The Development of Virtual Libraries in Commonwealth Libraries in Australia

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ABSTRACT

This research examines the development of virtual libraries in Commonwealth libraries in Australia in 1998-1999. The background to the study lies in some of the current issues in the information sector, and government responses to those issues.

The study begins by considering the nature of the Australian Commonwealth Government, reviewing what government libraries are and whom they serve, and examining the future trends expected to affect Commonwealth libraries. The current state of virtual library research is then reviewed, and the need for research in the Commonwealth library sector examined.

The author reviews the virtual library concept as expressed in the literature in the field, determines what a virtual library is, and gives consideration to why virtual libraries are being developed. The issues that affect and are affected by virtual library development are then examined. Based on this, a model of virtual libraries is formulated, along with a brief consideration of the possible application, importance and problems associated with each element of the model.

The research design and methods that were used to gather information for this study are then outlined, along with the inherent limitations of the research model. Following this, the findings from a survey of virtual library development in Commonwealth libraries are discussed. The author then conducts some analysis of these responses, and makes comparisons between different Commonwealth library responses, as well as comparisons with virtual library studies conducted in American and Australian academic libraries.

The research concludes by attempting to reach some conclusions about Commonwealth virtual library development and the validity of the proposed model of virtual libraries. Flowing from this, recommendations are made for further research in this field.

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GLOSSARY OF TERMS

AARNet	Australian Academic and Research Network
ABS	Australian Bureau of Statistics
ALG	Australian Libraries Gateway
ALIA	Australian Library and Information Association
ALLG	Australian Law Librarians' Group
ANU	Australian National University
ARL	Association of Research Libraries (US)
CAL	Copyright Agency Limited
CAUL	Council of Australian University Librarians
CGD	Commonwealth Government Directory
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DARPA	Defense Advanced Research Projects Agency (US)
DDC	Dewey Decimal Classification
DSD	Defence Signals Directorate
Email	Electronic mail
FLIN	Federal Libraries Information Network
FTP	File Transfer Protocol
GOLD	Government On-Line Directory
ICOLC	International Coalition of Library Consortia
ISO 2789:1991	International Standard on Information Documentation: International Library Statistics
LAMA	Library Administration and Management Association (US)
LIS	Library and Information Science
NASA	National Aeronautics and Space Administration (US)
NLA	National Library of Australia
NSF	National Science Foundation (US)
NSTL	Nashville State Technical Institute Library (US)
OPAC	Online Public Access Catalogue
SPSS	Statistical Package for the Social Sciences
SSCI	Social Sciences Citation Index
UNLV	University of Nevada, Las Vegas (US)
WWW	World Wide Web

1. INTRODUCTION

This research examines the state of development of virtual libraries in Commonwealth libraries in Australia in 1998-1999. An introduction to some of the current issues in the information sector, and government responses to those issues is provided in Chapter 1. The nature of the Australian Commonwealth Government is then considered, government libraries and their clientele are reviewed, and the future trends expected to affect Commonwealth libraries discussed. The current state of virtual library research will then be reviewed, and the need for research in the Commonwealth Government sector examined.

1.1. BACKGROUND TO THE RESEARCH

1.1.1. Current Trends in Information Management

Members of the international library and information profession have become acutely aware in recent years that "we are working and living in tomorrow's 'virtual world', [and] we must begin to look to the future and prepare ourselves for what networked technology is making possible" (Broering, 1995: 74). As a consequence, much of the recent literature in the field has been devoted to discussing and exploring the shape of future library and information services. One area receiving significant attention is the development of access to information through virtual libraries.

With the continuing expansion of the so-called 'Information Superhighway', governments worldwide have also become more aware that "technology has the potential to add significantly to [a nation's] capacity to educate, communicate and express [itself]" (Liberal Party of Australia and National Party of Australia, 1996: 3). Accordingly, they are moving to create 'information policies' which will both facilitate and regulate this brave new online world.

In 1996, the information policy for the Commonwealth of Australia was set out by the Liberal-National Party Coalition Government in an election document entitled *Australia Online.* Among other things, it stated that:

> The role of government as a leading edge user and a source of industry scale is recognised by the Coalition. A Coalition Government will adopt new online and multimedia applications where these technologies promise real long-term efficiencies in the delivery of Government services... The application of online technology to the business of government, particularly the delivery of services, will be vigorously pursued... Commonwealth Government agencies will introduce new applications of communications technology where these will result in enhanced services and can be cost-justified... Improvements in the quality and timeliness of service delivery in line with core agency functions will be a key...factor in determining priorities (Liberal Party of Australia and National Party of Australia, 1996: 14).

Much work in this field is occurring in both the library and information services community and in government. But is there any connection between the two? In Australia, at least, it would seem so. Senator Richard Alston, the Commonwealth Minister for Communications, Information Technology and the Arts, has said that:

> Public access to knowledge was one of the keys to a better life during the transition from agricultural and industrial society. The arrival of the information society will offer similar challenges. Access to books and the written word have been a crucial factor in building an educated society. Now library networks have a wonderful opportunity to play a leading role in facilitating access to on-line information services. It is the responsibility of government to do its best to make sure that this occurs (Australian Library and Information Association, 1996: 3).

1.1.2. Virtual Library Research

Schatz and Chen have acknowledged that interest in "the long-time topic [of virtual libraries]…has suddenly become white-hot" due to the development of the Internet and the World-Wide Web (Schatz and Chen, 1996: 1). Indeed, the 1996 Bowker

Annual noted that "[r]esearch on the topic of digital libraries clearly overshadowed research on any other topic in 1995" (Lynch, 1996: 427), while Meyyappan, Chowdhury and Foo (2000: 337) noted that "[d]igital library research has attracted much attention in not only the developed countries but also in developing countries". Stratigos and Strouse (2001: 67) also found in a year 2000 study that two-thirds of their respondents were working toward the development of partial or full digital libraries. A casual search of the library databases available on Dialog (some 12 in all) confirms the perceived importance of virtual libraries. When searched for records containing the term *virtual library*, some 5,500 citations are retrieved. When alternate terminology with similar meanings (for example, *digital library*, *electronic library*) is added to the search strategy, the number of citations located swells to nearly 19,000.

However, much of the existing research in the virtual library field is concerned with the practical application or implementation of virtual libraries, some on a very large scale. There are hundreds, probably thousands, of virtual library projects currently underway, with the majority of research occurring in the academic and public library sectors. Furthermore, these projects have taken widely varying approaches, dependent on the needs of the different libraries, the sector in which they are based, and, in part, the definitions that have been applied. This has led to a variety of virtual libraries being developed, with no common model being available.

1.1.3. Commonwealth Government and Commonwealth Libraries

Under the sections 51 and 52 of *The Constitution of the Commonwealth of Australia*, the Commonwealth Government has the power to make laws for the "peace, order and good government of the Commonwealth" (*The Constitution*, 2000: 28-30) in certain specific areas. Under Chapter 2 of *The Constitution* (2000; 34-35), the Executive Government, including various Department of State, then administer the laws enacted by the Parliament.

According to the 1997-98 *State of the Service* report (Australia. Public Service and Merit Protection Commission, 1998: 77-79), there were 18 Departments of State and

78 Commonwealth Agencies administering the various administrative functions vested in the Commonwealth Government. An examination of the Australian Libraries Gateway and other Australian Government and library directories (Australia. Department of Finance and Administration, 1998; Australia. Department of Finance and Administration, 1998; Bundy and Bundy, 1997; Fuller, 1995-; *Government On-line Directory*, 1998) located more than 300 libraries within those agencies.

1.1.4. Nature and Purpose of Government Libraries

The library community can be divided into a number of sectors, with government libraries generally falling within the special library sector. The *Harrod's Librarians' Glossary* defined a special library as being "a library or information centre maintained by an individual, corporation, association, government agency or any other group… Broadly, [it is] a library that is neither academic, commercial, national nor public. It is intended to serve the needs of a portion of the community requiring detailed information respecting a limited subject field" (Prytherch, 1994: 602). Similarly, the Australian Library and Information Association (ALIA) stated that special libraries "exist in all areas of private, government and community enterprise", and are "established to obtain and exploit specialist information for the advantage of the parent organisation" (Australian Library and Information Association. Special Libraries Section (Queensland Group), 199?: 1).

Stahl noted that "perhaps the one true statement about special libraries is that every one is slightly different due to its users" (Stahl, 1993: 202). This is certainly true of Commonwealth Government agencies and their libraries. Under section 51 of *The Constitution* (2000: 28-30), the Commonwealth Government has the ability to make laws under certain specified heads of power. These powers are either exercised solely by the Commonwealth, or only overlap the powers of other Australian jurisdictions in very limited ways. Likewise, the agencies that administer Commonwealth legislation under these powers tend to have sole jurisdiction over particular heads of power, or only overlap with other Commonwealth agencies in a limited fashion.

The Federal Libraries Information Network (FLIN) is a consortial body for libraries in Commonwealth-funded agencies in Australia. According to FLIN, the aim of Commonwealth special libraries is to "provide information to their clients to ensure that all government programs and policies are as relevant and as effective as possible" (Federal Libraries Information Network, Australia, 1995: 1).

A 1995 FLIN draft statement, *The Value of Information Services Provided by Commonwealth Government Libraries*, discussed the functions of Commonwealth libraries. According to this statement, the functions of Commonwealth libraries fall into six broad categories, these being:

- Collection, recording and preservation of information;
- Provision of in-house collections of resource materials;
- Provision of services by in-house information professionals;
- Information management within the organisation;
- Library services operated in accordance with overall Government objectives; and,
- Access to the resources and efficiencies of library networks (Federal Libraries Information Network, Australia, 1995: 1-3).

1.1.5. Future Directions for Commonwealth Libraries

In *The Value of Information Services Provided by Commonwealth Government Libraries*, FLIN also considered what the future might hold in libraries generally, and in Commonwealth libraries specifically. FLIN stated that the growth of electronic sources is likely to change both libraries and the role of librarians, with the major change to date being the supplementation of on-site collections (whether paper or electronic) with worldwide library and commercial electronic sources. Also noted is the fact that hard copy materials are likely to remain the primary source of information for some time yet, but the 'Information Superhighway' will change the way people handle information, and their ability to access it without the need for an intermediary. The final trend noted is that over time, the electronic library is likely to become more commonplace as more information is published electronically, and users become more self-sufficient. Librarians will then be more

involved in the development of "instructional strategies" to facilitate effective virtual library use, thus performing a more "managerial" and less "operational" role than in the past (Federal Libraries Information Network, Australia, 1995: 4-5).

FLIN noted that the "information environment" in Commonwealth libraries has been, and will continue to be, changed by the explosive growth of electronic information sources, and that libraries are increasingly using electronic information delivery, as well as developing techniques for managing electronic information. At the same time, libraries are continuing to provide traditional book and research services. FLIN considered that this changing information environment is likely to have three main effects.

First, information professionals will increasingly be required to act as "information guides" by assisting and instructing users, rather than locating information. Second, library functions will become more "technologically driven", with library staff becoming more directly involved in the transformation of information flow and communication. Finally, as more electronic information sources are provided, the origin of information will become transparent to users, thus blurring the distinctions between different types of information.

1.2. PURPOSE OF THE RESEARCH

Although there is considerable interest in online information on the part of governments in many countries, including Australia, there has been little research based in the Government library sector generally, and almost nothing in Australia. This research has attempted to address this apparent lack by reviewing the state of virtual library development within the Australian Commonwealth Government, and examining the reasons why the level of development was as it was. It also identified the various elements of virtual libraries, along with enabling and hindering factors for virtual library development. From this, a general model of Commonwealth virtual library development was formulated.

1.3. SIGNIFICANCE OF THE RESEARCH

The many existing virtual library studies can give a useful pointer to the general development of virtual libraries. However, many of these projects began in the early and mid-1990s. Given the speed of technological developments, this is a very long time. Indeed, when asked about their future intentions, a respondent to a 1993 survey of virtual libraries in Australian academic libraries noted that "[o]ur response in 12 months time will quite different!" (Schauder, 1994: 18).

