an electronic product could easily be one of the outputs alongside the printed version, and we are seeing many more electronic journals and magazines either alongside the printed versions, or, increasingly, produced as only electronic. In the artefactual disciplines, computers are being used in the practice of the discipline, and again an electronic output is a possible product. A good example of this is illustrated by the electronic journal, *Internet Archaeology*, funded by eLib, which is making exciting and innovative use of the structures and modelling techniques available through digital technologies for the representation of non-linear, three-dimensional archaeological information. The journal publishes the results of archaeological research, including excavation reports (text, photographs, data, drawings, reconstructions, diagrams and interpretations), analyses of large data sets along with the data itself, visualizations, programs used to analyse data and applications of information technology in archaeology: for example, geographical information systems and computer modelling. Conventional publication via the printed page cannot do justice to the rich diversity of archaeological information. Electronic publication, by contrast, offers opportunities to overcome these difficulties. In chemistry, the eLib Programme has funded the establishment of an electronic version of the journal *Chemical Communications*, a forum for the dissemination of preliminary accounts of important developments in chemistry. This is using Internet technologies such as Java to allow the display of three-dimensional molecular information attached to numerical and symbolical data in order to enhance the value of the information.

Some of the world's major research libraries which hold valuable and rare or unique materials are embarking on large-scale programmes of digitization as means to preservation and wider dissemination. For some of these projects, digitization is a means to the production of a paper surrogate, as in the Cornell Brittle Books Program, where printed books which are deteriorating badly are scanned to produce a digital paper facsimile, which is then bound to replace the crumbling volume in the stacks. This process has as a by-product a digital intermediate surrogate which is also being made available online. In other projects, the digital facsimile itself is the end product, particularly in libraries which are dealing with fragile and unique manuscript materials where access to the originals is restricted, providing a surrogate for the use of scholars and students from their desktops. Damage to the manuscripts caused through handling can (hopefully) be halted, while the needs of scholarship are served by the digital surrogates. If one has the appropriate technology, in particular a large screen, one can view side-by-side manuscripts from, say, Prague, New York, Paris and London. Palaeographers no longer need to rely on capacious memories, or the vagaries of the post which can deliver photographs months late; now at the click of a mouse many resources are available. There are several projects to which one could draw attention: the Beowulf manuscript studies being carried out at the British Library; the Celtic Manuscripts project at Oxford University; and the Aberdeen Bestiary at Aberdeen University are good examples.

There are still a considerable number of problems which need to be solved, however, in the provision of high-quality images of complex and rare originals, including the management of such images over a long period of time. Microfilm, the main surrogate storage medium at the moment, is accessible using relatively simple technology, though it does deteriorate over time, in particular if colour film is used. Digital images require highly sophisticated hardware for their display, and this hardware rapidly becomes obsolete.

This is a problem which has also been found in the uses and storage of electronic text. Some key texts were captured in the 1960s, the early days of textual computing, and the media of capture (punch cards, punch tape, etc.) are no longer available. If the texts are not moved up consciously through generations of hardware and software, then the life of an electronic text is potentially very short, shorter even than that of a text printed on the most fragile acid-based paper. If we are to spend vast amounts of money capturing digital images, then we need to ensure that the images survive as long as possible. We also need to preserve these secondary images as a means of conserving the originals, and controlling access to them. If the surrogates are sufficiently good, then use of the fragile originals can be restricted; but if we have to keep rescanning the originals, the use of surrogates as a conservation method becomes pointless. One great advantage which digital technology has over photography of medieval manuscripts is that the colours, if calibrated properly, are 'true', unlike colour photography, which varies with the brand of film and the chemicals used to develop it. Also, digital images do not degrade over time in the way photographs can. Much work is being done at the moment to calibrate colour targets, scanners, monitors and printers so that accurate colour reproduction at all stages is possible.

The delivery of digital information in a structured, reliable, organized and timely fashion has been seen as so crucial by various national bodies in the UK and elsewhere that funding has been mobilized for various electronic library initiatives. In the UK, a major report on academic libraries was produced in 1993 as the findings of a committee chaired by Sir Brian Follett (HEFCE, 1993). The Follett Report suggested that information technology could be mobilized to help meet the needs of library users and library managers over the next decade, and that substantial funding should be made available for a range of projects to investigate electronic library issues and to develop some of the content, resources and management structures needed for digital libraries. As a

direct response to the Follett Report, the JISC established eLib. The programme was initially given a budget of £15 million over 3 years to fund projects in a variety of areas. The main aim of the eLib Programme, through its projects, has been to engage the higher education community in developing and shaping the implementation of the electronic library.

The first two phases of the eLib Programme have so far yielded almost 60 projects funded in different programme areas. These areas are:

- Document Delivery;
- Access To Network Resources;
- Training and Awareness;
- Electronic Journals;
- Digitization;
- Images;
- Electronic Short Loan Collections;
- On Demand Publishing;
- Pre-Prints and Grey Literature.

The Programme has also funded the Higher Education Digitization Service at the University of Hertfordshire. The thrust of these initial stages has been to create some of the components of the electronic library: a building blocks approach. Particularly important is the ACORN (Access to Course Reading via Networks) Project, which is exploring the potential of information technology to deliver high-demand material electronically to students across the campus, via networked computers, and has developed and implemented a model for effectively managing the whole process, from requesting reading lists from academic staff to the consultation of the text by students; and EDDIS (Electronic Document Delivery – the Integrated Solution) which aims to produce an integrated, end-user-driven identification, holdings discovery, ordering and electronic supply service for non-returnable items (typically journal articles), which could be used by all UK higher education institutions.

Also important in these first two phases are the various subject gateway projects such as:

- OMNI: Organizing Medical Networked Information;
- ADAM: Art, Design, Architecture and Media Information Gateway;
- EEVL: Edinburgh Engineering Virtual Library;
- SOSIG: Social Science Information Gateway.

