The Concept of Collection Development in the Digital World

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The concept of collection development is central to the professional practice of librarianship as the whole notion of a library is fundamentally associated with the idea of a collection, to the extent that the words 'library' and 'collection' are almost synonymous. Other terms such as 'information centre' 'learning centre' or 'discovery centre' are often used now instead of 'library' and terms such as 'information resources' may be substituted for 'library collections', but the activities and processes traditionally associated with collection development are still essential to the effective functioning of contemporary library, information, learning and knowledge services, even though they may look and feel quite different to their historical counterparts. Our concern here is to explore the concept of *collection development* in the digital library and information environment and in particular to examine how thinking and practice in this vital area of library and information management have developed and changed in response to advances in digital technologies. What are the similarities and differences between collection development yesterday and today? Investigating such questions should help to prepare us for dealing with the collections of tomorrow.

The chapter therefore starts by examining a few definitions of the library as a collection to demonstrate the centrality of collection development to library and information professionals. It moves on next to the more problematic issue of collection development as a concept, showing how professional discourse on the subject has suffered from confused terminology. It then uses a convenient four-phase framework to review the impact of information and communication technology (ICT) on libraries, concentrating on effects on collections and their development. The final part of the chapter returns to academic and practitioner conceptions of collection development in digital environments, concluding with a set of questions for reflection on the future of collection development.

The library as a collection

Dictionaries, glossaries, encyclopedias and other reference works within and beyond our professional field generally define a library primarily as a collection (of books and other materials) and rarely mention services in their definitions, or only as a supporting element. The focus on the collection as the defining characteristic of a library has continued into the digital age. Thus the continually updated *Online Dictionary for Library and Information Science* (Reitz, 2010) defines a library as

> "A *collection* or group of collections of books and/or other print or nonprint materials organized and maintained for use (reading, consultation, study, research, etc.)."

and then elaborates the definition by explaining that

> "Institutional libraries, organized to facilitate access by a specific clientele, are staffed by librarians and other personnel trained to provide *services* to meet user needs."

Reitz's (2010) updated online definition quoted above adds 'print or nonprint' to the definition in the printed version of her dictionary (Reitz, 2004, p. 404) but in other respects echoes similar descriptions found in *Harrod's Librarians' Glossary and Reference Book* and the *International Encyclopedia of Information and Library Science,* which respectively define a library as "A collection of books and other literary material kept for reading, study and

consultation" (Prytherch, 2005, p. 416) and "A collection of materials organized for use" (McGarry, 2003, p. 371).

The ALA Glossary of Library and Information Science offers an older but more comprehensive definition of a library that links the important dimension of 'access' to the library and its collection:

> "A collection of materials organized to provide physical, bibliographic, and intellectual *access* to a target group, with a staff that is trained to provide services and programs related to the information needs of the target group." (Young, 1983, p. 131).

Another later ALA publication offers a more modern conception of a library that interprets access as explicitly including materials in *other* collections:

> "Libraries and information centers contain bibliographic materials, provide access to such materials, and supply services derived from those materials. These services are usually not based solely on materials actually present in a library's collection, but increasingly are enriched by access to materials in other collections." (Soper *et al.,* 1990, p. 65).

From the same period, Buckland (1989, p. 220) provides a usefully concise definition of 'collections' as "selections of materials deployed logistically to facilitate access to those materials for particular groups of users", which shifts the emphasis slightly by suggesting that collections are really a *means* to an *end*, rather than an end in themselves.

An essay by McGarry (2003) also highlights access as a key dimension of libraries, distinguishing between 'passive access', 'mediated access' and 'transitive access', representing different points on the service continuum, from making stock available to borrowers, through matching individual needs with materials, to reaching out directly to particular groups with special collections and services. McGarry (2003) discusses how libraries have evolved from historical times to the modern world and deals with the issue of whether advances in information and communication technology (ICT) and particularly the development of the World Wide Web have made the term 'library' redundant as a result of printed research material (such as books and journals) being replaced by electronic equivalents. Libraries as "book storehouses of the past" may be seen as irrelevant as "access to a universal virtual library, symbolized by and currently embodied in the Web, becomes a reality" (McGarry, 2003, p. 374).

However, McGarry (2003, p. 37) concludes that the concept of the library as "an organized and accessible collection of information resources…remains central to human activity". Similarly, the activities associated with creating organized and accessible collections remain central to the work of library and information professionals in all sectors, but how they are carried out and how they are conceived have changed significantly as digital technologies have transformed the information resources that are the focus of such efforts.

The concept of collection development

Collection development and the related term 'collection management' have been defined and described in different ways by academics and practitioners in the field over the years. Despite the confusions and ambiguities evident in the literature, we can identify several recurring themes. Collection development is particularly associated with the selection and/or acquisition of library materials (which can also include the 'de-selection' or 'de-acquisition' of stock), while *collection management* is generally seen as a broader term covering the whole

range of activities involved in managing access to information resources. However, there is confusion over the relationship between the terms: a few authors see the two concepts as related, but distinct; some see collection management as a broader term that includes collection development and many take this argument further and assert that collection development has simply been replaced by collection management, whereas others simply view the terms as interchangeable.

Hendrik Edelman's seminal paper of 1979 is widely cited in the literature and a good starting point for discussion. He notes that in the US book selection in academic libraries had been a neglected subject in the literature, particularly when compared to the literature on book selection in public libraries. He explains the relationship between 'collection development', 'selection' and 'acquisition' as a hierarchy and defines *collection development* as follows:

> "Collection development is a planning function. A collection development plan or policy describes the short- and long-term goals of the library as far as the collections are concerned, taking them into account and correlating them with the environmental aspects such as audience demand, need, and expectation, the information world, fiscal plans, and the history of the collections. From the collection development plan flows the budget allocation in broad terms."
> (Edelman, 1979, p. 34)

Edelman (1979) explains that *selection* is the next level, which implements the goals of collection development, using pre-defined criteria and methods; and *acquisition* then implements the decisions of selection and gets the material into the library. He also notes that the three levels naturally interact and may overlap. Gorman and Howes's book of 1989 provides a similarly clear and logical interpretation, complementing Edelman's (1979) triad by explaining the relationship in terms of the questions each process is intended to answer:

> "In the hierarchy of [collection development] policy → selection → acquisitions, three questions are asked and answered in a sequence: why? what? how?"
> (Gorman and Howes, 1989, p. 28).

Table 1 summarises this initial conception of the field, bringing together Edelman's (1979) and Gorman and Howes's (1989) points and relating them to levels of strategic thinking.

Table 1. The collection development hierarchy

Collection process	Relevant question	Management level
Collection development	Why?	Strategy
Selection	What?	Tactics
Acquisition	How?	Operations

As indicated above, the library environment has become more complex in recent decades, which has affected professional thinking on collection development and resulted in terminological problems. The following examples illustrate the divergence of opinion on the subject, drawing on professional glossaries, practitioner ideas and academic commentary. Fuller discussion of the relationship between collection development and collection management is provided by Ameen's (2006) review.

Prytherch (2005, p. 151) defines collection development as

> "The process of planning a stock acquisition programme not simply to cater for immediate needs, but to build a coherent and reliable collection over a number of years, to meet the objectives of a service."

Others, such as Reitz (2004, 2010) and Young (1983) expand the concept to include as explicit elements the assessment of needs (arguably implicit in Prytherch's description), planning for resource-sharing and also de-selection or weeding of material. Young (1983) also includes the maintenance of collections (binding, mending, repairing and conversion of materials) as part of collection development, whereas Prytherch (2005, p. 152) sees maintenance as part of collection management, which he defines as

> "The organization and maintenance of library stock, starting from collection development principles, keeping the needs of users a priority and considering alternative means of document and information supply to supplement local holdings."