Further, Cochrane and Lean considered that making generalisations about libraries is of most value in the area of labour force issues. Otherwise, libraries serving different clienteles are quite different from one another, and it is not necessarily helpful to make comparisons (Cochrane and Lean, 1995: 375). Similarly, Watson and Streatfield (1997: 1) were concerned that there has been a major focus on virtual library developments in recent years, yet there has been relatively little attention paid to special libraries, especially those outside the "commercial" arena. Missingham held complementary views, noting that the use of new technology in special libraries has been quite different to that of academic and public libraries (Missingham, 1996: 39).

As discussed at 1.1.4 (above), government libraries usually fill a quite different role within their agency than their academic and public library counterparts. Given these factors, it is difficult to make meaningful extrapolations from research in other sectors to the special library sector generally, and to Commonwealth libraries in particular. Furthermore, Missingham noted that although there is much written on the topic of virtual libraries generally, the lack of documentation on Commonwealth Government virtual library projects may simply be because most libraries are "just getting on and doing it" without necessarily writing about it (Missingham, 1997: 1).

This research therefore allows current Commonwealth virtual library development efforts to be gathered and reviewed in a way that has not previously been done. It further provides an opportunity to develop a general model of virtual library

development that is both meaningful and useful to Commonwealth libraries. Likewise, it provides an opportunity to determine whether virtual library developments from libraries in the academic sector do, in fact, have application in the government special library sector.

1.4. CONCLUSION

This process is begun in Chapter 2 with an examination of the relevant literature, to determine what virtual libraries are, find out why they are, and are not, being developed, and examine what factors are important when developing virtual libraries.

2. LITERATURE REVIEW

2.1. INTRODUCTION

The literature in virtual library and associated fields is examined in Chapter 2. The virtual library concept will be reviewed to determine what a virtual library is, and the components it comprises. Consideration will then given to why virtual libraries are being developed. The issues that affect and are affected by virtual library development will then be discussed.

2.2. VIRTUAL LIBRARIES

2.2.1. The Virtual Library Concept

The basic concept underlying the virtual library is not new. Writing in *Atlantic Monthly* in 1945, Dr Vannevar Bush of the U.S. Office of Scientific Research and Development discussed a device called a "memex". He envisioned this device, which was based on advances in microfilm technology, being used by individuals as "a sort of mechanised private file and library". The memex would be able to store large amounts of books, pictures, periodicals, newspapers, correspondence, and so on, with material being indexed for easy retrieval (Bush, 1986: 14-17). According to Saffady, the Bush vision is "one of the most influential and frequently cited precursors" of the modern virtual library concept (Saffady, 1995: 225).

Licklider posited another early precursor of virtual libraries in his 1965 book, *Libraries of the Future*. His two-year study, funded by the US Council on Library Resources, examined "the applicability of some of the newer techniques for handling information to what goes at present by the name of library work – ie., the operations connected with assembling information in recorded form and of organising and making it available for use" (Licklider, 1965: v). The recommendation of Licklider's study was that, by the year 2000, a "precognitive information system" should be developed, which could:

- Be available when and where needed;
- Permit several different categories of input, ranging from authority-approved formal contributions…to informal notes and comments;
- Converse or negotiate with the user while he formats his requests;
- Adjust itself to the level of sophistication of the individual user;
- Permit users to deal with either metainformation…or with substantive information…or with both at once; and,
- Eliminate publication lag (Licklider, 1965: 36-39).

Brophy noted that many of the issues raised in Licklider's study "remain the basis of continuing [digital library] research" (Brophy, 1999: 6). Similarly, Saffady noted that although the virtual library seems a revolutionary development, the concepts and technologies involved are more accurately described as evolutionary. He stated that "[l]ibraries have been creating, maintaining, and using computer-processible information for decades". For example, libraries have been replacing card catalogues with online equivalents since the 1970s. Likewise, they have been making routine use of online information services and bibliographic databases, CD-ROMs, and more recently, the Internet (Saffady, 1995: 224).

Price held a similar view, stating that libraries have tended to view virtual libraries as a set of finite projects, rather than an evolutionary process (Price, 1996: 57). Pacifici also concurred with Saffady's view. She stated that the virtual library did not develop from the Internet, as is often thought. Rather, it has been evolving since the 1960s, when libraries began integrating emerging information technologies (such as microfiche, microfilm and electronic files) to facilitate access to hard copy collections (Pacifici, 1997: 2).

The first recorded use of the term *virtual library* is attributed to A. J. Harley of the British Library, Lending Division. Speaking at the 1980 ASLIB/ISS/LA Joint Conference, Harley likened traditional libraries to "….a machine with many simultaneous users, each of whom perceives that he has the whole collection to himself, and further, through connections to other libraries,...access to much greater resources than are physically present" (Harley, 1981: 163). He continued to define a

virtual library as "one where the user has the illusion of access to a much larger collection of information than is really present, immediately or simultaneously. In the ultimate virtual library, he has access to universal knowledge, without delay, at his desk" (Harley, 1981: 163-164).

Although not a recent concept, in terms of actual development virtual libraries are still relatively new. Because of this, there is as yet no universally agreed terminology in place. In the literature, the *virtual library* may also be called the *library without walls*, *digital library*, *electronic library*, *e-library*, *desktop library*, *online library*, *future library*, *library of the future*, *logical library*, *networked library*, *hybrid library*, *gateway library*, *extended library* or *information superhighway*. Of these many terms, *virtual library*, *digital library*, *hybrid library* and *electronic* (or *e-*) *library* are most common.

2.2.2. Components of the Virtual Library

Although there are a wide variety of terms used to describe the virtual library concept, it is clear from the literature that there are certain common elements, regardless of the applied terminology. According to Bishop and Starr there must be, in some sense, a *collection,* which may include a range of media, as well as a range of intended uses. As with a fully physical collection, clients must be linked with this collection in an efficient and satisfying manner. There is also a set of *services*, either human or electronic, which link clients to collections. The *technologies* involved in providing digital library services should support document creation, retrieval, transfer, dissemination, manipulation and management. Finally, there must be an *institution* in which the digital library collections and services are embedded (Bishop and Starr, 1996: 308-309).

Cloyes stated that "[a] virtual library is the way a traditional library uses technology and innovation to meet customer demand", and that the common thread is the "use of technology to improve customer delivery, as well as the search and retrieval technology available on electronic networks" (Cloyes, 1994: 253).

Drabenstott noted five common elements for digital libraries. These were that:

- The digital library is not a single entity;
- The digital library requires technology to link with the resources of the many;
- The linkages between the many digital libraries and information services are transparent to the end users;
- Universal access to digital libraries and information services is a goal; and,
- Digital library collections are not limited to document surrogates: they extend to digital artefacts that cannot be represented or distributed in printed formats (Drabenstott, 1994: 9).

Murray believed that digital libraries would require "solutions developed from a large number of open system components". She listed a number of components that together form digital libraries (Murray, 1999: 175-176). Van Halm concurred, creating an almost identical list (Van Halm, 1999: 301). The components included in Murray and Van Halm's conceptions of the digital library were:

- Portals (Z39.50/http gateways which allow personalised cross-database and domain searching);
- Electronic document delivery, authentication and security;
- Library automation (integration of the digital library with traditional library systems);
- Interlibrary loans;
- Information harvesting and indexing (integration of Web-based network services into the digital library);
- Rights management;
- Digital archives and preservation;
- Digitisation and on-demand scanning;
- Secure charging methods (e-payments/licenses);
- Information push (alerting profiles and SDI services);
- Electronic publishing;

- Encryption;
- Storage management; and,
- Z39.50/http compliant metadata servers.

A major study, conducted by ARL in 1992, asked respondents to detail their activities and intentions regarding the construction of virtual libraries. The study, constructed by Schiller and Von Wahlde, asked respondents to indicate their involvement in 15 different activities considered essential to the formation of virtual libraries. These activities included:

- Use of, or development of electronic document delivery services;
- Policies, services, or reallocations that emphasise access [to information] over ownership;
- Participation in cooperative development or purchase of electronic files;
- Participation in the development of a campus-wide information system;
- A written plan that states its goal as access to information from a single workstation;
- Enhancement of the online public access catalogue (OPAC) to include the holdings of other libraries besides those held locally;
- Providing a gateway from the OPAC to other databases or networks, such as the Internet;
- End-user access to online files from on or off campus;
- Connection with the Internet;
- Training faculty and students:
- .....in the use of Internet sources; and,
- .....in end-user searching;
- Subscribing to electronic journals;
- Digitisation of text for electronic storage, retrieval and/or dissemination;

- An e-mail front-end that allows users to initiate interlibrary loan and document delivery requests, suggest purchases, or ask reference questions from within the OPAC; and,
- Access to electronic full-text (Schauder, 1994: 20).

A second study, conducted in Australia in late 1993 by Schauder, researched member libraries of CAUL (Council of Australian University Librarians). This research replicated the earlier American research, comparing and contrasting the results from the two surveys.

According to Schauder, there were extensive similarities between the findings of the two studies. Both found that many libraries were making significant progress in the areas of electronic document delivery, information access (over ownership), campus-wide information systems, end user access to online files, connection to the Internet, information skills training, and access to electronic full-text. At the same time, a relative minority of respondents had written plans with information access from a single workstation as their goal, subscriptions to electronic journals, text digitisation programs or electronic (email) request facilities.

There were some differences in the areas of inclusion of other libraries' holdings and gateway access to databases or networks, and also cooperative development or purchase of electronic files. American libraries were likely to provide access through their OPACs, while Australian libraries were providing such services, but not through their OPACs. Australian libraries, on the other hand, were somewhat more likely to be participating in cooperative development or purchasing of electronic files than their American counterparts. Overall, both surveys found that there was generally significant progress towards the development of virtual libraries (Schiller and Von Wahlde, 1992aa: 3-4; Schauder, 1994: 18-19).

When grouped logically, the activities identified by Murray, Van Halm, and Schiller and Van Wahlde fall into eight basic categories: the Internet and Intranets; integrated access to resources; digitisation of materials; electronic publications;

electronic document delivery; resource sharing; cooperative activities, and; end-user services.

2.2.2.1. The Internet and Intranets

The area of Internet connection, and library Internet and Intranets sites has had much attention devoted to it, with an enormous body of literature having developed in recent years. The level of library connection to the Internet is increasing rapidly. Cronin noted a 1996 survey by the National Commission on Libraries and Information Science, which found that approximately 45% of U.S. public libraries had connection to the Internet. The projected figure for Internet connection rose to 76% in 1997. Cronin further noted that access was not always equally distributed, and that library clients could not always access Internet services directly. Despite this, Internet connection rates in libraries were increasing significantly (Cronin, 1998: 42-43).

More recent figures for levels of library Internet connection do not appear to be available. However, government statistical agencies in many countries are now collecting information on levels of access to the Internet within their populations. An examination of the available statistics shows that in 1998, 19% of Australian households had access to the Internet. By 2000, this figure had almost doubled to 37% (Australian Bureau of Statistics, 2001: 2). In the United States, some 18% of households had Internet connections in 1997, a figure that had increased to 42% by 2000 (United States. Census Bureau, 2001: 1-2). For the United Kingdom, the rate of household Internet connectivity in 1999 was just 13%. In 2002, this figure had more than trebled to 40% (United Kingdom. National Statistics, 2002: 1). Given the general trend toward rapidly increasing Internet connectivity in Western society, it seems highly likely that libraries have continued to follow this pattern.

Clyde noted that it has become accepted that organisations will have web sites, and libraries are no exception. She further noted that library web sites could serve a wide range of purposes, although not all purposes are suitable to all libraries. Some of these purposes include: promoting the library and its services; providing access to online and CD-ROM-based reference sources, and remote access to library

catalogues and other databases; and, assisting library users to explore the Internet (Clyde, 2000: 97). In a Swedish study, Brümmer and Åstrand found that libraries have four major reasons for being present on the Internet. These reasons are to improve service; to decrease physical strain on the library; to offer new services; and, to cope with the information explosion (Brümmer and Åstrand, 1996; Clausen, 1999: 84).