Content building, too, is a priority for the Programme: important here are the HELIX project mentioned above; the Internet Library of Early Journals, whose aim is to offer expanded access over the Internet to digitized page images of substantial runs of 18th- and 19th-century journals, and to evaluate these in terms of use and acceptability; and MIDRIB: Medical Images: Digitized Reference Information Bank, which is creating, maintaining and delivering a comprehensive collection of medical images in digital form for use in teaching and research in medical and healthcare faculties of universities and teaching hospitals. A third phase of eLib has recently begun, with a small number of larger projects than in the earlier phases. These fall into two main areas: hybrid libraries and large-scale resource discovery. Worldwide there have been a large number of electronic, digital or virtual library projects which are producing a wide range of alternative technologies. The challenge now is to bring together technologies from these new developments, plus the electronic products and services already in libraries, and the historical functions of our local physical libraries, into well-organized, accessible hybrid libraries. These hybrid libraries must deal with materials in every kind of format, both digital and non-digital, and should integrate them through some system which is presented to the user through a single interface (this is discussed further below). The UK's higher education libraries contain an incomparable set of bibliographic resources, which are not fully exploited outside the individual institutions holding them. The Anderson report has highlighted the problems inherent in institutions

building adequate research collections on their own, and the increasing imperative to share resources, particularly at a regional level. Some of the eLib phase three projects will build integrated bibliographic resources ('clumps') which could serve regions or specific user groups. There is another strand of eLib phase three which is investigating the issues around preservation of digital data in library environments.

Another key national development in the UK in the route to the collection and dissemination of digitized materials for scholars is the establishment of the Arts and Humanities Data Service. In 1994 a feasibility study was funded by the JISC of the Higher Education Funding Councils in the UK to report on the potential for scholarship of such a service, and the study recommended that the service should indeed be set up; its finding were quickly endorsed by the funding councils, and a substantial annual budget was allowed for the purpose. The original study recommended that the role of the Service should be to promote effective, low-cost access to the widest range of relevant digital resources by UK academics in the humanities; and that a distributed structure should be established with some services provided centrally and others by specialist data and service providers in different subject areas or dealing with different media. The executive for the Service has been set up at King's College in London, with Dr Daniel Greenstein as Director, and five service providers have been selected: the History Data Unit at the University of Essex to provide historical data, the Oxford Text Archive to serve the literature and linguistics communities, a centre for archaeology at York, a centre for music and time-based data at Glasgow (PADS), and a centre for the visual arts at Surrey Institute of Art and Design (VADS). All the projects described above which are being funded by the UK Higher Education Funding Councils are contributing to the Distributed National Electronic Resource (DNER); a major initiative to make available teaching and research resources.

Outside of the UK higher education sector there are, of course, many electronic library projects. The Telematics for Libraries Programme of the European Union DG XIII

funds a number of pan-European projects, many of which have UK partners, and this programme has had great impact on developments throughout Europe. In the US, there are six federally-funded digital library projects led by universities which comprize the National Science Federation (NSF)/Advanced Research Projects Agency (ARPA)/National Aeronautics and Space Administration (NASA) Digital Library Initiative (DLI). The individual projects are:

- University of California, Berkeley: An Electronic Environmental Library Project;
- University of California, Santa Barbara: The Alexandria Project: Towards a Distributed Digital Library with Comprehensive Services for Images and Spatially Referenced Information;
- Carnegie Mellon University: Informedia: Integrated Speech, Image and Language Understanding for Creation and Exploration of Digital Video Libraries;
- University of Illinois at Urbana-Champaign: Building the Interspace: Digital Library Infrastructure for a University Engineering Community;
- University of Michigan: The University of Michigan Digital Library Project;
- Stanford University: Stanford University Digital Libraries Project.

There are also many other initiatives and centres throughout the USA; they are too numerous to mention individually, but details about them can be found at the dLib Magazine Ready Reference Web site. The commercial world, too, has become heavily involved in digital library developments: IBM, for instance, have been building digital library systems in partnership with a range of institutions: the Vatican Library, with nearly 1.5 million books; Indiana University's Variations project for distributing multimedia information across a campus network; and the Institute for Scientific Information, for example. In the UK, they are

partnering De Montfort University in the IBM/DMU Digital Library Project which is building a digital library for the ten distributed campuses of the university, as well as for access from outside.

So far, this chapter has looked at some of the underlying concepts which are important for understanding the digital library, and also some of the initiatives which are brokering the realization of the digital library. But in practical terms what is currently available is a diverse number of projects in several countries, dealing with different kinds of electronic media, and funded by different agencies and funding models with their own agenda, a veritable Tower of Babel of information with a vast diversity of management structures. How is this to be welded together into something which can be accessed and understood by all? A number of issues need to be mentioned here: first of all, the problems of cataloguing electronic resources (Hanson, 1998). Should they be integrated into the main library OPAC, or should this deal only with the physical resources of the library? In the new eLib hybrid library models there might be any number of possible solutions to this. I offer two suggestions: firstly that we should remove the ontological distinction between a physical and a digital object, and consider only 'objects' or perhaps 'library objects' or even 'information objects'. A library object might be a book, a manuscript, a letter, a CD-ROM, a microfilm, a video, an electronic document or other kind of electronic entity. The reader/user interrogates the OPAC as a one-stop shop for the data he or she seeks: the data could reside in one or more object types; this is irrelevant to the reader/user up to the point when the located object needs to be retrieved, when the ontological status will need to be known for pragmatic reasons: is one to click on an icon or walk to a shelf? The second suggestion is that we preserve the distinction between objects at a catalogue level, and thus have book catalogues, manuscript catalogues and other structured information about physical objects on the one hand, with different kinds of catalogue information about the electronic objects on the other hand. For the reader/user there

would be a 'catalogue of catalogues' which would offer the same one-stop shopping experience described above, with the distinctions between object types hidden until the point of retrieval. These two strategies would offer the same experience to the reader/user, but would have different underlying organizational principles.

Another issue closely related to cataloguing is metadata. If we are to build durable collections of quality electronic resources, the data we store with those resources needs to be rich, accurate, extensible, reliable and structured in some standard format. This metadata (or data about data) is arguably as important as the data itself. Three type of metadata have been identified by the National Digital Library Project of the US Library of Congress as being relevant to digital collections. These are intellectual metadata (cataloguing records, finding aids, etc.), structural metadata (information which links digital objects to make up a logical unit such as a journal article or archival folder) and administrative metadata (which allows the repository to manage the digital collection, including scan date and resolution, storage format and filename). Metadata is a burning question in the electronic library world, and indeed for any groups or individuals concerned with providing, distributing or maintaining electronic information in a networked environment. Many groups have been established to address the question in different communities and are working hard on offering some guidelines. A good start for understanding metadata in the context of electronic libraries is Paul Miller's article in *Ariadne* (1996).