Prytherch (2005) thus presents collection development as a more *strategic* activity, that is *operationalised* through the collection management function. In contrast, Young (1983, p. 50) has an unusually narrow and specific view of collection management as "the application of quantitative techniques (statistical analyses, cost-benefit studies, etc) in collection development", but this particular interpretation is not widely shared.

More typical is the widely-cited definition provided by Cogswell (1987, p. 269) that describes collection management as

> "the systematic management of the planning, composition, funding, evaluation and use of library collections over extended periods of time, in order to meet specific institutional objectives".

Writing in the academic library context, Cogswell (1987) cites the need to expand how we think about collection activities beyond selection and acquisition to access (in the form of resource-sharing), maintenance and preservation as an argument for *replacing* the word 'development' with 'management' when describing the collections process in a library. His conception of collection management includes *both* operational and strategic aspects of the process and he identifies eight functions that constitute this process:

- planning and policy making
- collection analysis
- materials selection
- collection maintenance
- fiscal management
- user liaison
- resource sharing
- programme evaluation.

Cogswell (1987, p. 269) goes on to argue that collection management "must be recognised as a program which pervades all areas of the library and which is rightly the concern of every academic library professional", thus placing collection management at the heart of professional practice. The breadth of Cogswell's (1987) conception of collection management is shown by the activities that he proposes for the user liaison function of collection management, which include bibliographic instruction, online searching and reference service. However, in practice, although all these activities are clearly collection-based, they are not generally seen now as part of the collection management process, but as significant *services* provided by libraries.

Others also see collection management as a concept that has evolved from and replaced collection development, i.e. as a mature version of an earlier concept, though not necessarily as broadly conceived as Cogswell (1987). Thus Soper *et al.* (1990, p. 66) state:

> "The concept of collection development, or materials acquisition, has been evolving recently to that of collection control, or collection management. This concept encompasses the design of a process for selecting bibliographic materials to meet a library's needs, goals, objectives, and priorities… Collection management also includes the processes of making materials accessible and of analyzing materials to see if they meet the goals and objectives of a library and its users"

G.E. Gorman (2003) similarly emphasizes selection and acquisition, collection planning and collection building, as the focus of collection development, but also mentions all the activities identified by Young (1983) under this heading, such as maintenance and weeding. It is not completely clear where Gorman (2003) sees the boundaries between collection development and collection management here: he notes that the two terms are sometimes used synonymously, but argues on the one hand that collection development is "a specific *subset* of the broader activity of collection management" and on the other hand that collection management "has *replaced* the narrower 'collection building' and 'collection development' of former decades" (Gorman, 2003, p. 81). He stresses that collection management is a more comprehensive term, "covering resource allocation, technical processing, preservation and storage, weeding and discarding of stock, and the monitoring and encouragement of collection use". Elsewhere, he links a growing preference for the latter term not only with a broader scope, which also includes systems development and new technology, but also with a paradigm shift, "from discrete institutional collections to a wider library world" in the networked environment (Gorman, 1997, p. x).

However, researchers and practitioners continue to use the term collection development and the argument for replacing it with collection management is inconclusive; practitioners generally differentiate staff *development* from staff *management,* so there is no reason why we should not continue to differentiate developmental and managerial aspects of our work with collections.

The impact of information technology

The impact of digital technologies on collection development is multi-faceted and can be traced back over five decades. Libraries were typically early adopters of computer systems within their organisations in the 1960s and they have continued to fulfil a leadership role with their development of access to networked resources and Web-based services in the 1990s and into the 21st century. Information and communications technology (ICT) has affected the development and management of collections operationally, tactically and strategically. Economic factors, political initiatives and social trends have also influenced the take-up of new technologies and affected how, when and where such developments have taken place. The next section briefly reviews key themes in the history of library exploitation of computers/ICT in relation to other environmental influences to show how conceptions of collection development have evolved in the shift towards an increasingly digital world.

The three phases identified by Lynch (2000) in his survey of 40 years of library automation are used here as a convenient framework for the period up to the end the 20th century, together with an additional fourth phase taking us into the first decade of the 21st century.

Lynch (2000) identifies a significant shift in library use of ICT during the period under review, which he characterises as moving from the *modernisation* achieved by *automation* of library routines, through *innovation* accomplished by *experimentation* with new capabilities (such as end-user self-service access to electronic information resources), to the *transformation* represented by the *digitisation* of library materials (including both the conversion to digital formats of existing stock and the routine acquisition of new content as electronic media). With the benefit of hindsight, Lynch's third phase has been relabelled here as a period of *transition,* on the basis that the transformation did not really take place until a critical mass of digital content was not only available, but also accessible, to the majority of libraries, which arguably did not occur – at least in the UK – until the new century.

This shift from collections as predominantly print-based materials to collections as increasingly electronically-delivered content has not only radically changed the character of the materials collected by the library, but has also fundamentally altered the nature of the library itself and raised strategic questions about the boundaries of both services and collections. The switch from local collections to networked information has accelerated in the 21st century with the emergence of Web 2.0 technologies that are particularly associated with social media and notions of user-generated content that have opened up more options for libraries and highlighted their role in not just supporting users but building communities. This latest phase emphasises *personalisation* and *socialisation* of services and resources through collaboration both with other service providers and especially with service users. Table 2 summarises the key themes discussed in the sub-sections that follow.

Table 2. Digital technology developments and collection development issues

	Digital technology developments	*Collection development issues*
late 1960s-1970s	automation, modernisation, computer-based operations	library housekeeping, bibliographic utlities, COM catalogues, retrospective conversion, microform masters, self-renewing/no-growth library
1980s-early 1990s	experimentation, innovation, computer-based services	library management, Conspectus methodology, OPACs, access versus holdings/ownership, end-user searching, just-in-time information
late 1980s-1990s	digitisation, transition, computer-based content	integrated systems, licensing consortia, full-text databases, multimedia products, resource discovery, virtual/digital/hybrid library
2000s-	collaboration, transformation, network-based collections	ERM systems, federated search, open access, institutional repositories, digital asset management, data curation

Modernisation – computer-based operations

In the late 1960s and early 1970s, libraries introduced computers to improve the efficiency of day-to-day operations, particularly circulation and cataloguing, although other areas of work were also affected with the availability of dial-up access for mediated searching of abstracting and indexing databases. The description of early library automation systems as library *housekeeping* systems underlines their perceived operational role. Shared cataloguing systems were a key development during this time. In the late 1960s the Library of Congress started to make its catalogue records available in machine-readable form to both individual libraries and library co-operatives/bibliographic utilities. As a prominent example of the latter, the Ohio College Library Center (OCLC, later the Online Computer Library Center) was formed in 1967 with a primary goal "to develop a computerized sharable

on-line bibliographic data base to increase productivity and decrease the costs of processing for its members" (Trochim, 1982, p. 2). Libraries were thus able to obtain catalogue cards from external databases for local use, instead of producing them in-house.