Likewise, Brinkley stated that the growing importance of the Internet in recent years has meant that libraries simply cannot afford to ignore website development, as the Web provides a perfect medium for delivering information access from any location (Brinkley, 1999: 18-19). Smith noted that, with the continued growth of e-commerce systems, users have developed an expectation that libraries will have an Internet presence with "24x7" availability (Smith, 2002: 4). Further, Cox found that one way for libraries to compete with the 'fun' Internet sites for attention is "to have the best website around" (Cox, 1999: 3, 5).

Bell considered that it is essential for information professionals to prove that they can still provide valuable assistance in the modern information world, with the Internet providing one way of doing this (Bell, 1997: 33). Cohen made similar remarks about Intranets. He believed that "[a]n Intranet is a powerful tool that, when used correctly, can enhance communication and collaboration, streamline procedures, and provide just-in-time information to a globally dispersed workforce". He noted that an Intranet could be an invaluable tool for getting the right knowledge to the right person at the right time (Cohen, 1998: 22, 26).

In the area of corporate Intranet development, Corcoran, Dagar and Stratigos noted that there is both good and bad news about library participation. A recent Outsell, Inc. study of the roles of information professionals found that multi-functional teams normally manage Intranets, with 86% of study respondents indicating that they were part of such teams. On the other hand, only 12% reported that they were in charge of these teams, while information technology areas led about 50% of Intranet programs (Corcoran et al., 2000: 33).

Where library staff have taken on corporate webmaster roles, Rible noted that there are several advantages that accrue. These include increased organisational recognition of the library, demonstration of organisational leadership in regard to information technology, and a vehicle for gaining resources (Rible, 1999: 19-20). Similarly, Jennings noted that libraries should not underestimate the power of library webmasters to "shape policy and service developments" within their organisations (Jennings, 1999: 14).

Library and information science (LIS) educators have recognised that while Internet and Intranet development are areas to which LIS graduates are ideally suited, there is often a failure on the part of those outside the profession to recognise that librarians have anything to offer in this arena (Smith, 2000: 2). Alderman, Milne and Singh noted that there is a need to alter the traditional, stereotypical view of the library profession to one where organisations appreciate the ability of libraries to offer "empowerment through information" (Alderman et al., 1999: 25), with similar views being expressed by Sturges (1999: 176-177). Marfleet and Kelly considered that the advent of the World Wide Web has provided new opportunities for libraries. They believed that it is vital for information managers to adopt proactive roles with regard to both the Internet and Intranets, and that they must lead the way in which they are used by organisations (Marfleet and Kelly, 1999: 364).

2.2.2.2. Integrated Access to Information

A major need in the virtual library environment is for integrated access to the information resources it contains. This may be divided into two related groups: enhancements to automated library catalogues, and the need to access resources in a simple manner through a single workstation.

OPACs have been standard features in most libraries for a number of years now. Although there is a considerable body of literature on the topic of OPACs, relatively little considers the use of the OPAC as a gateway to other information sources. Harmsen stated that "[b]y utilising the options which the World Wide Web offers, OPACs can be made the starting points of choice when searching [for]...information... End-users are not interested if information is available in print

or electronically, they are interested in the information itself. Therefore special libraries will have to become hybrid, and so will their OPACs" (Harmsen, 2000: 113). According to Gilbert, "[i]f we...regard the catalogue as the main search instrument for a library collection, then our virtual library basically comprises the collections of all those libraries for which the catalogues are accessible through our workstation... Searching a multitude of catalogues…[is] another concrete feature of the 'virtual library'" (Gilbert, 1993: 4-5).

In an article written in 1989, Ghikas noted that the Chicago Public Library expected that through the 1990s and beyond, "public access catalogs [will] combine access to books, journal articles, indices and abstracts (Ghikas, 1989: 128). Huggard and Groenewegen concurred, noted that using the library catalogue as a gateway is ideal, as it offers a centralised way of managing and offering access to all types of resources, whether hardcopy or electronic (Huggard and Groenewegen, 2001: 29-30).

Veatch wrote that when the Nashville State Technical Institute Library (NSTL) began making Internet resources available through their Web page, clients began using these resources to the exclusion of the physical collection. To overcome this problem, NSTL made the decision to add World Wide Web (WWW) 'holdings' to their library catalogue. He noted that through the cataloguing of Internet resources, clients at remote locations could conduct preliminary research before print resources arrived from the main library. Veatch further noted that although it brought a unique "subset of headaches", NSTL has received positive client responses to this decision (Veatch, 1999: 64-67).

Blair noted a project at Sonoma University Library, which developed software that delivered access to the library's own catalogue and the catalogues of numerous libraries worldwide in a seamless and transparent interface. The Sonoma Internet Library Access Software addressed a major user requirement, that is, the need to search beyond the Library's immediate holdings, both in the United States and internationally. This also overcame the need to access individual catalogues via the

Internet, which was considered both too technical and time-consuming for most library users (Blair, 1994: 23).

Harmsen reported a similar project at the Fraunhofer-Gesellschaft libraries in Germany, which used the Z39.50 protocol. He stated that "Z39.50 enables us to…combine our own institute catalogues [with libraries] covering similar research areas… [F]rom an end-user's point of view,...this service look[s] like the OPAC, [although it] will not be able to offer quite the same functionality as for a single OPAC". He considered, however, that this capability does not make sense for all libraries, and is dependent on libraries having similar subject coverage (Harmsen, 2000: 113). Overall, Morgan believed that in order to keep up with client expectations, library catalogues will have to be "more interactive and…provide value-added services to interface with their contents" (Morgan, 1999: 38).

Associated with the need for OPAC enhancement is the need to be able to access to information resources through a single workstation. Commings noted that "one-stop shopping has become a library motto", as libraries seek to make it easier for clients to access products and services (Commings, 1996: 26). Marks and Nielsen considered that libraries must offer clients the ability to use a single workstation to locate all of the resources they need, whether local and remote. They noted that while this is a change from the way libraries currently operate, if it is not done, then "the fully integrated network environment" cannot be achieved (Marks and Nielsen, 1993: 28). Against this, Arant and Payne found that a major limitation of common user interfaces is that they must necessarily operate at the "lowest common denominator" for the systems offered, which either requires much programming to take advantage of these capabilities, or forces specific search functionalities to be sacrificed Arant and Payne, 2001.

However, Miller considered that by putting in place interoperable systems, libraries could not only better use their internally held information, they would become more visible, useable and customer-focussed. He concluded that while "[c]hanging internal systems and practices to make them interoperable is a far from

simple task, [the] benefits for the organisation and those making use of [the] information it publishes are potentially incalculable" (Miller, 2000: 5).

2.2.2.3. Digitisation of Materials

Digitisation of materials or conversion to digital format is an important activity for the development of virtual libraries. According to Gertz, "[d]igital conversion allows us to satisfy our clients better…...because we can actually create a use medium they like and want to use. This is of course the whole reason we are concerned with digitisation in the first place. It has the potential to please our patrons, offers them capacities for research not available before, and broadens the range of media we can deal with" (Gertz, 2000; 101).

Lynch noted that many libraries maintain special collections, comprising manuscripts, photographs, maps, and other unique items, in which they own the copyright, or which are old enough to be in the public domain and free of copyright. He further noted that it is these materials that libraries are digitising and making freely available through the Internet. He stated that these materials, which historically have been "nearly invisible", are now among the most "visible" content offered by libraries, and that they offer a tremendous resource for users (Lynch, 2000: 65).

Mann, however, believed that it would be impossible for all libraries to digitise the whole of their collections. He noted that the Library of Congress hoped to scan five million images into its National Digital Library by the year 2000. However, most items were selected so that one image equalled one complete item. If each page of a book was counted as a scannable image, in 1996, the Library received 50 million new images for the collection. Even with one of the largest conversion projects in the world, the Library is not even close to having its total collection digitised (Mann, 1999: 61). Riggs made a similar point, stating that while digitised materials are an excellent complement to traditional collections, only a small percentage of the world's information resources have been digitised (Riggs, 2001: 304).

Another complicating factor in the digitisation area is the need to obtain permission to digitise materials. The Library Association noted that some rights owners are not permitting their works to be digitised or transmitted electronically, for fear that their intellectual property rights will be abused. This has a flow on effect in libraries, as it restricts the potential availability of materials (Library Association, 1995: 549).

Priestley noted that digitisation looks very powerful if there are no technological or financial restrictions. However, in reality it is "resource-hungry", and decisions have to be made about how much libraries can afford to invest and where (Priestley, 1998: 32), a view echoed by Smith (1999: 11-12). Similarly, Gertz considered that libraries must develop strategic plans for digitisation, or risk enormous waste of both human and financial resources. She noted that many libraries have developed digitisation criteria, with the following being the most commonly cited:

- Does the item or collection have sufficient value to, and demand from, a current audience to justify digitisation?
- Do we have the legal right to create a digital version?
- Do we have the legal right to disseminate it?
- Can the materials be digitised successfully?
- Do we have the infrastructure to carry out a digital project?
- Does or can the digitisation add something beyond simply creating a copy?
- Is the cost appropriate? (Gertz, 2000: 98-100).

Pearson believed that libraries need to develop joint strategies for achieving the best results from digitisation projects, as current efforts are often conflicting and fragmented (Pearson, 2001: 5). Overall, Gertz believed that digitisation has a great deal of potential, but careful decisions and much money will be needed. She stated that "[t]he essential thing is to use digitisation to its...greatest advantage, and to use traditional techniques and digital conversion together to better effect the preservation of our materials" (Gertz, 2000: 102).

2.2.2.4. Electronic Publications

According to the literature, electronic publications can be of two types: electronic journals or electronic full-text, both of which may be free or charged. Much of the literature concentrates on the electronic journal situation, although this is beginning to change. It is apparent, however, that many of the same issues apply to both forms.

Strangelove believed that any discussion of electronic journals "requires a keen sense of historical perspective". He wrote that while electronic journals began in the late 1980s, the majority of titles were less than four years old in 1996 (Strangelove, 1996: 139). Ashcroft and Langdon stated that the number of electronic journals is continuing to escalate. In 1999, the rate of increase was approximately 30% per year, with more than 7,000 available titles (Ashcroft and Langdon, 1999: 706). Chan noted that titles are now appearing in most academic disciplines, including science, technology and medicine, the arts and humanities and the social sciences (Chan, 1999: 11). Despite this, Anderson believed that the extent to which current journals will become electronic is unknown. One of the major reasons for this is that "…there has not yet been a critical mass of electronic journal titles available for most disciplines" (Anderson, 1999: 28).

Terry conducted informal research on how the latest "high-tech" trends were affecting librarians and their decisions. She found that her respondents leaned towards the purchase of materials in electronic formats that offer greater flexibility, but only when there were "worthwhile benefits" over print materials (Terry, 2000: 55).

Many authors have considered the potential advantages and disadvantages of electronic journals. According to Bandyopadhyay and Chu, the advantages associated with electronic journals include: remote and around-the-clock access; timely dissemination of information; simultaneous access by multiple users; value added features such as hyperlinks; searching capabilities; physical space saving; no need for physical processing; elimination of missing, late, stolen or mutilated journals, along with elimination of the need for binding.

On the disadvantage side, they stated that "pricing, archiving, copyright and technical issues...have forced many libraries to stay with their print subscriptions". They noted that electronic journals are expensive to produce, with access being costlier than for print, and that electronic journals "generate the need for hardware, software, paper and regular maintenance". The authors also considered the burning issue of "after-cancellation access to...electronically archived journal literature". The restrictions that publishers place on electronic transmission, copying or downloading for interlibrary loan or document delivery purposes are also seen as inhibiting factors, which will "discourage many libraries from eliminating print subscriptions" (Bandyopadhyay and Chu, 1999: 23-24). Similar views were also expressed by Stewart (2000: 81-82) and Khalil and Jayatilleke (1999: 247).

Pikowsky noted that there is no standard model for the pricing of electronic journals, and while it is often assumed that journals prices will fall, this is by no means inevitable. Although publishing journals electronically eliminates conventional production and distribution costs, there remain necessary costs associated with issues such as copyediting, marketing and administration. Pikowsky further stated that it is a "mistake" to assume that commercial publishers will pass on any cost savings achieved, as they may choose to increase profits by maintaining prices (Pikowsky, 2000: 48-49), a view with which Keller (2001: 388) agreed.