Standards and protocols are different but related issues: standards allow us to produce materials which we know will be exchangeable on different media if we only adhere to the international standards. The most well-worked out approach to standards is probably in the area of digital text. The Text Encoding Initiative has produced a set of complex, definitive standards for the encoding and interchange of digital text based on the Standard Generalized Markup Language, SGML. HTML (Hypertext Mark-up Language), the encoding

standard of the World Wide Web, is a subset of SGML, as is the newly-emergent XML (eXtensible Mark-up Language) standard. These standards are now widely accepted by the scholarly community and also by the publishing industry. There is another set of standards also being promulgated by the publishing industry, in particular for the presentation of electronic journals: Portable Document Formats or PDFs, a good example of which is Adobe Acrobat. The main differences between these are as follows: SGML enables the creation of user-defined markup languages which identify what textual elements are, rather than how they should appear, which is what PDFs specify; it is the difference between marking up a piece of text as 'Title' rather than as '24 point Times Roman, bold, centred'. The main advantage of PDFs is that they describe documents in such a way as to enable them to be presented in an attractive visual form on screen. There are some search facilities available in PDF-presented documents, but unlike SGML marked-up documents, they cannot be easily exchanged between systems. This is a disadvantage for the scholar, but a benefit for the commercial publisher of an electronic journal, who may be seeking to prevent any such easy exchange. The standards situation for images is less well-established and there are a number of image standards on the market: TIFF, BMP, etc. Digital sound and video standards are also much less well understood and finalized than standards for text, as are standards for the compression of images, video and sound.

Protocols allow the interchange of information between systems of hardware and software which are different and which hold materials which are of different standards. For instance, the Internet Protocol allows the interchange of information world-wide between sites which locally adhere to many different standards. An exciting and relatively new protocol, which is being used by a number of electronic library projects is the Z39.50 network protocol which is establishing an international standard for network information searching and retrieval. This allows the user to access remote database records by specifying criteria to identify appropriate

records, and then requesting the transmission of some or all of the identified records. The crucial point about Z39.50 is that it allows remote databases to be interrogated and integrated without their having to be compatible, and without the interrogator necessarily knowing anything about the structure: the search is as familiar as searching local, known databases. This is a vital development for the integration of various electronic libraries into a global virtual library. A good example of the use of Z39.50 for digital library exchange is the ELISE (Electronic Library Image Server for Europe) Project based at De Montfort University. This is funded by the EU to develop connected image servers running on different hardware platforms with different software systems in four countries. Cross-domain search and retrieval will be possible across the sites using the Z39.50 protocol.

Copyright/intellectual property rights are probably the thorniest problems faced by those developing electronic libraries, but without relatively straightforward and, hopefully, electronic means of managing these issues, there will be a paucity of resources which can be accessed via an electronic library. What makes this a particularly difficult area to deal with is the fluidity of the situation, and the intransigence of some of the copyright owners who fear the opening of the floodgates of illegal usage if they give an inch. In many ways, the copyright situation is no different if you want to digitize material and make it available than if you want to make materials available in some form other than digital. Permission is required from the owner of the rights (generally with printed materials this means both the author and the publisher) before making any use of it other than for personal research. Great complications arise with multimedia materials, since different kinds of materials are restricted by different rights, and may have various licensing agencies dealing with those rights. Music is different from printed materials, which is different from film or drama, for instance. There are also new rights established when the material is copied into a different form. For example, if a photograph is taken of a painting, the photographer owns the rights to

that photograph, unless he or she is working on behalf of another person or organization. If someone else digitizes that photograph, they then hold the rights to the digital copy, and permissions have to be obtained for every stage of the copying of protected materials. Publishers of complex multimedia systems have sometimes found themselves with a very difficult and expensive rights management situation on their hands, and it may necessitate thousands of individual negotiations. In the electronic library environment, in-copyright materials have to be managed in such a way that infringements are minimized and fees are paid to rights-holders as appropriate. There are some eLib and EU projects, as well as commercial organizations, which are working on electronic rights management systems: the EU-funded Decomate Project has information about a plethora of these.

Finally, and probably most important for librarians, how, in the electronic networked environment, are we to ensure the preservation of the materials we digitize? I mentioned above the problems of the survival of electronic information which is a different one from the survival of artefacts: artefacts are subject to physical deterioration over time because of external or internal environmental factors. We are all aware of the problems caused by the deterioration of books which were printed on acid-based paper. With the digital versions of artefacts the survival problems are different, and possibly even more costly to prevent. As I mentioned above, the potential survival of electronic materials can be very short, not because they are inherently fragile, but because they rely on other entities, namely hardware and software, to allow access to them, and the life of these is limited because of advances in technology which mean that obsolescence is rapid. We are therefore at the mercy of commercial forces which dictate that hardware has to be changed at least every four years, and software perhaps even more frequently. The necessary migration of materials up through the rapidly evolving generations is a cost which is often missed in electronic libraries programmes. In order to address this problem, the US Commission on Preservation and Access and

the Research Libraries Group (RLG) created a Task Force on Archiving of Digital Information, charged with investigating and recommending means to ensure 'continued access indefinitely into the future of records stored in digital electronic form'. The final report of the task force was produced in 1996 and is available on the RLG Web site. In response to the RLG work, JISC and the British Library Research and Innovation Centre (BLRIC) held a workshop in Warwick in 1995 to look into the issues raised. Subsequent to this, a number of studies were funded to raise awareness, promote best practice and help the community understand more fully the nature of electronic materials and the particular preservation problems they pose. BLRIC is overseeing these studies, and the various reports are being placed on the BLRIC web site.

New opportunities and new challenges are being offered to libraries with the advances in digital media. The great research libraries can reach out to readers scattered over a wide geographical distance, the less well endowed institutions have the opportunity to provide access to a greater range of research materials and tools than ever before. There are, of course, problems and blockages, but there is a spirit of goodwill and co-operation between libraries and librarians throughout the international community to overcome these.