Access to bibliographic data from other institutions also supported retrospective conversion of library catalogue records to machine-readable form and in addition facilitated resource-sharing through interlibrary lending. This was especially important in view of the exponential growth in published output that occurred during the 1960s and raised awareness of the need for interlibrary co-operation in relation to collection development (Kohl, 2003). The computer-based catalogues that gradually replaced card catalogues were typically computer-output microform (COM) using microfilm cassettes or microfiches. Microfilm was an important medium for libraries during this period as it was seen as a cost-effective format for specialist material and official publications, as well as forming the basis of institutional and national strategies for the preservation of library collections, which became recognised as a major concern during the 1960s and 1970s because of the embrittlement of acid-based paper introduced in the 19th century (Kohl, 2003). A *National Register of Microform Masters* was established by the Library of Congress in 1965 and served as the model for other countries.

Several commentators identify the 1960s and 1970s as the period when the term 'collection development' started to be widely used and the area of work became recognised as a professional specialism, citing the launch of journals such as *Collection Management* (1976), *Library Acquisitions: Practice and Theory* (1977) and *Collection Building* (1978) as evidence, and the complexity of the task in a world of increasing publication and diverse formats but steady budgets as justification for moving beyond the selection of materials to the development of collections in other ways, including resource-sharing (Johnson, 2004; Kohl, 2003). Another key factor influencing thinking during this period was the costs of the space and buildings needed to house library collections. The University Grants Committee in the UK took a firm line on this issue in a seminal publication known as the Atkinson report (University Grants Committee, 1976), which proposed the concept of the 'self-renewing library' in which new acquisitions would be offset by the equivalent volume of withdrawals.

The concept of the 'self-renewing', 'no growth' or 'steady-state' library was highly controversial and it was widely discussed by university librarians in the US, UK and Australia at conferences and in the literature in the late 1970s; the books edited by Gore (1975) and Steele (1978) are prime examples. Critics argued that the concept was based on flawed assumptions, namely that knowledge becomes outdated at the same rate as it is created, that future use of publications can be accurately predicted and that scholars seek material as isolated elements rather than in relation to other work; more specifically, they contrasted the typical linear sequence of bibliographical research in natural sciences with the less predictable process of humanities research, likened to an "ever-widening ring of references, citations, leads and discoveries" (Dowd, 1989, p. 67). It is important to note here that these arguments relate particularly to *research* libraries: smaller academic (university and college) libraries, school, public and many special libraries have generally operated on the basis of regular de-selection of items, recognising that withdrawal of out-of-date or little-used material improves the quality of a collection and makes it easier for users to find relevant material.

Innovation – computer-based services

The 1980s and early 1990s coincided with growth in the use of the Internet, personal computers and email. Libraries migrated to more sophisticated modular-based library *management* systems covering a wider range of functions, including interlibrary loans (ILL) alongside the now commonplace modules for acquisitions, cataloguing, circulation and

serials, although separate systems were often used for ILL. The key development at this time was end-user or public-access computing, represented by online public access catalogues (OPACs) and databases designed for end-user searching. Coupled with developments in local and wide area networking, the former enabled networked access to individual library and consortial union catalogues; the latter were initially accessed via dedicated customised computer workstations or CD-ROMs loaded on individual machines or networked across the organisation. Self-service searching involved a substantial change in professional work from conducting searches for clients to training users as searchers and had a significant impact on the instructional role of library and information services, leading to the development of purpose-designed computer-based training suites, in addition to the installation of many more individual workstations and computer clusters in libraries.

Access and specifically the concept of access to information and knowledge resources as an alternative strategy to *ownership* of library materials emerged as a critical issue in collection development in the early 1990s. The shift from ownership to access has also been likened to moving from a 'just-in-case' to a 'just-in-time' model of information provision. In practical terms, in the 1990s, this generally meant relying less on acquisition of stock and more on interlibrary loans or document supply. Writing from an American perspective, Brin and Cochran (1994) note that such discussion can be traced back to the 1970s, but became the subject of many more articles from 1989 onwards, citing papers offering general overviews and particular viewpoints, as well as treatment of specific aspects or reference to the concept while discussing other issues. In the UK, published case studies indicate that the debate was often described as access versus *holdings*, rather than ownership (Baker, 1992; Corrall, 1993), but the issues were the same; Crawford and Gorman (1995, p. 133) also use the phrase "access vs. *collection*", arguing strongly that the discussion should not be about access *versus* collection, but about finding the right balance between access *and* collection.

The antecedents here obviously included the zero-growth self-renewing library recommended by the Atkinson report cited above (University Grants Committee, 1976), but additional impetus came from another UK government body, the Library and Information Services Council for England (LISC), which issued three seminal reports on the future development of library and information services during the 1980s, covering all sectors (not just universities). The LISC FD2 report, *Working Together within a National Framework* (Department of Education and Science, 1982)*,* is significant as one of the first explicit attempts to articulate a strategy enabling libraries to fulfil their respective roles against a backdrop of severe financial constraints and proliferating information resources. The report concluded that:

> "libraries and information services should move more purposefully from a mainly 'holdings' strategy requiring the accumulation of large stocks towards a mainly 'access' strategy in which emphasis is placed on the efficient procurement of material and information as required... Emphasis needs to be placed on obtaining, from whatever source, quick and accurate answers to today's questions, using printed, electronic or other media or personal contacts as circumstances demand" (Department of Education and Science, 1982: p. 25).

FD2 explicitly links the access model with technological developments, anticipating that the development of databases combining bibliographic citations with the full text of articles and electronically-mediated document delivery services would facilitate a rebalancing between the traditional storehouse role of the library and its newer 'gateway' role. The case studies from the universities of Arizona, Aston and East Anglia all identify rising literature prices and

inadequate library budgets as key drivers and technology as a critical enabler of the access strategies described (Baker, 1992; Brin and Cochran, 1994; Corrall, 1993).

Another significant contribution to the access movement during this period was the development by the US-based Research Libraries Group of the Conspectus methodology for collection evaluation. Designed to support collaborative collection development and resource-sharing (particularly interlending), the tool was intended to provide a composite picture of existing collection strengths and current collecting intensities arranged by Library of Congress subject fields, using a numerical scale ranging from 0 (= out of scope) to 5 (= comprehensive collection). Predicated on the notion that "all libraries are linked in a great chain of access" (Stam, 1983, p. 21), the methodology was adopted not only in North America, but also in the UK (Matheson, 1989) and Australia (Henty, 1991), although take-up in the UK was patchy, with better coverage of Scotland and Wales than England (apart from the British Library). However, although conceptually attractive and potentially useful as a local management tool, the cost-effectiveness of Conspectus was a concern and its value in supporting collaborative collection building and resource-sharing became questionable with the widespread availability of library catalogues on the Web (Clayton and Gorman, 2002)

Transition – computer-based content

Overlapping with the phase above, in the late 1980s and particularly from the early 1990s, electronic library services progressed from citation databases to full-text content. Early examples included electronic versions of traditional print reference works provided on CD-ROMs, such as the *Encyclopedia Britannica,* in addition to new electronic resources that had no printed counterparts, notably *Encarta,* a digital multimedia encyclopedia produced by Microsoft from 1993 (initially on CD-ROM, but later as a Web-based product and in DVD format). The real breakthrough came with full-text primary material in digital form, such as the historic literature collections launched by Chadwyck-Healey (e.g. the *English Poetry Full-Text Database* launched in 1992) and full-text electronic journals, which had a lengthy gestation period experimenting with different formats and by the mid-1990s were available variously as online pay-as-you-go titles on a cost-per-access basis, CD-ROM document delivery systems and networked e-journals, the last category amounting to only around 100 titles by the mid-1990s (McKnight, 1993; Woodward and McKnight, 1995).