Lynch considered that as electronic full-text becomes more widely available, fundamental economic conflicts also arise. Libraries want price reductions, while publishers want to recoup their investment in conversion to electronic formats. Publishers have also argued that electronic versions are more useful, therefore, will be more heavily used, and thus, should cost more than hard copy equivalents. Another problem identified by Lynch was integration. Libraries want coherent, transparent systems for their users; users want to be able to move seamlessly through a range of products from different suppliers; publishers want to maintain brand identity and to keep their products on independent servers (Lynch, 2000: 64-65).

Lynch also noted that, with a few exceptions, virtually all print items that have been moved to digital form are journals, rather than books. He considered that there are many possible reasons for this, but the most important is that computer screens are not ideal for reading large amounts of text. Digitised versions of books are "cumbersome", and thus have received relatively limited use, although this is beginning to change as technology improves (Lynch, 2000: 65). Despite this limited usage, Young and Peters noted that electronic texts and the Internet have already had a significant impact on collection development. They believed that there would be many more digital texts in future, especially in relation to the preservation of rare materials (Young and Peters, 1996: 34).

Kemp stated that "[g]iven the reality that the literatures of the various disciplines currently have differential availability in electronic formats and that all existing print materials are unlikely to be digitised in the near future, libraries will be working with both print and electronic formats for years to come. The mix of formats will undoubtedly vary from library to library and will change over time, but the formats themselves are not mutually exclusive. Instead they will continue to complement one another" (Kemp, 1997: 32). Likewise, Pinfield noted that much electronic library development has, to date, been "opportunistic and unsystematic", and that libraries need to have integrated collection development policies that cover all media in order to gain best advantage from their collections (Pinfield, 2001: 5-6).

2.2.2.5. Electronic Document Delivery

The issue of document delivery remains very important in the virtual library sphere. It is apparent that all materials will not be available in digital form in the near future. Rowley noted that the dividing line between print and electronic document delivery services is often not clearly defined, with many possible delivery channels and formats available. However, she also noted that electronic document delivery has attracted considerable attention in recent years. She believed that this might partially be because it is seen as a way of maintaining adequate access to materials in an era of declining budgets and increasing materials costs (Rowley, 1998: 165-166).

Zhou noted that many previously local databases and other electronic resources are now available to anyone with network connections, and this is causing profound changes to libraries. She considered that perhaps the most "visible beneficiaries" of these connections are interlibrary loan and document delivery services: interlibrary loans, because of the availability of access to remote OPACs and other checking tools; and document delivery, because of the potential for instant delivery of the growing number of items in digital format (Zhou, 1994: 648-649).

At the same time, Shreeves stated that "[f]or remote access to substitute for local ownership, a library must minimise the time between identification of a needed resource and its provision. While few expect the time lag for remote resources to approach that offered by locally held materials..., there is general agreement that the average time of delivery must be reduced from its current average" (Shreeves, 1997: 375).

Dannelly believed that a spiral of increasing client expectations and decreasing resources has forced libraries to increase their reliance on resource sharing and other document delivery mechanisms. She stated that "[i]nterlibrary loan and resource sharing are no longer adjunct sources of information but have become integral components of primary library services" (Dannelly, 1995: 672).

2.2.2.6. Resource Sharing

Kemp noted that for most of the 20th Century, ownership was the preferred model for library collections. She stated that "[h]aving an item on-site was considered the best, most cost-effective method of providing information". However, this model has been under pressure from the increased volume of published materials, the static or declining nature of library budgets, and the success of new online services, such as CD-ROMs and the Internet (Kemp, 1997: 5). Anwar and Al-Jasem also believed that resource sharing would become more critical beyond the 1990s, for several reasons, including: the publication explosion, increased costs for both information access and ownership, constraints on library funding, and the decreased ability of libraries to satisfy client information needs from locally held collections (Anwar and Al-Jasem, 2001: 225).

Smith and Johnson suggested that in the electronic environment, libraries must move beyond the traditional ownership model to a much more access-based, sharing model (Smith and Johnson, 1993: 15), while Prestamo wrote that "[t]he challenge of maintaining access to, and collections of, both print and electronic resources will require libraries to build new partnerships that foster cooperative strategies with interests within and outside their respective institutions" (Prestamo, 1996: 50). Similarly, Nevins and Nyberg noted that "[a] consortial approach to acquiring resources...has greater appeal to funding sources" (Nevins and Nyberg, 1996: 15). Kemp considered that the broadening of the access concept to mean the provision of information regardless of format or location probably fits more closely the average user's wants and needs (Kemp, 1997: 32).

Kemp also noted that much of the literature about accessibility of information tends to cast this movement in an "either / or, often adversarial" light. A common theme is *access versus ownership*, which implies that the two are, to some extent, mutually exclusive (Kemp, 1997: 32). However, according to Galbreath, "it is misleading to place ownership in an either / or relationship. Ownership has until recently been preferred - because necessary - means of providing access... Now there are numerous ways of providing access, of which ownership of physical items is only one and not necessarily the most cost-effective when rapid, multiple use of very current information is anticipated" (Galbreath, 1997: 19). Indeed, Jacobs and Morris considered that in an environment where so many information delivery mechanisms are possible, ownership becomes merely one *subset* of access (Jacobs and Morris, 1999: 65).

Oppenheim and Smithson (1999: 98) wrote that the use of electronic resources has normally meant access rather than ownership, while Kemp noted that the underlying assumption is that access means *electronic* access. In the most extreme case, this could be taken to mean that no local holdings are required, provided information can be identified and delivered in a timely fashion. Kemp believed that few librarians would presently argue for such a radical definition, and that access should also include "well-maintained local collections, consortial

agreements for collaborative collection development and traditional interlibrary loan" (Kemp, 1997: 32).

Branin noted that "offering access as a stand-in for ownership only works when another library has chosen ownership over access and is willing to share the wealth" (Branin, 1991: 82). Boyle and Davies likewise found the "low level of subject coverage by many [document delivery] services", as well as the similarity of their title coverage, to be a major concern. They believed that the lack of critical mass in many disciplines, and the homogeneity of vendor offerings, compromised their present viability as an alternative resource access mechanism (Boyle and Davies, 1999: 110).

Similarly, Van Fleet and Wallace were concerned that virtual library models assume that materials not held in the local collection will be held in collections elsewhere, as with other resource sharing models. However, the materials that are most unique to a particular library's collection are usually those that it can least afford to lose, and therefore will not lend. Currently, most materials are not available in a form that can be directly transmitted electronically, so the access model breaks down (Van Fleet and Wallace, 1993: 307). According to Shreeves, resource-sharing arrangements cannot succeed unless they recognise the "overriding importance" of local needs. He stated that "[c]ommitments which call for putting consortial demands above local priorities are unlikely to remain viable for long" (Shreeves, 1997: 379).

2.2.2.7. Cooperative Developments

Gorman believed that libraries are entering a "Golden Age of Cooperation" because the necessary technology is now available and getting better all the time, and because economics are forcing cooperation (Gorman, 1991: 7). Dannelly concurred with this view, noting that these economic and technological factors are having a more direct impact on library programs and practices today than at any time in the past (Dannelly, 1995: 664).

McGee enumerated a number of possibilities for library cooperation in the digital era. These included sharing of:

- Physical facilities;
- People and expertise;
- Telecommunications networks and services;
- Computer hardware, software, subsystems and standards;
- Networked information services;
- Data and data conversion projects, and cataloguing services;
- Library materials;
- Persuasion of organisational 'permission givers';
- Processes for specific goals; and,
- One-time and ongoing costs (McGee, 1998: 12-13).

According to Sipe, cooperative development arrangements are important to virtual library efforts, because "...digital resources can carry a hefty price tag..., [and] more often than not these expenses are...expected to be absorbed through allocation of existing resources" (Sipe, 1999: 358). Similarly, Dannelly suggested that to take advantage of the efficiencies offered by automation, it is important for libraries that have traditionally shared "…programs, research initiatives, and other activities to expand those traditions to encompass cooperative or shared networks" (Dannelly, 1995: 674-675).

Engle considered that it is basically economics that is driving moves toward resource sharing among libraries with common objectives. She stated that "[w]hile necessity is probably the mother of these innovations, the new consortial arrangements are based upon a spirit of cooperation and trust that has the potential to reap returns well beyond the initial aspirations of the participants" (Engle, 1996: 109). Similarly, Reger wrote that some of the best benefits of the new digital world lie in the collaborative partnerships between organisations that it requires (Reger, 1999: 75).

Shreeves noted that most commercially available electronic information requires libraries to license its use, and consortial approaches to licensing have led to some "dramatic financial successes" for resource sharing. He stated that "[u]nlike traditional cooperative collection development, which seeks to rationalise and distribute responsibility for acquiring little-used marginal publications, shared approaches to licensing tend to focus on high-use high-demand databases which all or most members of the consortium wish to make available. Even when this is research-intensive information, the ability to provide immediate access from anywhere makes it far more shareable than the peripheral material that was the traditional object of cooperative collection development" (Shreeves, 1997: 385).

The International Coalition of Library Consortia (ICOLC) stated that publishers act globally to provide electronic information, so libraries must also act globally to obtain the best deals on pricing and other terms and conditions for accessing that information (International Coalition of Library Consortia, 1998, 45). In Thornton's view, "…consortia will become even more important forces in the electronic information world. As long as they can prove they are providing a cost-efficient product that is used, they will continue to receive the support of funding agencies" (Thornton, 2000: 854). For Keller, while there is some disagreement about the exact benefits that consortia offer, the area of electronic information publication is one that offers great potential for consortial activity (Keller, 2001: 388).

On the other hand, Branin noted several reasons why cooperative activities have had only limited success. He suggested that local priorities have pushed consortial arrangements into second place. Similarly, libraries are unwilling to give up autonomy, there are difficulties in administering cooperative arrangements outside a limited geographic area, and there is insufficient authority in many library programs to do so (Branin, 1991: 89, 105-106). Atkinson believed that another reason for collaboration failures lies in the fact that much of the information that libraries wish to share is owned by others, who do not wish to have sharing arrangements that will impact upon their potential revenues (Atkinson, 1996: 29-30).

2.2.2.8. End-User Services

End-user services are divided into three basic overlapping categories: end-user access to online information, user training and user-initiated requesting. When libraries are considering whether to offer access to online services, Piggott considered that users must be educated about what "self-sufficiency" actually means. She believed that systems must be demonstrated to users, so that they can experience how an application looks. This will, in turn, lead to user acceptance of the offered services (Piggott, 1995: 6).

Tenopir and Ennis conducted research with members of the Association of Research Libraries (ARL) on the way in which electronic services were incorporated into reference services. In the area of end-user access to online services, they discovered that such services are now seen as a "mainstream offering", with over 80% of respondents offering end-user access to one or more commercial online sources (Tenopir and Ennis, 1998: 24-25).

In an earlier study on the same topic, Tenopir and Nuefang found that user expectations had changed. They noted that end-user access to electronic sources has "...brought on a culture where the promise of instant access brings on the demand for instant gratification" (Tenopir and Nuefang, 1995, 1995: 7). Similarly, Pagell noted that once end-users are given access to online services, their expectations are raised. Lists of citations generated from online services are no longer enough: users want the full-text, on their desktops, and they want it immediately (Pagell, 1993: 2).

Brunelle noted that electronic full-text is currently a "hot topic" in the library community, especially for institutions with a crucial need for access to journal literature. She believed that "[r]esearchers who can search the full text of a journal from their desktops have a significant advantage over their peers who cannot". This is one reason that libraries are keen to allow users access to electronic full-text (Brunelle, 1998: 249).

This leads to the question of user support and training. Cox believed that a different user support model is needed in virtual libraries (Cox, 1996: 168). Sylge noted that

the relationship between library staff and client is essential to the success of virtual libraries. Users must be trained, and library staff must be aware of their changing needs, and act as facilitators. Many users aren't getting "the best of what's out there", so it is up to librarians to become the "trainers and signposters" (Sylge, 1996: 26), a sentiment reiterated by Wilson (2000: 83). Riggs held similar views, stating that "[t]he day for our role as knowledge navigators has come" (Riggs, 2001: 305).