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SECTION 2

Management Issues at Campus Level

CHAPTER TWO

Information Strategies

Lynne Brindley

Introduction

This chapter aims to give an overview of the concept of information strategies, particularly through their development in UK higher education institutions. It is within the context of an information strategy that the more specific challenges of managing the electronic library will need to be set. To date the only thing that unites writers about information strategies is an agreement that there is terminological and conceptual confusion about exactly what an information strategy is or ought to be. Many senior decision-makers in universities now recognize that their institution should develop such a strategy but are still grappling with how to do it and what to include.

For that reason it is not the intention to commence with lengthy and competing definitions: rather the emergence of information strategies in higher education will be approached from an historical perspective, identifying some of the main influences that have helped to shape the UK national initiative in this area, led by the Joint Information Systems

Committee (JISC) and its immediate predecessor the Information Systems Committee (ISC). The chapter will build up a rich and complex picture of these influences and the different emphasis that each brings, thus working towards some clarity of scope, if not certainty of definition. The progress of the JISC initiative will be charted and the major issues that are emerging in practice will be highlighted. The added impetus that has recently been given to information strategies by the Dearing report on higher education in the learning society (NCIHE, 1997) will be assessed, and finally some comment will be made on the implications for libraries and their role in the management of electronic information resources and service development.

From Information Technology (IT) to Information Systems (IS) Strategies

Information strategies in higher education in the UK have had a long gestation in concept and in implementation. As early as 1990 this author was in discussion with the Computer Board for Universities and Research Councils on the need to develop a methodology for information systems strategies in UK universities. The Computer Board had outline guidelines on producing an IT and Computing Strategy, to provide support to the formal review and visit of the Computer Board in connection with the academic computing procurement cycle, at that time centrally controlled and funded. By late 1990 it was known that this national procurement process was going to cease – the concept of large, mainframe procurements on a seven year cycle had become obsolete – and in preparation for a different role, when in 1991 the Computer Board became the ISC of the University Funding Councils, arguments were made to the Funding Councils for a programme of work to be initiated to help institutions develop their independent information systems strategies.

The case for this work was accepted by the UFC, interestingly with Sir Ron Dearing as Chairman. The new, broader remit of the ISC included oversight of management, administrative and library computing, as well as academic computing. At this stage a deliberate shift of emphasis away from IT towards IS was signalled, in the scope and terms of reference of the new committee, with IS embracing 'the use of computer and communications hardware, software and networking facilities and services in support of research, teaching, library or administrative functions in universities'. Thus began the decoupling of a central funding regime for university computing in the UK from the provision of advice on institutional information systems strategy formulation on a more integrated basis.

The ISC was short-lived, but this broadening of remit, together with, for the first time, the inclusion in its membership of two librarians and a senior administrator, reinforced this change. The shift was reinforced by speakers at an Inter-University Committee on Computing Conference in 1992, who referred to information systems as the new focus of attention and to the importance of information management. A more detailed discussion of this early period can be found in a special issue of the British Journal of Academic Librarianship (1991), which is devoted to the topic of IS strategies, and in particular the article by Breaks (1991).

From Information Systems Strategies to Information Strategies

The JISC was set up in April 1993 to take over from the ISC and to reflect in membership and scope of activities the newly merged polytechnic and university sectors after the abolition of the binary divide. JISC endorsed the information systems strategy initiative and set up a sub-committee to develop an IS strategy framework. As part of its wider remit JISC was developing a major programme of national electronic information services, negotiating national dataset deals and

mounting these resources for access by the whole higher education community at national datacentres, hosted by three universities. Information strategy and electronic content, as well as networking and other technology infrastructure issues, were firmly on the JISC agenda.

Another endorsement of IS strategies during 1993 came from the Chief Executive of the Higher Education Funding Council for England (HEFCE) who indicated that institutions would be required to have IS strategies and submit them to the Funding Councils. This resulted in guidance being issued by the Funding Council (HEFCE, 1994) which since then has required that institutions include an 'information and library systems strategy' as part of their overall annual return of a strategic plan and financial forecast, alongside estate and staffing strategies. In more recent guidance from all funding councils specific reference is made to the JISC guidelines.

The scope of the IS strategy envisaged in this context is 'the exploitation of information systems for teaching and learning, research and administration, showing the extent to which an institution has developed an integrated information strategy (*sic*), addressing areas such as networking, library provision, management information systems, access to information sources, electronic information dissemination, telephony and computational facilities for research'. It is interesting to note that the term information strategy is emerging as the umbrella term for what is required.

The sub-committee of JISC met for the first time in November 1993 and very deliberately decided on two changes: it dropped information systems in favour of information strategies in its title, and became a group instead of a sub-committee, signalling its intention to treat the development in information strategy guidelines as a finite project. Information strategies in higher education had reached a starting point, at least as far as national involvement was concerned.

At the same time there were other developments within and outside the sector which were important influences on the way in which JISC thinking developed on what an information strategy should be. These are selectively

described below and indicate clearly the evolving nature of work in this field.

Review of Libraries in Higher Education – the Follett Report

The Follett Review of libraries in higher education was set up in 1992 and issued its report in December 1993 (HEFCE, 1993). The background and driving force behind the Review was high level concern across the newly unified higher education sector that university libraries were not able to cope with the pressures of a massively increased student population and that resource pressures on libraries continued to be particularly acute. Given this background to the review it was inevitable that its references to information strategies would be perceived to have a library orientation. In fact the recommendations of the report in this area are framed very broadly, and only in part can be seen as a context for reviewing the role of the library.

In the introduction (p.5) the report states that institutions 'need a sea change in the way they plan and provide for the information needs of those working within them'. The report recommends that each institution should develop an information strategy setting out how it proposes to meet the needs of those working within it (para. 83–4), and the place of the library in meeting these needs. The report was concerned that frequently there was not a close link between institutional strategy and the planning for library and information service developments. The report specifically made a connection with the information systems strategy (*sic*) initiative proposed by JISC (para. 268) and recommended that an institutional information strategy 'should be sufficiently widely drawn' to encompass the JISC guidelines. Overlapping membership between the two committees facilitated this relationship. The report endorsed the funding councils' thinking that institutional strategies should be required to have a component dealing with library and related services,

based on the institutional information strategy, and a more integrated review of information resources.