Another key development during this period was national, university and public library involvement in the digitization of their own holdings for both access and preservation purposes, typically special collections and often facilitated by external project funding; the Library of Virginia's Digital Library Project included records, correspondence, newspapers and photographs (Roderick *et al.,* 1997). In the UK, the Electronic Libraries (eLib) Programme was launched in 1994 as a result of the Follett report from the Higher Education Funding Councils Libraries Review Group (JFCLRG, 1993). This was a massive development programme, representing a significant investment of public funding in innovation for academic libraries: the first two of the three phases cost £15 million and the projects extended well beyond digitization, with programme strands also covering access to network resources, digital preservation, electronic document delivery, electronic journals, electronic short loan projects, images, large scale resource discovery, on-demand publishing, pre-prints, quality assurance, supporting studies, training and awareness (eLib, 2001; Rusbridge, 1998). The first usage of the term 'hybrid library' is generally attributed to Chris Rusbridge, Director of the eLib programme, who explained that

> "The name hybrid library is intended to reflect the transitional state of the library, which today can neither be fully print nor fully digital" (Rusbridge (1998).

The hybrid library strand of the programme aimed to integrate technologies, systems, resources and services, including access to 'legacy' print materials, 'transition' (digitized legacy) resources and new (born-digital) resources, such as e-journals, e-books, databases and datasets in many formats (bibliographic, full-text, image, vector/map, audio/video, statistical and numerical). eLib contrasted with the US Digital Libraries Initiative which was mainly a computer science *research* programme, in contrast to the UK library service *development* programme (Rusbridge, 1998). There were other important national and international collaborative developments: in the UK, the Higher Education Digitisation Service (HEDS) was set up as a result of eLib (Tanner, 1997); in the US, the JSTOR organization was formed in 1995 to digitize journal backruns and the National Digital Library of Theses and Dissertations (now the Networked Digital Library of Theses and Dissertations) was established in 1996 at Virginia Tech University (Kohl, 2003).

New commercial document delivery services such as EBSCOdoc, Faxon Finder and UnCover also emerged in the 1990s, supporting the shift from holdings to access as a solution to periodical price inflation and library budget cuts: some offerings were marketed as combined Current Awareness Services with Individual Article Supply, known as CASIAS products (Brunskill, 1997; Kohl, 2003). As the volume of full-text electronic content increased, web-based collections or *aggregations* of electronic resources began to appear as an alternative to title-by-tile subscription; such resources included sets of journals, conference proceedings, data files and government publications, grouped by publisher, function or topic, adding to the growing complexity of the information landscape for libraries and preparing the ground for the much larger 'bundles' of titles that eventually arrived, known generally as 'big deals' and usually acquired through licences, which were increasingly negotiated through regional consortia or national initiatives (Bley, 1998; Kohl, 2003; Roberts *et al.,* 2004; Walters *et al.,* 1998).

Investment in UK public libraries came later, but was equally significant: the People's Network was a £170 million project to create ICT learning centres in all 4,300 service points, funded through the government's New Opportunities Fund (NOF). The public library initiative was intended to complement programmes already under way in higher and further education, the health sector (the National Electronic Library for Health) and the central government UKOnline portal (Woodhouse, 2001). A substantial part of the funding (£50 million) was allocated to the NOF-*digitise* programme, launched in 1999, which awarded 154 grants, ranging from £14,000 to £4 million, to 37 consortia (including partnerships with national and university libraries) and 34 individual projects, to produce

> "a digital learning materials foundry of well over 1 million images, tens of thousands of audio and video clips, innumerable pages of text and many hundreds of new learning packages on topics as diverse as biscuits, voluntary work, migration, biodiversity, football, contemporary art, music and photography, reading, etc" (Woodhouse, 2001).

Transformation – network-based collections

The proliferation of licensed electronic content, especially e-journals, led at the start of the decade to the development of *electronic resource* management systems (ERMS) to automate and streamline the processing of acquisitions by library staff and the presentation of content to library users, in many cases replacing the labour-intensive compilation of title-by-title listings on library web pages, which in some institutions were duplicated in their OPAC. The growing complexity of the library systems marketplace is shown by the different providers of such systems, which included individual libraries, library consortia, library

systems vendors and subscription agents/aggregators (Collins, 2008). Other systems that libraries might be using now to manage access to digital content – in addition to their existing *integrated* library system – include a digital object or digital asset management system (DOMS or DAMS) for locally-produced content, an information retrieval portal or federated search engine for cross-searching of databases (Hakala, 2004) and a virtual learning environment (VLE, also known as a learning or course management system), typically used by academic libraries to manage access to electronic course readings or 'e-reserves' and to information literacy tutorials (Black, 2008).

VLEs offer the potential to personalise the delivery of electronic information resources to users as academic staff and students can automatically be given access to the courses, modules or units for which they are registered, together with the resources associated with the course, such as digitised versions of key texts and subject-specific electronic resource guides with links to relevant web sites. However, they have created challenges for libraries, as access to the course web sites within VLEs is generally controlled by academic staff, who do not always recognise the need to integrate library resources with their teaching materials and in some cases have developed their own collections of electronic resources for students, in effect setting up mini online departmental libraries, often without checking the copyright position; in many cases, librarians have carried on delivering course-related material via separate web sites because they have not been given access to the VLE system (Corrall and Keates, 2011; MacColl, 2001).

The 'open access' movement to widen access to scholarship became a significant driving force during this period, manifested in new campaigning organisations and several formal declarations of commitment. Driven by the continuing escalation of journal subscription costs, the movement was also a natural evolution from open source software and reflected the frustrations around access to information having become more restricted at a time when the Web was opening up resources in other areas. According to Suber (2003, p. 92),

> "Open-access literature is defined by two essential properties. First, it is free of charge to everyone. Second, the copyright holder has consented in advance to unrestricted reading, downloading, copying, sharing, storing, printing, searching, linking, and crawling."

The two main strategies used to achieve open access are for researchers – or others working on their behalf, such as librarians – to deposit or 'self-archive' their outputs in individual, discipline-based, institutional, consortial or national repositories (Peters, 2002) and for publishers to create 'open-access journals', based on alternatives to the traditional subscription-based model, for example by charging authors fees for publishing. The movement has been controversial and has generated a significant amount of literature on the issues arising, much of which predictably is freely available (*see* Bailey, 2010).

Institutional repositories have been defined as "digital collections capturing and preserving the intellectual output of a single or multi-university community" (Crow, 2002, p. 4) and libraries have typically taken a lead role in establishing and developing them, generally in collaboration with IT and other services (Rieh *et al.,* 2007). The term digital *asset* management is particularly associated with efforts to manage all the important digital content of an organisation or institution, moving significantly beyond the research outputs (e.g. journal articles, conference papers and doctoral theses) that are typically the starting-point for an institutional repository, to a broader range of material often with a focus on multimedia resources, including image, sound and video files, which could include not only teaching and learning materials, but also the workflows of scientific simulations, the data supporting

scholarly papers and recordings of research symposia, musical and theatrical performances, public lectures and talks (Hilton, 2003; Joint, 2009; Lynch, 2003).

Much of the library literature on institutional repositories has concentrated on the role of subject/reference/liaison librarians, but repository development and management is essentially a collection development and management issue, where existing policies and practices in areas such as content selection, metadata creation, access management and collection evaluation need to be applied or adapted in line with strategies established for redefining the scope of the collection to meet institutional needs in the digital environment (Connell and Cetwinski, 2010; Genoni, 2004). The next challenge here is dealing with data: many academic libraries are already taking responsibility for managing access to publicly-available numerical and geographical digital data sets, just as they used to acquire statistical series in hard copy; in addition, libraries are being encouraged to get involved with the management and curation of data generated by research projects within their institutions, by extending their repository services and engaging with virtual research environments (VREs) to facilitate the discovery, transfer, re-use and archiving of data (Hey and Hey, 2006; Voss and Procter, 2009; Walters, 2009).