Similarly, Campbell believed that virtual libraries would require new attention to be paid to user education because of the practicalities of navigating new systems (Campbell, 1996: 29). Pinfield concurred with this view, noting that the complexity of the electronic information environment means that clients often need more help than ever in using the available tools, making strong client support systems essential (Pinfield, 2001: 9).

Piggott noted that acceptance of electronic information access and delivery is often mixed. Clients with a strong technological base accept electronic delivery as normal; others who are not as technologically literate need extensive training to be comfortable with virtual libraries (Piggott, 1993: 210). Indeed, Garrod noted that end-users are reluctant to even try electronic services if they have no understanding of what the resource is and what it offers them, as well possessing the necessary level of computer skills (Garrod, 2001: 31).

In the area of user-initiated requesting, it is apparent from the literature that most such services are located in the loan and interlibrary loan areas. Prabha noted that the emergence of consortia has produced a movement towards user-initiated interlibrary loans in both academic and public libraries. She further noted that email and Internet-based forms have become the normal method for submitting such requests. She considered that the advantage of these systems lies in the fact that the requesting systems are an integrated part of the local system, requiring no additional effort on the part of users to obtain materials (Prabha, 1999: 1-2).

Preece and Kilpatrick looked at the user-initiated interlibrary loans processes of the Southern Illinois University, Carbondale. In a small survey, they found that users were overwhelmingly satisfied with initiating their own interlibrary loans, and by cutting out the "middle person", users had been empowered, with steady increases in both the number of users and number of items borrowed. They also found that users perceived that they could get what they wanted more quickly by doing it themselves. Similarly, the library found that it was able to devote more time to more complex interlibrary loan matters, due to a decrease in the amount of time needed to process routine requests (Preece and Kilpatrick, 1998: 6).

Against this, Haslam and Stowers found that, rather than decreasing, the University of Nevada, Las Vegas (UNLV) actually experienced an increase in both interlibrary loan workload and expenses during a trial of unmediated document delivery services. In this study, the library found that those who used the unmediated service were not regular users of traditional interlibrary loans services, and thus there was no decrease in regular document delivery work Haslam and Stowers, 2001: 89).

Shreeves considered that the move to allow clients to initiate unmediated requests to external libraries is one of the more interesting aspects of virtual libraries. However, he also noted that such systems raise many policy issues that libraries must consider, including availability, applicability of circulation and interlibrary loan policies, and borrowing limits. He stated that "[p]atron-initiated ILL promises to put pressure on consortial commitments to view members' resources as a seamless whole, the consortium as 'one library'" (Shreeves, 1997: 3-6). Similarly, Hawks noted that while very convenient for clients, user-initiated requesting systems are "fraught with policies" (Hawks, 1995: 7-9), with similar views being expressed by Berry (2000: 160-161).

When considering the issue of unmediated user access to article document delivery systems, Holleman noted that there is a danger that wasteful purchasing by unsophisticated or malicious library users will occur, causing "painful" financial problems to librarians (Holleman, 2000:703). This view was echoed by Jacobs and

Morris, who considered that cost and pricing structures would be "major factors" in library acceptance (or otherwise) of end-user document delivery models (Jacobs and Morris, 1999: 73).

2.2.3. Reasons for Implementing Virtual Libraries

Different libraries have many reasons for developing virtual libraries. Their reasons range from the very broad to the very narrow, from the grand vision to the very practical. Researchers have found that different libraries have specific and differing motivations for creating virtual libraries, and different expectations about what they will provide (Meyyappan et al., 2000: 339). Furthermore, while some libraries begin their conversion to the virtual environment gradually, others are "thrust" into it through organisational dictate (DiMattia and Blumenstein, 1999: 42).

In the introduction to a special issue of the *Journal of the American Society for Information Science* dealing with digital libraries, Fox and Lunin (1993: 441) noted that the need for digital libraries is based on a foundation with three legs: the first being the basic human need for timely and relevant information; the second being the accumulation of information, and its supporting infrastructure; and the third being supported by advances in methods and technology. Similarly, Majka noted that, with the development of virtual libraries, libraries have been offered the opportunity of a lifetime to exchange current sources for information sources that can be delivered to the desktop, regardless of its location, via a "near-universal user interface" (Majka, 2000: 69).

Arms said that libraries hope to improve organisational life by building better libraries, or they would not be building "electronic edifices". He was confident that electronic libraries can, and will, deliver enormous benefits, but in 1992, these benefits were still mostly potential (Arms, 1992: xxx). This view was later echoed by McDonald, who stated that "[d]espite all the research and all that has been written,...we are very much at the start of the electronic adventure" (McDonald, 2000: 5).

In 1995, ARL examined the issue of virtual libraries at a national level in the United States. It considered that there are six basic reasons for developing a national digital library system:

- It can be used to expedite the systematic development of means to collect, store and organise information and knowledge in digital form, and digital library collections.
- It can promote economical and efficient delivery of information to all parts of society.
- It should encourage co-operative efforts in research resources, and computing and communications networks.
- It should be used to strengthen communication and collaboration between and among research, business, government and educational communities.
- It must take an international leadership role in the generation and dissemination of knowledge in areas of strategic importance.
- It should contribute to lifelong learning opportunities for all (Association of Research Libraries, 1995: 1).

Many authors have noted the fact that society's information culture is changing. Chen stated that the knowledge world is changing from a paper culture to an electronic one (Chen, 1996: 313), a sentiment with which McGee (1998: 1) concurred. Holmes-Wong, et al. (1997: 74) also agreed with this view, noting that "...communication is moving from a paper-based, text-centred model to one that is digital and multimedia based". They continued to say that library collections would follow this trend.

Given this move towards a more electronically based culture, many have agreed that while traditional sources are still important, they are simply no longer enough (Lynden, 1996: 3). Prime (1994: 1) concluded that "[a] time is coming when corporations, in order to survive, will have to move toward the virtual library because it is going to come whether they like it or not". Price concurred, stating that libraries and library services must change if they are not to become irrelevant

(Price, 1996: 51). Broering (1995: 77) wrote in a similar vein, stating that libraries must take the necessary steps now if they are to play the information game tomorrow.

In a more electronically based society, the Benton Foundation believed that libraries must act as an "information safety net". It stated that public libraries are uniquely suited to provide gateways for people in underserved areas, as they have traditionally been viewed as "the people's university". The Foundation considered that libraries should provide training, equipment and information to the 'information have-nots', and for this reason, they should pursue virtual library and other electronic initiatives (Benton Foundation, 1996: 1.3).

Financial factors often figure as reasons for development, both in terms of cutting costs and raising revenue. Modern libraries have to contend with a wide variety of constraints upon their funding, ranging from the ever-increasing cost of acquisitions and subscriptions, to the explosion in the amount of information available, to endemic budgetary reductions. Arms noted in 1992 that, although electronic libraries were even more expensive than traditional libraries, the price of the components was falling rapidly. His contention was that by 2002, computerised storage would be cheaper than storing books on shelves (Arms, 1992: xxx-xxxii). Similarly, Mason believed that networked electronic access is one way of counteracting financial constraints on collection development (Mason, 1996: 2-3).

According to Noerr (1998: 8-9), some organisations are turning to virtual libraries in order to raise revenue by selling digital information and services. King considered that many libraries are investing in information technologies in the expectation that there will be financial rewards for doing so (King, 1993: 167-168). Overall, Marcum (1997: 82) considered that the financial incentives for undertaking virtual projects are simply too great to be ignored.

Others writers reasoned that virtual libraries address problems inherent in traditional physical libraries. Lesk (1997: 2) noted that digital libraries "address traditional problems of finding information, of delivering it to users, and of

preserving it for the future." He also stated that "[d]igital information takes less space than paper information and thus may help libraries reduce costs". Saffady concurred with Lesk's view. He stated that the virtual library simplifies the day-to-day maintenance and control of collections because materials are never on loan, overdue, mis-shelved, returned damaged, or stolen. Similarly, the need to physically maintain materials is eliminated, and the need for large amounts of storage space is reduced (Saffady, 1995: 235).

Many information professionals consider that virtual libraries should be built because they have the potential to expand and extend current library services, and to create innovative new services. The Queensland Department of Education Library noted that their virtual library could provide access and deliver information to large numbers of clients in a cost-effective way. The Department stated that it does not replace traditional sources, but is an extension to those services, offering capabilities never before available (Cram and Allison, 1995: 10). Mitchell wrote that the best virtual libraries add value to library services (Mitchell, 1997: 5), while Harden believed that the virtual library concept offers almost unlimited opportunities to devise new and innovative services. He considered that the library of the 21st Century will be very different from today's library and continued to say that "[i]f [librarians] accept the challenge, the profession stands to gain immeasurably from the development of the virtual library" (Harden, 1994: 101).

Broering (1995: 77) considered that library clients can make more informed decisions, thus making their jobs easier, by tapping electronic resources in a coordinated way, something which virtual libraries facilitate, while Crawford believed that by "...providing information in a timely fashion to our patrons without requiring their physical presence in the library, [t]he reach of the library and the effects it can have on patrons have expanded greatly" (Crawford, 1999: 64). Stratigos and Strouse found that, in many cases, libraries that were developing a virtual library were doing so because it would permit them to serve many more clients with only modest increases in staffing and budget (Stratigos and Strouse, 2001: 67).

The perennial issue of access to information versus ownership is another regularly cited reason for virtual library development. Writing on the topic in 1980, Harley considered that while theoretically possible for a library with very limited, well-defined objectives to collect everything in its field, it was impossible for practical purposes (Harley, 1981: 164). Friend has more recently considered the possible future for libraries. He believed that "[t]he one certainty [for the future is] that we shall not be able to afford to buy as many books and journals as we buy now… So unless we give up the fight to provide library users with the information they need, we may be forced to take the question of access in lieu of holdings seriously whether we believe in it or not" (Friend, 1992: 105-106). Desmarais and Luther concurred with this view. They continued to say that when a library can no longer afford to collect or own materials, it's focus must shift more towards providing access to materials owned by others. It was their opinion that virtual libraries can allow library clients to access information that cannot be maintained on site by connecting to remote databases and networks (Desmarais and Luther, 1996-1997: 24).

Also, unlike a physical library, the virtual library is, at least theoretically, available at any time, from any location with access to a computer and telecommunications. In a study conducted by the Benton Foundation, leaders in American public libraries acknowledged that information can be created, gathered and disseminated at any time in any place, and that the digital library can thus reduce, perhaps even eliminate, geographical and temporal barriers (Benton Foundation, 1996: 1.3). Keys' vision of virtual libraries was rather grander. He believed that they would "free users from the constraints of time and space", give information seekers "24x7" access to information resources, and free people to "work when and where they are most productive" (Keys, 1995: 24-26).

Some authors have noted that the virtual library offers superior access to information by utilising the searching power of computers. By using full-text searching capabilities, information can be located and accessed through multiple access points (Lesk, 1997: 1-2). Broering stated that two important benefits of the virtual library are the low cost and time savings when searching for information

(Broering, 1995). Aligned with superior searching is the ability to access greater amounts of information. As Mitchell noted, virtual libraries are intended to handle more, rather than less, resources, and cover larger, rather than fewer, disciplines (Mitchell, 1997: 5). King (1993: 167-169) and Manville (1994: 36) also listed this capability as a major reason for implementing a virtual library.

Another reason given for the interest in virtual library development is the recent dramatic advances in computing and telecommunications technologies. Griffin (1997: 114-115) wrote that "computing and communications technologies have become powerful, economical and widespread", a sentiment with which Mason (1996: 3) concurred. Griffin continued to note that there are now international networking infrastructures in place, along with common standards to govern their use, which has also given impetus to the creation of virtual collections.

There has also been a huge growth surge in the availability of electronic information, which is an obvious flow-on effect from the advances in computing and telecommunications technologies and standards. Malinconico and Warth (1996: 134) have studied the extent to which libraries are using electronic information sources. They noted that electronic products and services are appearing at a rapidly increasing rate. Dowler and Farwell (1996: 7) listed this availability as a key reason for Harvard University Libraries' decision to develop a virtual library.