The Follett Report also touches on information strategies and their relationship with convergence, although the report deliberately steered clear of being prescriptive in its organizational and managerial recommendations. It did, however, highlight the need for some convergence, at least in the sense of better integration of provision. The advantages of organizational convergence were suggested, namely that they might enable an integrated information strategy to develop. The importance of designating a senior person to be responsible for this area and to be involved in the high level management of the institution was stressed. Ultimately though, the report leaves it to institutions to decide which approach they wish to take (paras. 91–4).

The Follett Report has been an important influence in many ways in the development of information services and libraries over the past several years. It provided a timely focus on information as a strategic resource to be managed at a high level, it stressed the need for integration with the strategic plans of institutions, and it questioned organizational and management arrangements. All of this gave the information strategies initiative of JISC an additional high profile and helped to bring it to the attention of vice-chancellors and other senior decision makers in universities.

Strategic Information Systems Planning

The broad field of strategic information systems planning now has an enormous literature, but there was not a significant amount available on IS or information strategies in the public sector on which the JISC initiative could draw. There existed guidelines on IS and information management for government departments; most consultancies were using their own adopted formal methods for IS strategies in the corporate sector, and companies such as ICL were developing frameworks for IS strategy formulation. However, there was

a gap which needed to be filled to assist higher education institutions to develop their information strategies in their own particular settings. Universities were looking for advice on good practice, case studies and checklists of key questions that they needed to address. Feedback to the JISC suggested that institutions wanted non-prescriptive guidelines for practitioners and help in raising the awareness of vice-chancellors and pro-vice-chancellors of the importance of information strategies.

An early contributor to the JISC initiative was Michael Earl, one of two UK academics making major contributions to this field, the other being Galliers (1987, 1991). Earl's work (1989, 1990) and thinking was influential at this stage and his experience fed directly into a workshop for the community early in 1994, the third joint information services conference held at Stirling, at which it was apparent that most participants were grappling to conceptualize what an information strategy should be.

A useful starting point was his IT strategy triangle (Figure 2.1) which includes three dimensions of strategy: the IS strategy, owned by senior management, business and applications focused and linked closely to institutional priorities (the what of the strategy); the IT strategy, supply oriented, technically focussed architecture and infrastructure to support the performance and delivery of the IS functions (the how of the strategy); and the IM, information management strategy, the organizational and management aspects of the strategy (the wherefore of the strategy).

Taking this framework together with the Follett emphasis on information services (comprising the information content, information resource allocation, balancing the holding of information locally or accessing it remotely, the integration of information provision within course design and planning, the life cycle of information sources, and so on) begins to give a sense of the broad scope of what might generically emerge as an information strategy.

Earl warned against too strong a dependence on any 'off the shelf' formal methods for IS strategy planning. His own

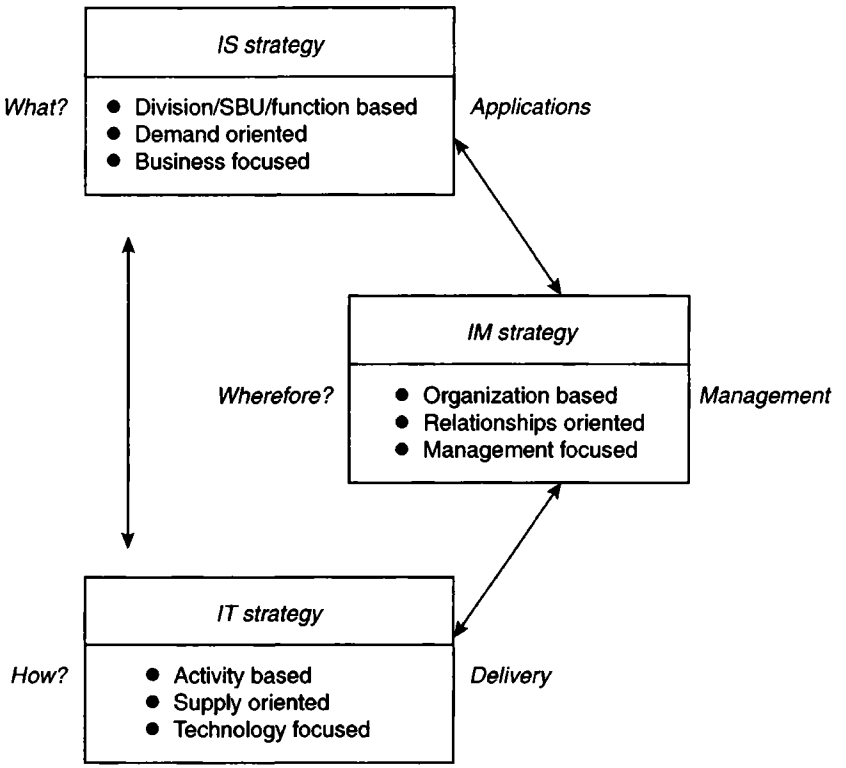

Figure 2.1 Three levels of strategy in IT
Diagram originally published in *Management Strategies for information technology*, Prentice Hall, 1989

research (Earl 1992) argued for a multiple methodology framework, showing that in practice no one method works in isolation. He proposed three types of approach: 'top down', in relation to any significant change in business strategy; 'bottom up', through audit and evaluation of current systems; and perhaps most significantly for universities, 'inside out' whereby innovation for IS comes from all parts of the organization involved in different processes and activities, and that many of the best applications of IT for competitive