Collection development in digital environments

Reflecting on the nature of librarianship in the 21st century, Michael Gorman (2000, pp. 10, 11) offers "a modern definition of the word 'collection'", which he presents as a quadruple configuration that includes:

- tangible objects (books, and so on) that the library owns
- local intangible (electronic) resources owned and controlled by the library (CD ROMs, and the like)
- tangible objects owned by other libraries, but accessible to local patrons by means of union catalogues and interlibrary lending schemes
- remote intangible resources not owned by the library but to which the library gives access.

The definition above incorporates several dichotomies: local and remote; owned and not owned, but accessible; tangible and intangible. An Association of Research Libraries Task Force also found that its members had "expanded the traditional view and definition of collections" (ARL, 2002, p. 8). In addition to the examples given by Gorman (2000), the ARL (2002, pp. 6, 8) report notes that "libraries are "engaging in digitizing and electronic publishing projects" and "taking responsibility for born-digital collections (such as geospatial or numeric data sets, faculty or class Web sites) and developing tools for their management and use". A more recent ARL report confirms growing involvement of libraries in data management, providing six detailed case studies as examples of emerging practice (Soehner *et al*., 2010). Other significant activities include "managing and servicing born-digital content that resides outside the domain of the library" (ARL, 2002, p. 6), through the development of knowledge management systems to preserve and make accessible the institution's intellectual capital; a notable example here is the Ohio State University Knowledge Bank (Branin, 2003).

The ARL (2002) report suggests that rather than being defined by ownership, future collections could simply be resources that the library *manages*, *services* or *preserves* on behalf of library users – regardless of their location (or content). The centre of gravity was shifting, with the focus of collection development moving from local to global resources, as envisaged by Billings (1996, p.4):

> "the local collection will evolve into one enhanced and extended by digital technologies and electronic information sources. Policies for managing – and sharing – national and global mega-collections will emerge from the construction of cooperative programs on a stage that far transcends concerns for building the local collection."

An international cross-sectoral survey of library collection managers similarly found that that digital information developments had made them "think differently about the meaning of collection development" and at a practical level had meant spending more time on consortia activities (Dorner, 2004, p. 272).

As Gorman (2000, p. 11) suggests, these conceptions of the collection could be modelled as a series of concentric circles "beginning with the 'traditional' collection of the local library" and expanding infinitely to include "all the recorded knowledge and information in the world". However, while it is easy to envisage this in general terms, it is harder to work out the most appropriate sequence for the particular elements identified; different groups of library and information users might have different views on what should be placed at the centre of the model, with most fiction readers and many humanities scholars seeing the first category as central to their needs, but natural scientists and business researchers placing electronic resources (irrespective of their location) at the centre of their information universe. Lee (2000) argues that collection developers/information professionals view collections in terms of levels of *control* (e.g. ownership, lease, interlibrary loan, referral elsewhere and no availability), but information users view them in terms of *access* (e.g. immediate access, delayed access and no access – or even only in terms of immediate access or no access).

Writing specifically about *collection development* in the 21st century, Gorman (2003a, p. 459) reconfigures his four-part conception into a hierarchy where he claims that "each level is less organized and harder to gain access to than its predecessor" as follows:

- locally owned physical documents
- physical documents owned by other libraries but available through ILL
- purchased or subscribed to electronic documents
- 'free' electronic documents.

The second part of his assertion is questionable, as electronic documents are often easier to access than physical documents, which may not be available at the time when the user wants them: e-reserves as electronic versions of book chapters and other recommended texts for students were developed precisely to solve the problem of many people trying to access the same texts at the same time; in addition, free electronic documents are often easier to access than purchased or subscribed documents, despite being less organized.

Another problem with Gorman's taxonomy is that it is not clear where physical documents held locally (i.e. within the organization or community to which the library belongs), but not owned by the library fit into the picture. Bell (1995, p. 181) points out that in a university environment, academic and other service departments often have collections of books and serials that "have developed and exist outside the library's financial, administrative, and physical structure", noting that initiatives such as campus-wide information polices have encouraged librarians to investigate their incorporation in their OPACs to maximise access and minimise duplicate purchases; she cites one example of an institutional vision of a system that would also includes researchers' personal collections of citations and departmental collections of slides and instruments, as well as print materials. Such resources can also be found in businesses, law firms, hospitals and other workplace environments, as well as in central and local government departments and agencies.

Building on her earlier work, Lee (2003) also proposes a concentric circles model of the information universe, but goes beyond Gorman's (2000, 2003a) conception by including researchers' personal collections in her model, which is based on interviews with academic staff and aims to reflect users' perspectives on the information environment supporting their research and teaching. Her model has three layers characterised as the 'immediate space', 'adjunct space' and 'outside space' and is interesting in including an aggregation of personal physical collections, personal digital resources and library electronic resources in the centre, while relegating the library's physical resources to the middle circle. Figure 1 adapts and extends Lee's (2003, p. 432) "structure of users' information spaces" by including the 'informal collections' discussed by Bell (1995), renaming the adjunct space as *intermediate* space and introducing a few additional items to the 'immediate space' to provide a more comprehensive picture of the contemporary information environment.
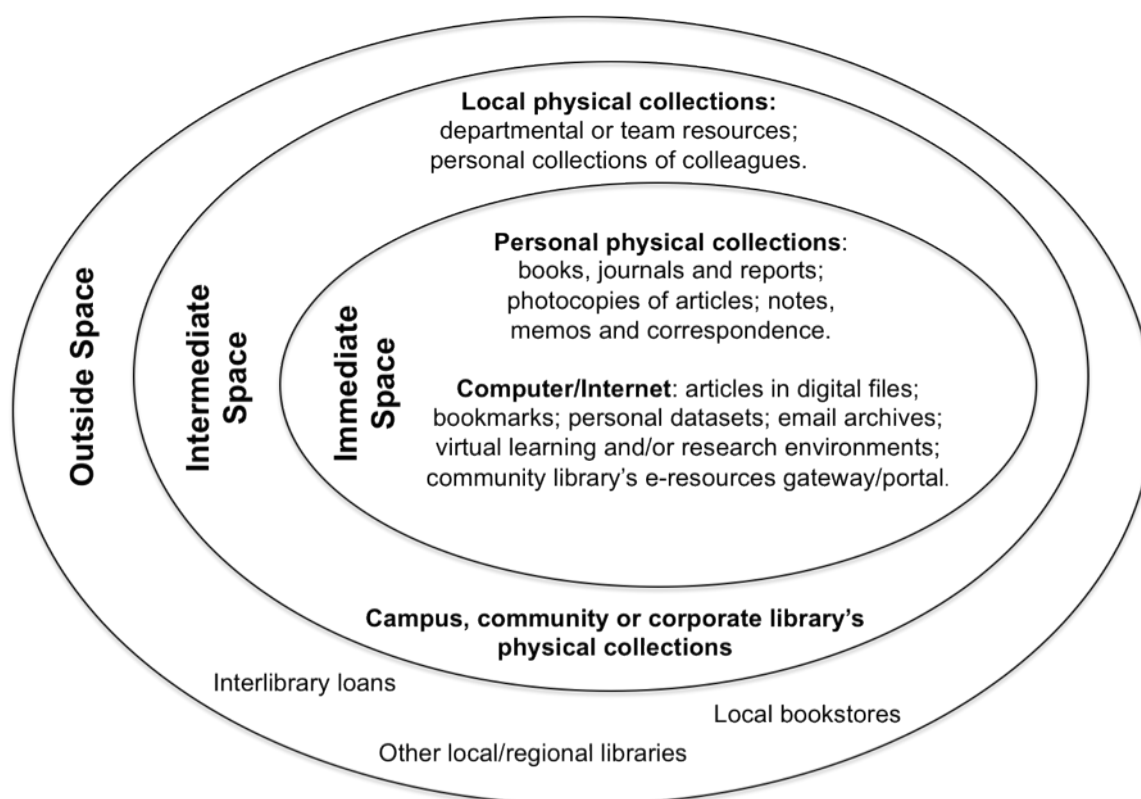