For Saffady, virtual libraries are simply the next development in the library automation process. He stated that "[t]he finding aids that support library collections are increasingly computerised; computer-based management is the next logical step in library automation" (Saffady, 1995: 224).

Another key factor in the development of virtual libraries is client demand. According to Malinconico and Warth (1996: 134), users find electronic products and services "attractive", and when available, use them more heavily than traditional print sources. Manville (1994: 36), Czech (1996: 211) and Noerr (1998: 8-9) all noted that client demand is a prime force driving virtual library development. For

Gilbert, the main reason for developing virtual libraries simply lies in the fact that they are user-centred (Gilbert, 1993: 14).

Perhaps the best summary of the advantages and disadvantages of virtual libraries was provided by the Trends Awareness Committee of the Library Administration and Management Association (LAMA). It found nine pros and cons, with advantages being that a virtual library can:

- Provide wide access to information;
- Provide unique and distant information;
- Provide current information
- Enhance access to information through keyword and Boolean searching;
- Increase a library's collection;
- Provide access to information available exclusively online;
- Provide multimedia with one workstation;
- Fulfil popular demand, as many users now prefer electronic means of getting information; and,
- Foster cooperation.

On the negative side, virtual libraries:

- Often prove to be an ineffective and inefficient way to get answers;
- Do not provide accountability for quality and accuracy;
- Lack organisation;
- Will never provide everything;
- Involve costs that are high and continuing;
- Lack the human factor;
- Involve practicalities, such as telecommunications and infrastructure, that delay success;
- Cannot furnish or preserve certain types of essential information; and,

- Will never be a panacea (Library Administration and Management Association. USA Public Relations Section. Trends Awareness Committee, 2000: 95-97).

2.2.4. *Issues Affecting and Affected by Virtual Library Development*

McDonald believed that libraries are only at the beginning of their "electronic adventure", and since there are no established rules for the development of virtual libraries, libraries are "making it up as [they] go along" (McDonald, 2000: 5). The writers in the field are all agreed that there are numerous issues impacting on virtual libraries which must be resolved if progress is to continue. Authors have differed on the significance of the various issues, but the issues all fall within nine inter-linked subject groups: legal issues; financial issues; client issues; personnel issues; organisational issues; management issues; technological issues; collaboration issues, and; subject discipline issues.

2.2.4.1. Legal Issues

The literature gives much consideration to the legal issues involved in virtual library development. Lynch suggested that this is because the "legal, political and cultural problems are just starting to surface. They are going to get much more complex, and much more difficult" (Lynch, 1997: 32). The main issues in the legal arena are copyright and privacy, with the overwhelming majority of writers focussing on copyright.

Lesk considered that moves towards digital collections and services would be strongly affected by copyright and licensing requirements. According to Kuny and Cleveland, copyright has the potential to "derail" digital libraries altogether (Kuny and Cleveland, 1996: 3). Mason concurred, noting that the potential advantages offered by virtual libraries are threatened by the possibility of increased levels of copyright protection (Mason, 1996: 6,9). Similar views were also expressed by Brian (1991: 170), Ellis (1994: 46), Valauskas (1995: 136-137) and Pacifici (1997: 5), among many others. For Ribaudo, et al. the resolution of intellectual property issues is "paramount" to the viability of virtual libraries. Until these issues are resolved, the development of virtual libraries will be "hobbled" (Ribaudo et al., 1994: 6). Fong

concurred, stating that digital libraries face much higher levels of legal risk than traditional libraries (Fong, 1999: 1).

Lynch noted that "it has become very clear that while a tremendous amount of resource sharing is *technically* possible, much of this will be prohibited by copyright law or by license agreement" (Lynch, 2000: 64). This view was echoed by Pinfield, who believed that the relationship between libraries and vendors is changing with the increased availability of electronic information. Since licensing, rather than copyright, governs much of the usage of electronic resources, this allows the vendor to take a much stronger position on how, and by whom, information is used (Pinfield, 2001: 6).

Many believe that current copyright regimes must be revised for the electronic era. Wynne noted that in regard to electronic copyright, current laws are "unhelpful" (Wynne, 1996: 18), while Mason stated that the law contains many inadequacies, and that its shortcomings with regard to new technologies causes considerable uncertainty (Mason, 1996: 6). For Schrader, copyright is still relevant in the electronic information era. She believed that the main issue is "...what legal regime will stimulate the optimum quality and quantity of new works while facilitating their wide dissemination at reasonable cost to the public" (Schrader, 1994: 49).

Within the copyright debate, the issue of fair dealing or fair use is one that is of much concern to libraries. Ray considered that there is a significant danger that publishers will gain increasing control over information, leading to charging for every use, and the destruction of fair use (Ray, 1996: 29), a concern raised by many others, including Price (1996: 51), Harper (1997: 12), Lynch (1997: 37), and Fong (1999: 2). Black believed that fair dealing provisions may be reduced or become totally redundant in the digital environment, except where information is available at no charge (Black, 1995: 142), while Wynne noted that it is "...widely held that there is no 'fair dealing' in electronic material" (Wynne, 1996: 18).

Garrett and Lyons believed it inevitable that copyright will adapt, based on the development of new technologies. They suggested that copyright owners must

understand that current ways of doing business may no longer be appropriate for the "digital marketplace of the future" (Garrett and Lyons, 1993: 469). On the other hand, Arnold and Ramsden noted that publishers want access to electronic information controlled because they wish to protect their revenue and that of their authors (Arnold and Ramsden, 1995: 189).

Similar views were held by Mann. He noted that digital library enthusiasts tend to regard copyright as a problem to be solved. However, he considered that "[*p*]*iracy* is the problem; *copyright* is the answer" (Mann, 1999: 56). Brian argued that current laws are no longer adequate to protect the interests of copyright holders, and that all parties need to look critically at why copyright exists, rather than treating it as a 'given' which must be modified as each new technology is developed (Brian, 1991: 168).

For Wodetzki, the balance between protected rights and exemptions to those rights must be redefined in the digital environment, something that will be no easy task. She stated that authors, publishers and libraries must start searching for common ground, rather than differences. She also noted that rights holders and users all have legitimate concerns. Copyright owners have the right to exercise reasonable controls on the use of their works, and to demand payment for such use. Libraries and their clients have the right to expect that information will be made accessible to them, that royalties will be reasonably priced, and that fair use will continue to apply (Wodetzki, 1996: 2-3).

Along with copyright, the other major legal issue is that of privacy. Lynch noted that the 'information world' would raise many new issues, including privacy. He continued to say that "...your personal PC knows an awful lot about you" (Lynch, 1997: 34). Similarly, Kirby noted that in cyberspace, a determined investigator could collect large amounts of data about an individual. He considered that this vast quantity of personal information is likely to increase rather than decrease, and that "[t]o the extent that the individual has no control over, and perhaps no knowledge about, the mass of identifiable data that may be accumulated concerning him or her and to the extent that national law-makers, despite their best

endeavours, enjoy only limited power to protect the individual in the global web, privacy...is steadily undermined" (Kirby, 1999: 15).

The Australian Federal Privacy Commissioner held similar concerns, stating that while there has long existed the to potential for publicly-available personal information to be collected about individuals, the introduction of new technologies has meant that it is both "...possible and relatively cost effective to collect and use [such] information in large quantities and to link it either individually or in bulk to other information in a whole range of ways that people may not reasonably expect" (Australia. Office of the Federal Privacy Commissioner, 2002: 5).

In a library context, Atkinson believed that, in the virtual library, libraries would need to intrude a little more on user privacy by assembling data from use studies, as this can be an instructive means for improving service (Atkinson, 1999: 19). On the other hand, Cottrell stated that "privacy and confidentiality have always been crucial issues in librarianship", with data collected in the course of library business being treated with great care. She believed that technology might exacerbate risks to privacy and confidentiality, leading to new responsibilities for librarians to protect this information (Cottrell, 1999: 109), a view echoed by Balas (2001: 53-55). Similarly, Smith (2002: 4) considered that libraries should be prepared to use client data collected through digital transactions, but to handle this information in an ethical manner, so that the "trustworthy" image of libraries is not compromised.

Merry noted that modern technology allows electronic tracking of information usage, and while copyright holders need protection for their rights, users must also have the right to privacy protection. She considered that old privacy protections have become either "inadequate or irrelevant", and that librarians "...must take a proactive stance on the issue of privacy to forestall a dangerous situation before it is entrenched in practice" (Merry, 1996: 36-37, 42), a view with which Cochrane and Lean (1995: 379), Buschman (1993: 140-143) and Von Elm and Trump (2001: 35) concurred.

2.2.4.2. Financial Issues

Many authors believe that financial issues will have a major impact on virtual library development. In a Delphi study on the future of academic libraries and librarians, Feret and Marcinek found that financial issues are considered the most important issue currently facing libraries (Feret and Marcinek, 1999: 5). Campbell stated that "...[t]he toughest challenge of creating...the new library paradise really appears with the issue of finance. It is easy to contemplate the new opportunities;...it is hard to pay for them" (Campbell, 1996: 31). Arnold held similar views. He believed that libraries would need to lobby vigorously for funds, for while information may be free, delivery systems are expensive (Arnold, 1994: 12). Likewise, Garrett noted that information costs money, and that better information costs more (Garrett, 1993: 11).

Garrett suggested that virtual libraries would cost a lot, but that much more research is needed before libraries can even ask the right questions about the economic challenges. He also noted that working out "who owes what to whom" will be very difficult in a distributed library environment, because of the very large amount of information involved, as well as the sheer numbers of information owners and providers (Garrett, 1993: 3-4).

Trolley stated that "[i]n terms of development, costs for [electronic library] initiatives and products are in the billions of dollars. While a cost saving in delivery of information via electronic channels may appear 'cheaper', the cost of designing and supporting these systems has been dramatic" (Trolley, 1997: 224). This view was echoed by Pinfield, who noted that instead of immediately reducing library costs (as often expected by senior managers), developing a virtual library will not provide an easy way of saving money (Pinfield, 2001: 2).

In a similar vein, Tebbetts noted that it has become clearer that virtual libraries are a "long-term" cost, rather than a one-time add-on cost. The fast-paced development of information technology requires "updated hardware to manage more powerful software and faster telecommunications connections". Although existing platforms may not "wear out", their usefulness becomes limited, because they can no longer

meet the requirements of new applications and expanded resources. She considered that many libraries have not budgeted for this situation, and that strategies for long-term funding must be developed (Tebbetts, 2000: 127), a view shared by Kemp (1997: 35) and Pinfield (2001: 2-3). Cline also agreed with this view, believing that the total cost of virtual libraries will be hard to determine. She also stated that the important thing is for libraries to identify a "predictable annual cost" so that budgets can be managed (Cline, 1996: 21). For Noerr (2000: 7), long term funding commitment is essential to virtual libraries, as, unlike other libraries, virtual libraries that are left alone become useless.

Ray considered that the "economic realities" for libraries must shift with the move to the information age. Technology is altering the way information is stored; it must correspondingly alter the way for which it is paid (Ray, 1996: 29). Similarly, Smith and Johnson considered that a "long-term solution" is beginning to emerge with moves towards an electronically based society (Smith and Johnson, 1993: 389). Van Houweling noted that support for libraries increasingly will be based on the value they deliver, and that new financial models must therefore be considered (Van Houweling, 1996: 15). Young concurred, noting that new electronic services require "radically different approaches to library budgeting" (Young, 1996: 111). In a similar vein, Majka stated that "[t]here are significant financial nuances to the transformation to the digital library that extend beyond the basics of budgeting for new products and new equipment" (Majka, 2000: 68).

Ray believed that with the move to digital information services, libraries may be forced more toward "fee-for-service" models by vendors pushing for "metered use" of their products. However, he also believed that a fee-for-service approach might be advantageous to libraries in some situations (Ray, 1996: 30). Similarly, Gilbert believed that libraries should be thinking in terms of financing based on service levels rather than on collection costs. He wrote that "…the virtual library is user-centred and it would seem more appropriate to charge on the basis of usage, particularly to users outside one's own mother organisation" (Gilbert, 1993: 14). Keller noted that while some are unenthusiastic about pay-per-use and fee-for-service models, these are likely to become more necessary in future (Keller, 2001:

391). Smith expressed similar views, believing that digital libraries may need to be "run on more commercial lines than their traditional counterparts" (Smith, 2002: 5).