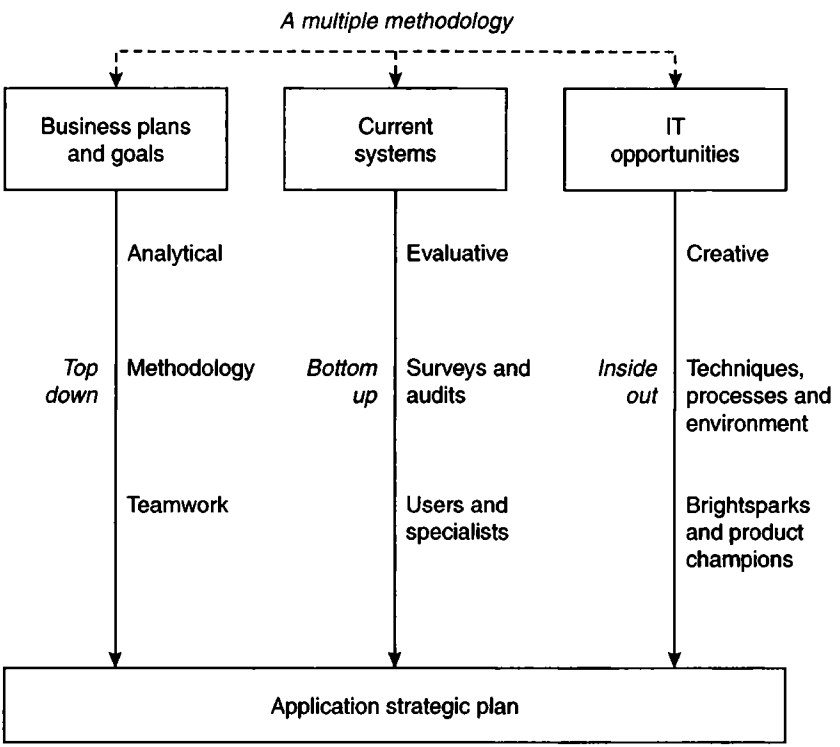

Figure 2.2 IS strategy formulation: a multiple methodology
Diagram originally published in *Management Strategies for information technology*, Prentice Hall, 1989

advantage are derived from the ideas and exploits of users within the organization.

His work also emphasizes the need to combine different approaches (Figure 2.2), which he terms business led, method driven, administrative, technological and organizational, recognizing the pros and cons of different approaches and the possibility of 'mixing and matching' them. This flexible and non-prescriptive approach seemed to have much to commend it in the context of higher education, and institutions early in to information strategies development commonly drew from Earl's work.

Information Policies and Information Analysis

Another early influence on the JISC initiative was the work of Orna (1990) on information policies. Her work on how to manage information flows in organizations brought a very different perspective from that of the strategic information systems planning writers: her focus is that of information resource management, with a more theoretical information science framework. Her key text on practical information policies defines their benefits: it explains how to set about developing a policy, based on an 'information audit'; it looks at the role of information professionals in developing and managing information policies; and it takes readers through the stages of introducing, implementing and monitoring the policy. It gives particular attention to the integration of information policy into key activities and objectives of the organization, the use of human resources, and technology to support an information policy.

She defines the scope of an enterprise information policy and provides strong pointers to the dangers of not having such a policy for information. Examples are cited:

- incomplete exploitation of information;
- implementation of office automation systems without due consideration of information handling concepts such as indexing and edition control;
- information products continuing well beyond their useful life or presented in entirely unhelpful formats;
- technical investments made without linkage to overall objectives.

Librarians will probably feel most comfortable with this approach and it takes little to extrapolate what might be appropriate roles for library and information professionals in this wider information policy development.

Orna introduces consideration of the tools of information audits and information mapping techniques. The conduct of a total or partial information audit can be a vital part of

information strategy development. She also usefully makes a link with others' work on information management (Burk and Horton, 1988) and work on the relationship between information technology and organizational change (Eason, 1986). A useful review article by Ellis *et al.* (1993) provides an assessment of a range of information audit, communication audit and information mapping techniques to support information strategy development.

Information Assets in the Corporate Sector

During 1995 an important report emerged from the private sector which reinforced the importance of the JISC information strategy initiative, by reflecting many shared concerns, albeit couched in the language of business. The Hawley Committee report (KPMG, 1995) was undertaken under the auspices of the KPMG IMPACT programme, a club of major organizations seeking to share experience in information management in its broadest sense. The committee sought to put together a set of guidelines for boards of directors on information as an asset, recognizing that all significant information in an organization, regardless of its purpose, should be properly identified even if not in an accounting sense, for consideration as an asset of the business.

It proposed that the board of directors should address its responsibilities for information assets in the same way as for other assets – e.g. property, plant. This implied a new approach to how information should be treated and requires a board to make clear to management what actions it wishes to be taken and who is responsible for action and compliance. The report sets out a checklist of actions that should be taken by the board in considering the proper direction and supervision of their information assets. Interestingly the report notes that whilst most boards feel comfortable with most subjects on their agenda – financial, marketing, personnel, business strategy – the area of information management is considered difficult. This problem is mirrored

in Dearing (NCIHE, 1997), which urges institutions to 'introduce managers who have both a deep understanding of C & IT [Communications and Information Technology] and its application to higher education, and senior management experience. There is a shortage of such individuals within higher education'. It does not take much imagination to see the relevance of this corporate approach to higher education.

JISC's Information Strategy Initiative

Throughout 1994 the JISC working group was building up a complex picture of the many possible approaches to an information strategy, primarily, but not solely, through the influences described above. Feedback on the Follett Report and informal contact in the sector suggested that guidance was seriously and urgently needed by the sector. The group tendered for this work and commissioned Coopers & Lybrand to assist with the development of guidelines for sites wishing to prepare information strategies. The first phase of the work, conducted in the early part of 1995, identified the generic functional activities in universities and outlined a possible framework for information strategy development.

Late in 1995 saw the production of more detailed guidelines for developing an information strategy (JISC, 1995). In the preface Professor Arbuthnott, Chair of JISC staked a claim for information as the lifeblood of higher education institutions, a key resource which needs managing as such and on a par with finance and human resources. The emphasis in the executive briefing is on flexibility of approach and the non-prescriptive nature of the guidelines. In the view of Coopers, 'the best way to think of an information strategy is as a set of attitudes rather than as a report' (p.9). This is indeed a far cry from formal methods-driven strategic information systems planning (SISP). The document spells out that an information strategy should embrace:

- 'teaching and learning materials (in all media);
- research information and data;
- the management information needed to plan and monitor the delivery of teaching, learning and research. Such information may or may not be held on computers and may or may not be found in libraries' (p.9).