Figure 1. A user-centric view of library/information collections (adapted from Lee, 2003)

The implications for collection development

Conceptual models such as Gorman's (2000, 2003a) and Lee's (2003) provide useful frameworks for thinking about information resources and collections, but cannot adequately capture the complexity of the contemporary information universe. In addition to electronic versions of traditional library materials, such as text books and reference works, newspapers and periodicals, theses and dissertations, archives and manuscripts, maps and photographs, music and film, there are web-based information resources with no direct print equivalents, including listservs (email discussion lists) and chatrooms, blogs and wikis, where the content is not only *dynamic*, because it is being continually edited, revised and supplemented, but also *user-generated,* as people engage in continuous role-switching between information user and information producer. Previously distinct roles in the information supply chain have converged and diversified with individuals and institutions

acting as publishers through their websites and periodicals subscription agents becoming library systems suppliers; in addition, many academic libraries have become publishers of scholarly monographs, conference proceedings and peer-reviewed journals (Kahn, 2008).

Collection development in the current environment still needs to fulfil its established functions in relation to traditional materials, but practice has also had to respond to the new information landscape. Academics and practitioners have discussed the impact of the digital/electronic/virtual library on the scope of collection development and the role of collection developers. Buckland (1989) uses the opportunity to review the functional role of library collections, which he defines as three-fold: *archival* (retention and preservation), *dispensing* (availability and access) and *bibliographic* (organisation and identification); he later added a fourth *symbolic* role, associated with rarity and status (Buckland 1995). Buckland (1989) first argues that the archival and bibliographic functions will continue to be important, but the dispensing role will shift from long-term to temporary local storage for electronic media. Moving on specifically to collection development, he then asks the fundamental question (Buckland, 1995, p. 157):

> "What will collection developers do as local collections diminish in significance relative to networked electronic resources?"

Drawing on McColvin's (1925) classic text on book selection for public libraries, Buckland (1995) argues the need to think differently about selection based on *demand* and selection based on *value,* which he refers to as *privileging* some works/documents over others, concluding that 'value-based privileging' will be more important than 'demand-based decisions' and will be implemented by providing customised access to the information universe for particular client groups, thus anticipating more recent discussion around *personalisation* and *customisation* of content through portals (*e.g.* Dempsey, 2003; Kalyanaraman and Sundar, 2006; Nicols and Mellinger, 2007; Shedlock *et al.,* 2010). Brophy (2007, pp. 120-121) similarly confirms that selection should continue to be a central task for the modern library, but characterises the role in slightly different terms, introducing concepts such as *sense-making*, *mapping* and *codifying,* which can be seen as contemporary interpretations of Buckland's (1989, 1995) bibliographic/advisory role:

> "While libraries can act as the interface to this wealth of information, one of their most important tasks is to create order out of potential chaos. They do this by selecting and describing information sources which they will offer to their users. … Within this understanding of the 'collection', the process of making sense of the information universe on behalf of users, partly by mapping and codifying it (including borrowing from the codification of others) and partly by selecting from it those parts which are likely to be of interest and are known, or likely, to be accessible, is critical."

Demas *et al.* (1995) offer a more pragmatic view of collection development for the e-library, arguing the need to 'mainstream' electronic/networked resources by integrating them conceptually and operationally into collection development practice. Drawing on applied research and development at Cornell University, they describe the use of 'genre specialists', to develop expertise in different categories of resources (such as applications software, numeric files and multimedia materials); an Electronic Resources Council, to assess impact and co-ordinate activity across functional units; Internet Prospectors, an 'advance team' to develop strategies and policies for integration; and a five-level 'tiers of access' framework to match delivery mechanisms to anticipated demand. Many libraries established new teams and/or specialist positions to deal with new formats, but often as temporary structures to

manage the transition (Dorner, 2004). Many libraries also used separate budgets for hard-copy and electronic resources, which Gorman (2003a) rightly criticises as inappropriate.

Demas (1998, p. 158) revisits Buckland's (1995) question about the role of collection development in the specific context of digitisation, arguing that this is an area where the *art* of *value-based* selection – rather than the *science* of *demand-driven* selection – is needed to build "a network of national and international digital libraries". Demas (1998, p. 158) argues that market forces will deal with the high-demand material, but librarians need to develop "rational, national co-operative plans" by collaborating with scholars in the *re-selection* of major parts of their collections for preservation and enhanced access within discipline-based intellectual frameworks. Lynch (1998) also calls for libraries to work together in developing co-ordinated national and international programmes to manage the transition to digital collections. He stresses the importance of moving beyond CD-ROMs as "closed, bounded *artifacts"* to create resources that facilitate re-use and enhancement by the scholarly community over time, by integrating primary content "into a web of commentary, criticism, scholarship, and instruction" and linking it to related content across institutional and geographical boundaries (Lynch, 1998, pp. 140-141).

Evaluation and selection have emerged as key continuing roles for collection development in the digital world, but the information universe from which libraries can select and collect resources for their communities is far more diverse and dynamic than the print-based world. Several commentators have attempted to model the digital content landscape in order to help practitioners establish priorities for managing intellectual assets for their communities. Conway (2008) presents a complex multi-dimensional model that differentiates resources in a university context by source, structure, possession and rights. Dempsey (2003) describes a simpler 'collections grid' that divides materials into four categories on the basis of their *uniqueness* and *stewardship* (level of requirements for custodial care, such as metadata), which has been modified to cover collections in all types of libraries (OCLC, 2003). The OCLC (2003) model provides a useful graphic illustration of how the digital world has expanded the potential scope of collection development beyond the *published content* and *special collections* in the 'high stewardship' quadrants to include *open web content* and *institutionally produced content* that have generally been given 'low stewardship' attention. Thinking about the relative uniqueness of different resources may lead practitioners to change their priorities, spend less time on 'commodity content' and devote more effort to the unique resources within their communities.

Revolution or evolution?

Many commentators have stressed the transformation of libraries and their collections over the past 20 years. However, a few, notably Michael Gorman (2003b, p. 8), challenge this interpretation, arguing instead that library collections "have grown and *evolved* over a long period", with each new development representing an 'evolutionary step' – not a 'revolution'. In contrast to Gorman (2003b), Moss (2008, p. 69) suggests that we are now experiencing a "*second* digital revolution", but warns against both techno-determinism and curatorial nostalgia. Arguing that "the information community needs to return to what it is good at, 'collection development', leaving resource discovery to the search engines and internet providers", he advocates "Rebalancing information services away from service delivery towards collection development" on the basis that search engines "can be left to provide the distribution channel and consumer profiling", though he acknowledges the need for information literacy, but notes the need here for mediation "by those with the appropriate

skills and knowledge", because such literacy is usually "highly differentiated" (Moss, 2008, pp. 70, 86).