Price stated that "[g]reat savings are not going to exist through virtual collections. Material costs will remain constant even though the mix of services and formats...may be very different... [T]radeoffs involving all parts of the information chain must occur in order to keep costs down" (Price, 1996: 53). Majka held similar views noting that libraries have the opportunity to examine costs and tradeoffs, and decide where economies or worthwhile investments can be made. He continued to state that "it is a great, perhaps unprecedented, opportunity to perform a comprehensive review of how the library serves its patrons and to shift product and services to meet the needs of the digital age" (Majka, 2000: 71).

Smith and Johnson noted that libraries are facing shrinking budgets and purchasing power, while having to provide access to more information in more formats (Smith and Johnson, 1993: 390). Likewise, Quandt suggested that libraries have become economically disadvantaged through changes to the pricing of materials, to the point that they are in danger of being unable to provide sufficient information. He contended that electronic publishing and delivery might improve libraries' financial positions, depending on how, and how much, vendors charge for licenses to access their products (Quandt, 1996: 9, 15).

Lowry suggested that "[l]ibraries will not have large amounts of new resources to buy electronic information..." (Lowry, 1995: 113), while Kurzweil noted that library budgets are not unlimited. For this reason, he believed it highly likely that the virtual library would have constraints on its services, just as traditional libraries do today (Kurzweil, 1992: 64). According to Campbell "...it is difficult to move forward...without using funds [that are] already committed". To move to the virtual library, libraries "...will have to reallocate dollars previously devoted to long-standing library operations... [T]he new information environment...must be bought at some price to present...service". He stated that it is therefore critical that libraries work closely with clients to achieve the library of the future (Campbell, 1996: 30-31).

2.2.4.3. Client Issues

According to the literature, the major client issue for virtual libraries is that of user needs. Van Houweling stated that virtual libraries must focus on users if they are to work. Libraries must ask what is good for the client, rather than what is good for themselves (Van Houweling, 1996: 15). Piggott noted that the user is the key to the success of virtual libraries because the whole purpose of a virtual library is to satisfy the user's information needs (Piggott, 1993: 206), while Price wrote that virtual library services must be based on user needs if they are to be supported (Price, 1996: 52).

Strong (1996: 155-156) noted that libraries of the future would allow end users to decide what they will explore, how they will navigate and when they are satisfied with the result. To achieve success, librarians must realise that users must be included in service design and delivery processes. Sylge was particularly blunt in her assessment. She believed that libraries must listen to client needs and modify services accordingly, or they will die (Sylge, 1996: 30). Similar views were also expressed by Wilson (2000: 81), who considered that discovering what library clients want and need is not only crucial to proper planning and delivery of library services, but the cornerstone to staying alive.

Strongly related to this was the issue of client expectations. According to Campbell, users have become accustomed to the speed of electronic information delivery, leading to an increase in their expectations. He was concerned that users may be expecting more that we can deliver (Campbell, 1996: 26-27). Cline noted that users want more access, both in terms of the scope of choices available as well as the diversity of access points, and that they want it from wherever they are working (Cline, 1996: 18). Cox considered that user expectations are changing. People have become used to using computers, which has implications for the types of services offered to library users and the way in which they are supported (Cox, 1996: 168-169). Wilson simply noted that libraries need to stay ahead of client expectations to remain viable (Wilson, 2000: 85), while Stratigos and Strouse found that desktop access to information is no longer just "nice to have", but a necessity (Stratigos and Strouse, 2001: 68). Despite this, Oppenheim and Smithson believed that users are

not interested in "ambitious visions" of the future. Rather, users want to have easy access to what is available now (Oppenheim and Smithson, 1999: 109).

Various authors raised the issue of client resistance. Lesk (1997: 3) considered that one of the forces delaying the development of digital libraries is that many people have a real preference for books the way they are. Similarly, St Clair noted that some users find reading from the screen "unacceptable" (St Clair, 1997: 80), while Sylge wrote that many users still prefer paper copies, so they make printouts of electronic information (Sylge, 1996: 28).

In a similar vein, Crawford considered the issue of access versus ownership. Although not against technological developments, Crawford is opposed to the hype and mythology that surrounds much of the debate about the future of library services, and virtual libraries in particular. He noted a Research Libraries Group report, *Preferred Futures in Libraries*, which stated that clients want materials to be available locally, rather than at some distant library. Likewise, some clients depend on the ability to browse at the shelf. He believed that pushing towards virtual libraries regardless, becomes a case of telling users what they need, rather than giving them what they want, which is doomed to fail (Crawford, 1995: 162-163).

Chowdhury and Chowdhury believed that "[a]s digital libraries become a major source of information for many people, there is a need to know more about how people seek and retrieve information in digital environments" (Chowdhury and Chowdhury, 1999: 427). Guenther echoed this need for user studies, stating "[t]o truly understand how to build the digital library, we need to start with understanding more about our end users. They are they keys to creating any type of product" (Guenther, 2000b: 49-50). Similar views were expressed by Pinfield, who noted that libraries need to know not only who is using electronic resources, and how, but who is not using them (Pinfield, 2001: 9).

According Van Fleet and Wallace, libraries serve more roles than just providing access to information. They are not merely "storehouses", but places in which people "seek and exchange" information. Electronic communications systems are

effective within their own limits, but they are not a complete substitute for face-to-face interaction (Van Fleet and Wallace, 1993: 308). Cox (1999: 5) also noted that physical libraries always formed a public meeting place, and questioned how this could be recreated in the virtual sphere.

Arnold noted that visions of the virtual library are threatening to some because they change the way knowledge is organised. He noted that "[a] collapse of traditional roles always creates uneasiness" (Arnold, 1994: 11). Smith and Johnson held similar views. They considered it likely that there will be client resistance for some considerable period of time, and that it should not be underestimated. At the same time, they believed that librarians could overcome resistance if changes are handled sensitively (Smith and Johnson, 1993: 392-393). Guenther (2000b: 49) considered that it could even be possible to expand considerably library client bases by building and delivering tightly integrated systems that will effectively serve users, and it appears that many libraries involved in virtual library developments hold similar expectations (Stratigos and Strouse, 2001: 67).

2.2.4.4. Personnel Issues

According to the literature, there are a number of personnel issues that must be taken into account when building virtual libraries. On the question of the human resource requirements of virtual libraries, Young (1996: 124) stated that "[d]igital information libraries have human resource requirements that are only now beginning to become clear". He noted that digital librarians would need to act as knowledge navigators and cyberspace organisers, as well as resource integrators and creators of information. He also believed that they would need to offer clients customised consultation and interpretation services, and to add value to the use of information. Likewise, Cox stated that "[w]hile the technology is important, the human resource remains the critical element in delivering electronic information services (Cox, 1996: 166).

Numerous authors have also considered the potential changes in staff roles and responsibilities. Griffin stated that "[t]he emergence of...new information technologies...has cast traditional organisational and managerial functions in a new

light, forcing new responsibilities on library staff at all levels of the organisation" (Griffin, 1997: 142). Similarly, Reid wrote that virtual libraries would require staff who were "willing to work and / or supervise in different environments,...[and] to develop, establish, and define new work habits, processes, norms, and means of communication" (Reid, 1995: 221). According to Arnold, libraries would need to rethink [their] strategies, with librarians needing to develop new skills. Such changes would, in his opinion, require a "reallocation of personnel as well as financial resources" (Arnold, 1994: 11).

Likewise, Campbell noted that staff in traditional libraries usually have specialties in one or other aspects of that traditional environment. He believed that, "[t]he new more technologically based information world...not only ignores the old boundaries but crosses them freely, mixing responsibilities, tasks and territories" (Campbell, 1996: 30). Burke considered that while many of the traditional roles performed by library staff would continue, there were also a number of new roles that could be performed by library staff in the virtual environment. These included: providing intellectual access to information in any format; evaluating available information sources; organising and structuring information; ensuring information preservation; and, providing specialised staff to offer instruction and assistance in accessing and interpreting resources (Burke, 2002: 34-38).

The virtual library literature has yet to specifically address the effect of virtual library developments on staff skills. However, the issue has been considered in the context of general library automation. Riggs and Zhang considered that technology is driving a "doing more with less" mentality. They believed that as less and less staff are forced to do more and more, they have less time to think critically about their work, leading to less "cerebral" work (Riggs and Zhang, 1999: 794).

Cottrell noted that some writers believe that new technologies will have the effect of deskilling many areas of librarianship, as automated systems take over many tasks. However, other authors have found evidence of both skilling and deskilling as new technologies are applied (Cottrell, 1999: 111; Mueller and Dyerson, 1999; 21). Perrolle concluded that "[c]omputer technology itself does not automatically have a

single effect on conditions of work. New means to rationalise intellectual activity and to embody technical skill, professional judgement, and decision-making logic in computers will not necessarily lead to intellectual assembly lines. They will, however, extend the deskilling debate to higher levels of the stratification system" (Perrolle, 1991: 223).

According to the literature, as staff roles and responsibilities change, so too must staff training and development change, along with staff competencies. Young considered that few would deny that new electronic services require radically different skills of librarians (Young, 1996: 111), while Grygierczyk stated that "[i]t has become commonplace to suggest that a growing number of skills are required from...library staff" (Grygierczyk, 1997: 86). Garrod noted that "[t]he literature on the topic of new skills and changing roles for information professionals has grown exponentially, and become more urgent in tone". She further noted that the common theme is that librarians urgently need to acquire new skills and knowledge. Further, she believed that a failure to acquire these skills could amount to "professional suicide" (Garrod, 1998: 244). However, Smith (2000: 2) noted that while the technologies used have changed, "the core areas of professional practice remain".

According to Hastings and Tennant, digital libraries require "digital librarians...to select, acquire, organise, make accessible, and preserve digital collections". They believed that although the broad tasks would be the same as those in a traditional library, the similarities would end there. They further noted that digital librarians would find themselves doing almost nothing they learned in library school, and little that is familiar (Hastings and Tennant, 1996: 1-2), with similar sentiments being expressed by Smith (2000: 1), Murray (2000: 1) and Pinfield (2001: 11-12). Tennant also considered that "the importance of staff training in the creation of virtual libraries cannot be overemphasised", and that "[a]ny investment made in retooling staff skills...will be repaid many times over in better service to clientele and a vital and engaged workforce Tennant, 1995: 46).

According to Noble, modern librarians required a wider range of skills, particularly in the areas of technology and networking, and thus the staff competencies required would also be altered (Noble, 1998: 54). Similarly, Ojala considered that core competencies are likely to change "significantly and abruptly" with the move to virtual libraries. In the area of information management, she believed that librarians would require:

- A solid understanding of information sources, and the ability to access them;
- The ability to deliver information in any form desired by the client;
- The ability to evaluate information resources, and thus add value to the information gathering process;
- The ability to organise information so that it is useable;
- The ability to anticipate client information needs, gained through a thorough knowledge of organisational goals and objectives;
- The ability to connect disparate pieces of information to create new information; and,
- A knowledge of when, how - and whether - to store information.

The organisational administration skills required would incorporate:

- A thorough understanding of the organisational environment in which librarians work;
- Expertise in the dynamics of team management and human dynamics in an online environment;
- The ability to communicate effectively in a variety of media throughout the organisation;
- The ability to market and sell information products;
- Provision of leadership and vision;
- The ability to be client-centred and customer-driven; and,
- Recognition of the fact that simply providing access to information is not enough - they must force information to permeate the organisation (Ojala, 1993: 231-233).

2.2.4.5. Organisational Issues

There are a number of organisational issues that must also be considered in the virtual environment. One issue that may impact on virtual libraries is organisational size. Although not in the particular context of virtual libraries, several authors have considered this issue in relation to organisational innovation. Such literature is relevant to the development of virtual libraries, as they may be considered a technological innovation, with impacts on the whole organisation in which they are implemented. Studies of organisational innovativeness conducted by Mytinger, et al., and Mansfield found that size was an important factor in organisational innovation (Rogers, 1983: 358-359). According to Mytinger, "…size…is perhaps the most compelling concomitant to innovation" (Mytinger, 1968: 7).