The guidelines (Figure 2.3) contain pointers to the relationship between information strategies and IS and IT strategies. 'For the sake of clarity we define an information

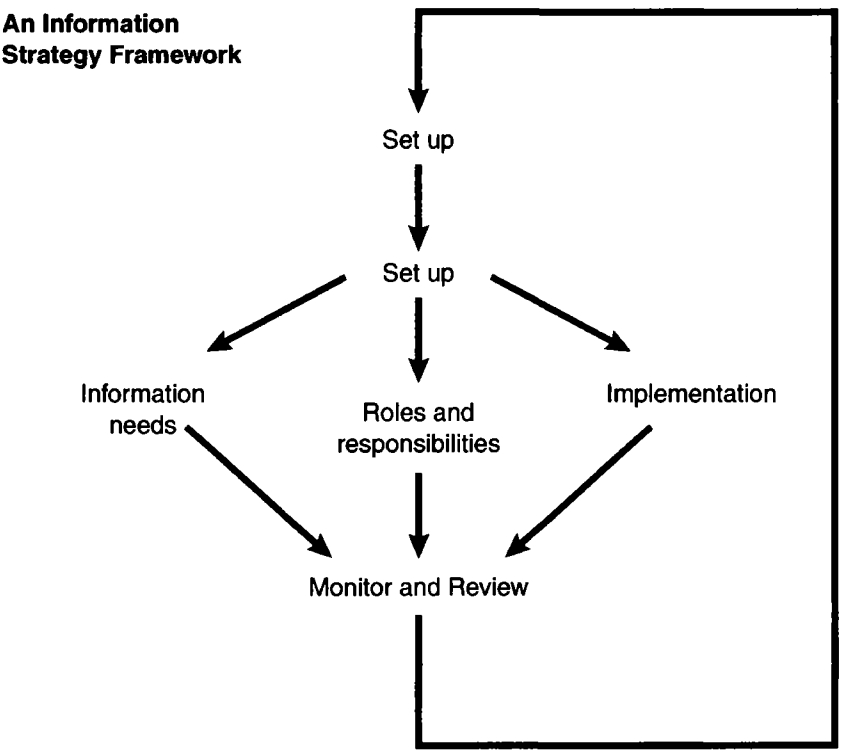

Figure 2.3 An information strategy framework
Diagram originally published in *Guidelines for developing an information strategy*, JISC, 1995

system strategy as the computer systems needed to support the information strategy; in turn, the information technology strategy defines the technical infrastructure covering standards, hardware and software, operating systems, networks and technical policies. This document and guide is not directly concerned either with information systems or with information technology' (p.14).

The practitioners' guide provides information on how to develop an information strategy through six main steps and is complemented by examples of tools and techniques to support its development and checklists of key points that institutions need to cover.

At one level this aims to be a very practical guide, yet at another level it is almost too high and broad really to focus institutional effort.

Guidelines into Practice

After the production of the guidelines the JISC working group moved swiftly to the next phase of the project and sought volunteer universities to pilot the guidelines, to provide feedback on their usefulness so that they might be revised and improved appropriately. Six pilot sites were selected, representing different types of universities, in a range of locations, and with very different sizes and missions. The institutions chosen were Bath College of Higher Education, Universities of Glamorgan, Glasgow, Hull, and North London, and Queen's University Belfast. They have benefited from the availability of some consultancy assistance, joint workshops to share experience, and the involvement of the information strategies coordinator, whose role it is to facilitate the sharing of good practice, both within the pilot sites and across the wider higher education community. A regular series of participant workshops were held through 1996.

Many lessons have been learned and there are significant issues emerging:

- pilots were slow in getting started as it often proved difficult to put resources in place;
- maintaining momentum has been difficult because of the extended timescale of the exercise and the often nebulous nature of the work;
- it is easy to get overwhelmed with the size of the task, and especially in very large universities with significant devolved responsibilities it has proved difficult to be focused and agree on priority activity;
- skills such as information auditing and mapping and project management are often lacking;
- an approach which uses exemplar projects has been found to be useful, but carries the danger of lack of integration;
- associated management of change, e.g. in processes, procedures and activities is critical, but often poses major challenges and is seen as threatening;
- it is encouraging if a few 'quick wins' can be identified and carried through;
- more centrally managed universities are finding it easier to establish a direct linkage between academic plans and information strategy.

Perhaps none of these points is surprising, nor that the process is both time consuming and resource intensive. After a major open conference held in November 1997 the pilot sites' experience was reviewed, and this led to a revision of the strategy guidelines and the framework. Revised guidelines with accompanying case studies were issued in Spring 1998 (JISC, 1998).

Other Activities

Meanwhile a significant and complementary set of activities has been under way at Sheffield University Department of Information Studies, particularly through the work of Professor T. Wilson and David Allen. In 1995 with the support of JISC, SCONUL and UCISA, Allen carried out a survey

through questionnaire of four major stakeholders in information strategy development – librarians, academics, chairs of IS/IT committees and directors of IT (Allen, 1995). The aim of the survey was to explore process, content and use of the two intertwined concepts of information strategies and IT strategies. For the purpose of the survey the information strategy was differentiated from the IT strategy and defined as 'a strategy evaluating information gathering, processing, storing or dissemination within your institution'.

He found that the majority of higher education institutions (HEIs) had or were currently developing information strategies, and were not on the whole just waiting for the JISC guidelines. The primary reason for this rapid uptake seems to be that the JISC initiative came at precisely the right time for many HEIs. The concept has been used by some as an internal political tool with which they can push information issues up the organizational agenda. There was common concern about the difficulties of resourcing the IT infrastructure needed to support exponentially growing demands. There was dissatisfaction with the IT centre in terms of service and IT resources, as well as dissatisfaction with management information provision.

In the light of a realistic assessment of likely resources and spiralling costs of information and IT there seemed to be a strong awareness of the need to reassess the information provided to user communities and the way in which it should be provided. At least half of the institutions surveyed perceived the information strategy as potentially changing radically or transforming the way in which their institutions operate. It was found that the process of information strategy formulation was being approached in a fairly consensual manner (more so than with previous IT strategies), with librarians and IT directors generally working well together during the process.