Several commentators, including Brophy (2007), Buckland (1995), Demas (1998), Gorman (2003b), Lynch (2000) and Moss (2008), have argued that the changes in the information universe demand that libraries *return* to and strengthen their traditional practice of *value-based selection,* to help their user communities navigate and make sense of the diversity and complexity of the new information universe. Demand-driven acquisition will also be important, but may in future be associated less with medium- to long-term collection development and more with short-term document delivery. The format and location of the material has changed (and will continue to change) but the principles of selecting material to meet current and future user needs still apply. More significantly, library and information professionals are increasingly applying their knowledge and skills in a wider context through participation in regional, national and international consortia and collaborative initiatives, recognising that collection development for the future must look beyond traditional locally-based collections to the development of large-scale global collections accessible to researchers and lifelong learners around the world irrespective of their location.

Questions for reflection

- Is the concept of collection development relevant in the digital world?
- Do we need to adopt new terminology for the new information universe?
- How can libraries acquire the expertise to evaluate specialist resources?
- Should libraries shift their focus from local to global collections?
- Should libraries give higher priority to locally-generated content?
- How should libraries deal with freely-available Internet resources?

References

Ameen, K. (2006) From acquisitions to collection management: mere semantics or an expanded framework for libraries? *Collection Building,* 25 (2), 56-60.

ARL (2002) *Collections & access for the 21st-century scholar: changing roles of research libraries, a report from the ARL Collections & Access Issues Task Force. ARL Bimonthly Report,* 225. http://www.arl.org/bm~doc/main.pdf

Bailey, C.W. (2010) *Transforming Scholarly Publishing through Open Access: A Bibliography*. Houston: Digital Scholarship. http://www.digital-scholarship.org/tsp/w/tsp.html

Baker, D.M. (1992) Access versus holdings policy with special reference to the University of East Anglia. *Interlending & Document Supply,* 20 (4), 131- 137.

Bell, S.S. (1995) Integrating access to formal and informal collections: what is important and what succeeds. *Journal of Academic Librarianship,* 21 (3), 181-186.

Billings, H. (1996) Library collections and distance information: new models of collection development for the 21st century. *Journal of Library Administration,* 24 (1/2), 3-17.

Black, E.L. (2008) Toolkit approach to integrating library resources into the learning management system. *Journal of Academic Librarianship,* 34 (6), 496-501.

Bley, R. (1998) NESLI – the National Electronic Site Licence Initiative. *VINE,* 28 (1), 34-37.

Branin, J.J. (2003) Knowledge management in academic libraries: building the Knowledge Bank at the Ohio State University. *Journal of Library Administration,* 39 (4), 41-56.

Brin, B. and Cochran, E. (1994) Access and ownership in the academic environment: one library's progress report. *Journal of Academic Librarianship,* 20 (4), 207-212.

Brophy, P. (2007) *The Library in the Twenty-First Century,* 2nd ed. London: Facet.

Brunskill, K. (1997) The issues surrounding the provision of CASIAS services in libraries. *Interlending & Document Supply,* 25 (2), 57–63.

Buckland, M. (1989) The roles of collections and the scope of collection development. *Journal of Documentation,* 45 (3), 213-226.

Buckland, M. (1995) What will collection developers do? *Information Technology and Libraries,* 14 (3), 155-159.

Clayton, P. and Gorman, G.E. (2002) Updating conspectus for a digital age. *Library Collections, Acquisitions, & Technical Services,* 26 (3), 253–258.

Cogswell, J.A. (1987) The organization of collection management functions in academic research libraries. *Journal of Academic Librarianship,* 15 (4), 268-276.

Collins, M. (2008) Electronic resource management systems (ERMS) review. *Serials Review,* 34 (4), 267-299.

Connell, T.H. and Cetwinski, T. (2010) Impact of institutional repositories on technical services. *Technical Services Quarterly,* 27 (4) 331-346. Preprint available at http://hdl.handle.net/1811/38978

Conway, P. (2008) Modeling the digital content landscape in universities. *Library Hi Tech,* 26 (3), 342-354.

Corrall, S.M. (1994) The access model: managing the transformation at Aston University. *Interlending & Document Supply,* 21 (4), 13-23.

Corrall, S. and Keates, J. (2011) The subject librarian and the virtual learning environment: a study of UK universities, *Program,* 45 (1), 29-49.

Crawford, W. and Gorman, M. (1995) *Future Libraries: Dreams, Madness & Reality.* Chicago: American Library Association.

Crow, R. (2002) *The Case for Institutional Repositories: A SPARC Position Paper.* Washington, DC: Scholarly Publishing and Academic Resources Coalition. http://www.arl.org/sparc/bm~doc/ir_final_release_102.pdf

Demas, S. (1998) What will collection development do? *Collection Management,* 22 (3/4), 151-159.

Demas, S., McDonald, P. and Lawrence, G. (1995) The Internet and collection development: mainstreaming selection of Internet resources. *Library Resources and Technical Services,* 39 (3), 275-290.

Dempsey, L. (2003) The recombinant library: portals and people. *Journal of Library Administration,* 39 (4), 103-136.

Department of Education and Science/Office of Arts and Libraries (1982) *The Future Development of Libraries & Information Services 2: Working together within a National Framework,* Library Information Series No. 12, London: HMSO.

Dowd, S. (1989) Alexandria revisited: another look at space and growth. *Collection Building,* 9 (3-4), 65-92.

Dorner, D.G. (2004) The impact of digital information resources on the roles of collection managers in research libraries. *Library Collections, Acquisitions, and Technical Services,* 28 (3), 249-274.

Edelman, H. (1979) Selection methodology in academic libraries. *Library Resources & Technical Services,* 23 (1), 33-38. http://alcts.ala.org/lrts/lrtsv23no1.pdf.

eLib (2001) Electronic Libraries Programme. *The Projects.* Bath: UKOLN. http://www.ukoln.ac.uk/services/elib/projects/

Gore, D. (ed.) (1975) *Farewell to Alexandria: Solutions to Space, Growth and Performance Problems of Libraries.* Westport, CT: Greenwood Press.

Gorman, G.E. (1997) Introduction. In Gorman, G.E. and Miller, R.H. (eds) *Collection Management for the 21st Century: A handbook for Librarians,* pp. ix-xv, Westport, CT: Greenwood Press.

Gorman, G.E. (2003) Collection management. In Feather, J. and Sturges, P. (eds) *International Encyclopedia of Information and Library Science,* 2nd ed., pp. 81-83. London: Routledge.

Gorman, G.E. and Howes, B. (1989) *Collection Development for Libraries.* London: Bowker Saur.

Gorman, M. (2000) *Our Enduring Values: Librarianship in the 21st Century.* Chicago: American Library Association.

Gorman, M. (2003a) Collection development in interesting times: a summary. *Library Collections, Acquisitions, & Technical Services*, 27 (4), 459-462.

Gorman, M. (2003b) *The Enduring Library: Technology, Tradition and the Quest for Balance.* Chicago: American Library Association.

Hahn, K.L. (2008) *Research Library Publishing Services: New Options for University Publishing.* Washington, DC: Association of Research Libraries. http://www.arl.org/bm~doc/research-library-publishing-services.pdf

Hakala, J. (2004) Resource description in a heterogeneous system environment. *Library Collections, Acquisitions, & Technical Services,* 28 (3), 275-282.

Henty, M. (1991) Conspectus in Australia: the view from the bridge. *Australian Library Review,* 8 (2), 107-113.