Sheffield University also hosted two conferences during 1996 on information strategies, the latter of which was reported in *Ariadne* (MacColl, 1996). From this report it is clear that there are mixed views on the value of information

strategies and different motivations for their development, including compliance with Funding Council instructions; as a convenient trigger for convergence of library and computing services, and so on. Some have questioned the value of information strategies as a tool for competitive advantage (Allen and Wilson, 1995). Most encouragingly Professor Gareth Roberts, Vice Chancellor of the University of Sheffield, and at that time Chair of the committee of vice-chancellors and principals (CVCP), stated that 'information is the foundation on which any strategic plan is based'.

Recent International Initiative

So far this chapter has concentrated on leading work in the UK higher education sector. However, early in 1997 the Coalition for Networked Information (CNI) in the USA issued a white paper entitled 'Institution-Wide Information Strategies' as a background to a proposed initiative in this area (CNI, 1997). The initiative aims to promote institution-wide strategies in several key areas of networked information resource and service development. The focus of this initiative is on information – its use, its users, and the strategic allocation of resources in support of networked information across an entire institution. Its definition of information strategies embraces IT resources and infrastructure, financial resources – budget, cost models and price structures, organization and human resources information policies and practices and strategic alignment of the information strategy to the mission and business strategy of the institution.

The view is taken that most organizations cannot address all the issues involved in a comprehensive, institution-wide strategy on their own, and what is proposed is a collaborative approach where participants work on a 'manageable piece of the challenge', to produce best practice case studies. Some examples of strategic information initiatives are suggested as follows:

- a user-centred design programme to integrate diverse information resources and tailor them to the needs of specific groups;
- an information policy programme to establish standard rules for information use, access, sharing, disclosure, protection, etc.;
- an electronic licence programme to negotiate and fund institution-wide agreements for acquiring digital content or widely-used commercial software;
- a collaborative user service programme which builds teams or other structures that cross a variety of organizational boundaries – library and technology, central and departmental – to support the use of information resources institution-wide.

The UK is participating in this initiative through the JISC information strategies coordinator and it is anticipated that the programme will enrich any further stages of the work on UK guidelines.

Implications of Dearing

In the immediate aftermath of the appearance of the Dearing Report (NCIHE, 1997), it would appear that information strategies have been given another significant boost in importance. Dearing uses the phrase 'Communications and Information Technology' (C & IT) widely through the report, especially in connection with teaching and learning, and reinforces many of the messages about information strategies that have been developed in the JISC initiative. Dearing recommends specifically that all higher education institutions in the UK should have in place overarching communications and information strategies by 1999/2000 (Recommendation 41). The Committee recognizes that its vision of the future in which a world market in learning materials based on educational technology will develop depends on the successful management of institutional change. The Committee

believes that 'the development and implementation of an integrated C & IT strategy will be one of the main challenges facing managers of higher education institutions' and is in itself a process for change.

Effective management through the development of information strategies and through programmes of training and support is seen to be at the heart of the effective use of C & IT in higher education. This is expressed diagrammatically in Figure 2.4:

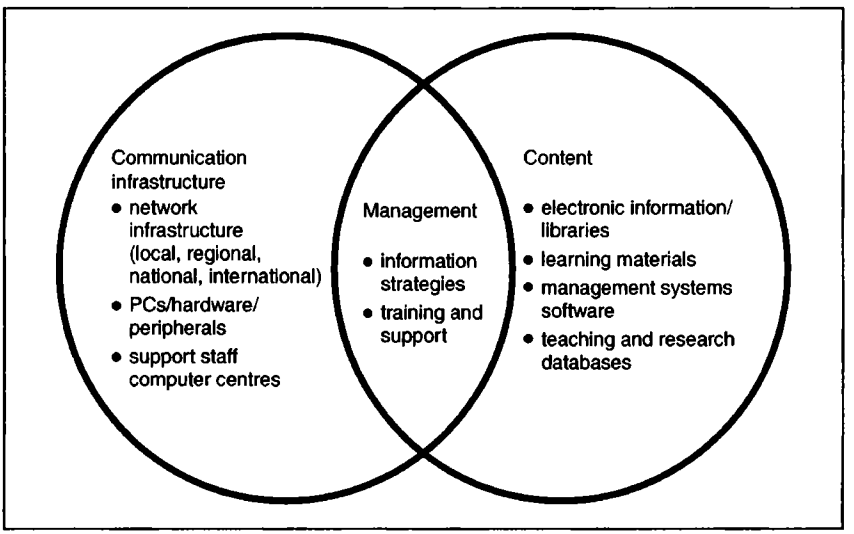

Figure 2.4 Effective use of communications and information technology in higher education
Diagram originally published in *Higher education in the learning society*, NCIHE, 1997

The scope of such a strategy is suggested as covering:

- information resources;
- the facilitation of staff/student communication;
- the development (purchase or production) of learning and teaching materials and other content;

- the development of effective management information systems in an integrated manner.

The current requirement of the funding bodies for institutions to have information strategies is suggested as a good basis for extension to all aspects of C & IT. This positive, almost ringing, endorsement of the importance of C & IT and information strategies is likely to be used to bring information issues to the fore in most universities.

Information Strategies and Managing the Electronic Library

This chapter has deliberately avoided attempting a precise definition of information strategies: by now it will be obvious that the concept is emerging and evolving constantly. However, in whatever form or interpretation it emerges within a particular university, it will be the context for electronic library developments (and indeed traditional library developments), and one within which they will need to be managed. The process of information strategy development within an HEI is thus extremely important for libraries. There are in addition opportunities for librarians to be key players in information strategy development, but in some institutions they are excluded or marginalized. There is no set pattern and much will depend on the political relationships within each individual institution.

What is clear is that the management of electronic library developments will require continuing engagement well beyond the boundaries of the traditional library. It requires the forging of new working relationships across campus, collaboration at many levels of the university, the imaginative application of library skills to non-library situations and an appreciation of the opportunities that are opened up for the library to play a leadership role – for example, in electronic publishing, in copyright management, and in content negotiation – well beyond traditional bibliographic and library confines.

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