Hey, T. and Hey J. (2006) E-science and its implications for the library community, *Library Hi Tech,* 24 (4), 515-528.

Hilton, J.L. (2003) Digital asset management systems. *Educause Review,* 38 (2), 52-53. http://net.educause.edu/ir/library/pdf/ERM0327.pdf.

Johnson, P. (2004) *Fundamentals of Collection Development and Management*. Chicago: American Library Association.

Joint, N. (2009) Practical digital asset management and the university library. *Library Review,* 58 (2), 89-96.

JFCLRG (1993) Joint Funding Councils Libraries Review Group. *Report* [Follett Report]. Bristol: Higher Education Funding council for England. http://www.ukoln.ac.uk/services/papers/follett/report/

Kalyanaraman, S. and Sundar, S.S. (2006) The psychological appeal of personalized content in web portals: does customization affect attitudes and behavior? *Journal of Communication,* 56 (1), 110-132.

Kohl, D.F. (2003) Collection development in the ARL library. In Drake, M. (ed.) *Encyclopedia of Library and Information Science,* 2nd ed. pp. 570-584. New York: Dekker.

Lee, H.-L. (2000) What is a collection? *Journal of the American Society for Information Science and Technology,* 51 (12), 1106-1113.

Lee, H.-L. (2003) Information spaces and collections: implications for organization. *Library & Information Science Research,* 25 (4), 419-436.

Lynch, C. (1998) The role of digitization in building electronic collections: economic and programmatic choices. *Journal of Library Administration,* 22 (3/4), 133-141.

Lynch, C. (2000) From automation to transformation: forty years of libraries and information technology in higher education. *Educause Review*, 35 (1), 60-68. http://net.educause.edu/ir/library/pdf/ERM0018.pdf

Lynch, C. (2003) Institutional repositories: essential infrastructure for scholarship in the digital age. *ARL Bimonthly Report,* 226, 1-7. http://www.arl.org/resources/pubs/br/br226/br226ir.shtml

Matheson, A. (1989) Conspectus in the United Kingdom. *Alexandria,* 1 (1), 51-59.

MacColl, J. (2001) Virtuous learning environments: the library and the VLE. *Program*, 35 (3), 227-239.

McColvin, L. (1925) *The Theory of Book Selection in Public Libraries.* London: Grafton.

McGarry, K. (2003) Libraries. In Feather, J. & Sturges, P. (eds) *International encyclopedia of information and library science,* 2nd ed., pp. 371-374. London: Routledge.

McKnight, C. (1993) Electronic journals – past, present…and future? *Aslib Proceedings,* 45 (1), 7-10.

Moss, M. (2008) The library in the digital age. In Nicholas, D. and Rowlands, I. (eds) *Digital Consumers: Reshaping the Information Profession,* pp. 69-91. London: Facet.

Nichols, J. and Mellinger, M. (2007) Portals for undergraduate subject searching: are they worth it? *Portal: Libraries and the Academy,* 7 (4), 481-490.

OCLC (2003) *Collections Grid.* Dublin, OH: OCLC Online Computer Library Center. http://www.oclc.org/reports/escan/appendices/collectiongrid.htm

Peters, T.A. (2002) Digital repositories: individual, discipline-based, institutional, consortia, or national. *Journal of Academic Librarianship,* 28 (6), 414-17.

Prytherch, R. (comp.) (2005) *Harrod's Librarians' Glossary and Reference Book: A Directory of Over 10,200 Terms, organizations, Projects and Acronyms in the Areas of Information Management, Library Science, Publishing and Archive Management,* 10th ed. Aldershot: Ashgate.

Reitz, J.M. (2004) *Dictionary for Library and Information Science.* Westport, CT: Libraries Unlimited.

Reitz, J.M. (2010) *ODLIS: Online Dictionary for Library and Information Science.* Santa Barbara, CA: ABC-CLIO. http://www.abc-clio.com/ODLIS/odlis_A.aspx

Rieh, S.Y., Markey, K., St. Jean, B., Yakel, E. and Kim, J. (2007) Census of institutional repositories in the U.S.: a comparison across institutions at different stages of IR development, *D-Lib Magazine,* 13 (11/12). http://www.dlib.org/dlib/november07/rieh/11rieh.html

Roberts, M., Kidd, T. and Irvine, L. (2004) The impact of the current e-journal marketplace on university library budget structures: some Glasgow experiences. *Library Review,* 53 (9), 429-434.

Roderick, E., Taylor, J.M., Bourd, S. and Courson, G. (1997) The Library of Virginia's digital library project. *Library Hi Tech*, 15 (3-4), 56-62, 89.

Rusbridge, C. (1998) Towards the hybrid library. *D-Lib Magazine,* 4 (7/8). http://www.dlib.org/dlib/july98/rusbridge/07rusbridge.html

Shedlock, J., Frisque, m., Hunt, S., Walton, L., Handler, J. and Gillam, M. (2010) Case study: the Health SmartLibrary experiences in web personalization and customization at the Galter Health Sciences Library, Northwestern University. *Journal of the Medical Library Association,* 98 (2), 98-104. http://www.ncbi.nlm.nih.gov/pubmed/20428276

Soehner, C., Steeves, C. & Ward, J. (2010) *E-Science and Data Support Services: A Study of ARL Member Institutions.* Washington, DC: Association of Research Libraries. http://www.arl.org/bm~doc/escience_report2010.pdf

Soper, M.E., Osborne, L.N. & Zweizig, D.L. (1990) *The Librarian's Thesaurus.* Chicago: American Library Association.

Stam, D.H. (1983) Think globally – act locally: collection development and resource sharing. *Collection Building,* 5 (1), 18-21.

Steele, C. (ed.) (1978) *Steady-State, Zero Growth and the Academic Library: A Collection of Essays.* London: Bingley.

Suber, P. (2003) Removing barriers to research: an introduction to open access for librarians. *College & Research Libraries News,* 64 (2), 92-94, 113. Expanded preprint available at http://www.earlham.edu/~peters/writing/acrl.htm.

Tanner, S. (1997) The Higher Education Digitisation Service: managing the conversion to electronic formats. *Serials*, 10 (3), 352-356.

Trochim, M.K. (1982) *Academic Library Resource Sharing through Bibliographic Utility Program Participation: Report to the Office of Libraries and Learning Technologies.* Washington DC: United States Department of Education, Office of Educational Research and Improvement. http://www.eric.ed.gov:80/PDFS/ED227853.pdf.

Young, H. (ed.) (1983) *The ALA Glossary of Library and Information Science.* Chicago: American Library Association.

University Grants Committee (1976) *Capital Provision for University Libraries: Report of a Working Party.* London: HMSO.

Voss, A. and Procter, R. (2009) Virtual research environments in scholarly work and communications. *Library Hi Tech,* 27 (2), 174-190.

Walters, T.O. (2009) Data curation program development in U.S. universities: the Georgia Institute of Technology example. *International Journal of Digital Curation,* 3 (4), 83-92. http://www.ijdc.net/index.php/ijdc/article/viewFile/136/153

Walters, W.H., Demas, S.G., Stewart, L. and Weintraub, J. (1998) Guidelines for collecting aggregations of web resources. *Information Technology and Libraries,* 17 (3), 157-160.

Woodhouse, S. (2001) The People's Network and the learning revolution: building the NOF digitise programme, *Ariadne,* 29. http://www.ariadne.ac.uk/issue29/woodhouse/

Woodward, H. and McKnight, C. (1995) Electronic journals: issues of access and bibliographical control. *Serials Review,* 21 (2), 71-78.