On the other hand, Rogers questioned whether size is as relevant a measure as it appears. He stated that "[f]ew scholars have much theoretical interest in size as a variable, but it is a convenient stand-in variable for other variables of interest". He further found that while easily measured, organisational size is "…probably a surrogate measure of several dimensions that lead to innovation, [including] total resources, slack resources, organisational structure, and so on" (Rogers, 1983: 359). Clayton (1997: 100) echoed this view, noting that "[i]t seems possible that the interactions between the various aspects of increased size…and successful implementation [of innovation] are more complex than the simple linear relationship [that earlier] studies have posited".

Many authors have considered the question of library organisational structures in creating virtual libraries. According to Arnold, libraries would need to "...break out of rigid organisational structures and begin to look across existing barriers" if virtual libraries are to be successful. He considered that a reconfiguration of management might also be necessary (Arnold, 1994: 10). Van Houweling believed that to make tomorrow's library work, libraries must be built on organisational flexibility. He noted that rigid structures and processes will certainly not bring success, and thus the way libraries are organised today needs to be rethought (Van Houweling, 1996: 15). Likewise, Prestamo noted that "[s]uccess in the electronic

environment can only be accomplished if libraries are ready and willing to rebuild their organisational and operational structures. Automation and modernisation will no longer be sufficient to build the library of the future" (Prestamo, 1996: 67). Similar views were also expressed by Smith and Johnson (1993: 393) and Steele (1994: 13).

Von Wahlde predicted that "innovative ways of using technology to transform traditional services or develop new services may not result in a change in the actual structure of an organisation but, rather, a change in the way people work, both with co-workers and clients" (Von Wahlde, 1993: 30). In a similar vein, Cooley and Goedeken considered that the increased acquisition of information in electronic form would lead to a steady withering away of divisions within libraries, with the workflows of the various departments (such reference and technical services) merging. They believed that this would lead to librarians' professional responsibilities becoming more seamless, with staff requiring "an in-depth knowledge of the broad range of information-handling activities" (Cooley and Goedeken, 1996: 53, 55). Pinfield expressed complementary views, stating that prioritisation of library staff time also needs to be reviewed, as "[m]anagers often expect staff to manage access to [electronic] collections...in their 'spare' time" (Pinfield, 2001: 3).

Novak noted that "[t]hings we were accustomed to seeing as highly distinct...become, if not one and the same, at least much more alike than they have been" (Novak, 2002: 2), while Steele believed that librarians needed to abandon rigid classifications, and become more flexible. He stated that librarians could not afford to "ghettoise" themselves into particular categories (Steele, 1994: 14-15). Cox (1996: 169), Commings (1997: 21) and Campbell (1996: 30) have all expressed similar sentiments. Indeed, Sokvitne believed that "[c]oncrete and antiquated" definitions of library staff duties would seriously impede the development of virtual libraries (Sokvitne, 2002: 171).

Saunders noted that technology has created new jobs, while eliminating others. She noted that public services have expanded, due to the growing to need to assist

library clients with the use of electronic systems and services. At the same time, technical services functions are being outsourced, leading to a reduction in staff in these areas (Saunders, 1999a: 781). Indeed, Stratigos and Strouse found that libraries that were developing virtual libraries actually expected staffing levels to increase, based on the greater potential reach of virtual services, and the consequent increase in client demand that this creates (Stratigos and Strouse, 2001: 67).

In a survey in ARL libraries, Johnson found that while lower level, clerical-type staff were often reduced as a result of library automation, this was not reflected at higher levels, with numbers of more senior (professional) staff either remaining static or increasing slightly. She further noted that, as a result of automation, more than half the libraries studied had reclassified staff members to higher-level positions (Johnson, 1991: 71-74). Dawes also found that automation makes some clerical jobs redundant, while paraprofessional staff are increasingly used to do tasks previously done by professionals. Professional staff are then primarily used as managers or information specialists. She also noted that automation often does not eliminate the need for particular tasks, but changes the way they are performed (Dawes, 1989: 6-7).

Hanson believed that as libraries become automated, they are forced to justify their claim to professional status. Such constraints can therefore force librarians to take on a more professional role (Hanson, 1982: 7). Arnold stated that "it does seem logical that...new technologies might free the professional skills of library staff by taking over routine logistical tasks" (Arnold, 1997: 26C). Roitberg also found that in a virtual environment, libraries still have a need for their professional staff, but they must be "prepared to move from one field to another, or to incorporate additional duties frequently". Alongside this, she believed that library staff would require higher-level qualifications, with constant updating, if virtual libraries are to succeed (Roitberg, 2001: 18).

White noted that technology could also alter the staffing mix for libraries. He considered that libraries need the right mix of professional and paraprofessional staff. He believed that there are two potential problems when this mix does not

exist. Either paraprofessionals do professional work, because *someone* has to do it, or professionals do clerical work, leading to a devaluation of professional skills (White, 1998: 117). Johnson (1991: 28) and Garrod (1998: 252) also noted this trend.

2.2.4.6. Management Issues

A wide variety of organisational management issues have been considered in the virtual library context. Powell considered that virtual library models seem to require significant changes in library management practices. However, he noted that the development of virtual libraries might only affect management approaches in a "tactical" way, without changing the "strategic" management fundamentals. He stated that "factors such as distance from customers, specific product/service delivery mechanisms, technology, and organisation must be planned and managed differently, but the underlying concepts of customer-focussed management are not profoundly changed" (Powell, 1994: 260). Against this, McDonald stated that while many in the library community believe that virtual libraries can be "grafted" onto traditional libraries, there is increasing evidence that "different organisational and managerial culture[s] are required for successful electronic libraries" (McDonald, 2000: 4)

Johnson considered the issue of organisational structure from the viewpoint of library automation processes generally. She believed that, in the majority of libraries, organisational changes are made spontaneously over time as a result of new technologies being introduced, rather than having new technologies introduced with a systematic, planned approach to structural change. She continued to state that "[c]hange *is* unavoidable, but it becomes more acceptable, more manageable, and more productive if we know what to expect and plan for it" (Johnson, 1991: 58).

The issues of strategic and financial planning are often raised in connection with the development of virtual libraries. Broering believed that libraries must develop strategic plans because planning for the future requires "...a vision of what the library will become". She also believed that such plans should address "financial resources, the organisational structure, changing technologies, and training needs

of our users" (Broering, 1995: 88). This view was echoed by Novak, who believed that "[v]irtual libraries need strategic planning as much as hard copy libraries" (Novak, 2002: 10). Balas (1999: 41-42) and Saunders (1999b: 43) also reiterated the need for strategic planning.

Prestamo likewise wrote that strategic planning is required to provide the structure and vision to transform to the library of the future, and that wherever possible, this should be undertaken "in concert with the institution as a whole" (Prestamo, 1996: 62). Cline noted that when libraries select the resources they will make available in the electronic environment, there will necessarily be impacts on strategic planning and budgeting, and that such choices must be therefore made within the context of the organisational mission, its structure and budget (Cline, 1996: 20). According to Steele, libraries in the electronic environment would need to redefine their mission and engage in strategic planning so that they understand, and are responsive to, the big picture in their "operational and institutional frameworks" (Steele, 1994: 13).

The issue of statistics and measurement systems, and whether traditional measures can be used to describe virtual libraries has also received some attention. Lindahl discussed the findings of a Danish Working Group, which considered whether conventional library statistics, as described by the *International Standard on Information Documentation: International Library Statistics* (ISO 2789:1991), can be used to cover electronic library activities. The Working Group concluded that although conventional statistics can be extended to cover specified electronic activities and services, there are problems in providing relevant and valid documentation of these activities, because conventional statistics cover a very narrow range of services, and allow only limited methods of collecting the required data (Lindahl, 1997: 4). Similarly, Gilbert cautioned against the indiscriminate use of electronically generated statistics, noting that they are not necessarily accurate or meaningful simply because they are easily generated (Gilbert, 2000: 18).

Young also considered the issue of library measurement in the digital era, noting that there is, as yet, no agreement on appropriate statistical measures for electronic resources and services. He believed that such measures are critical for

organisational efficiency, effectiveness, and performance. He further considered that attempts to extend conventional statistical measures raise difficulties that seem to require the development of new measures to overcome them. According to Young, new electronic services require the reconceptualisation of quantitative library measures (Young, 1997: 1-2). However, Missingham found that there were numerous similarities between traditional library statistics and those gathered in the electronic environment. She believed that the major reason for developing new statistical measures is because there is "a lack of comparable data..., a lack of context..., incomplete data usage, lack of comparable content... [or] different cost issues" (Missingham, 2001: 5), a statement reiterated by Luther (2001: 3-6). Marshall believed that information professionals are becoming more comfortable with sophisticated evaluation techniques, and that the challenge will be to develop techniques that will allow the continued development of library and information services (Marshall, 2000: 29).

Johnson noted that while libraries implement automated systems, such as virtual libraries, to improve their products and services, "…they will inevitably experience personnel problems and a certain degree of staff resistance". She continued to say that if an automated system is to work properly and be successful, then library mangers must pay attention to and address staff issues and resistance (Johnson, 1991: 125). Shepherd concurred with this view, noting that a common pitfall in the implementation of library automation is the failure of managers to "understand, anticipate and prepare for resistance". He believed that managers must devote time, training and communication, and assist staff to see how new systems can improve quality of work and staff efficiency (Shepherd, 2000: 4).

Klobas noted that the availability of new information technologies provides "...a significant opportunity for positive change in libraries", and that such opportunities can be realised if the introduction of new technology is carefully and deliberately managed. She further noted that when implementing technological change, libraries must pay attention to political processes within the organisation, and gain the knowledge and support of organisational decision-makers, so that the organisation as whole is prepared to accept the necessary changes. Otherwise, the

introduction of new technologies will fail (Klobas, 1990: 344, 347). Wynne, et al. also noted the critical importance of securing senior management's support when introducing virtual library services (Wynne et al., 2001: 1-2).

However McDonald (2000: 6) found that virtual library success could be achieved both 'top-down', with full organisational commitment and support, or 'bottom-up', with libraries succeeding almost despite their parent organisation. According to Griffin, the rate and extent of adoption of digital technologies will depend on many factors, including leadership by those who manage organisations (Griffin, 1997: 116). Similarly, Cline considered that the implementation of virtual libraries might create opportunities for libraries to lead changes within their organisations (Cline, 1996: 19), a view shared by Roitberg (2001: 16).

Greenstein noted that the challenges associated with virtual libraries really belong to the parent institution, and as such, must be resolved at an appropriate organisational level. He further considered that a virtual library could only be considered mature when its activities "are woven into the fabric of its host institution" (Greenstein, 2000: 300). Interestingly, DiMattia and Blumenstein believed that libraries that pursued virtual library developments would be less likely to be downsized or closed by their parent organisation, as virtual libraries are considered less "vulnerable" than their more traditional counterparts (DiMattia and Blumenstein, 1999: 43-44).

2.2.4.7. Technological Issues

There has been a great deal written on the technological aspects of virtual libraries, with many authors focussing on specific systems or kinds of systems. The question of specific technologies will not be considered here, as this is a very detailed area, requiring equally detailed study. However, there are a number of general technological issues that impact across virtual libraries, regardless of the specific technologies employed, and these are discussed here.

Lowry noted three basic tasks that must be accomplished for virtual library projects to be successful. First, there must be a seamless foundation of information

technologies that allows users to access information easily and without having to become technical experts. Second, there must be a substantial body of digitised information that clients really want to use. Third, legal policy and developments relating to copyright that will support virtual libraries must occur (Lowry, 1995: 39-40). Feldman stated that "[d]igital libraries face the technical challenge of storing massive amounts of data, retrieving data quickly and effectively transferring large files, indexing records, and building intuitive interface designs for navigation and content retrieval" (Feldman, 1996: 39).

Czech noted the kinds of technologies required to support virtual libraries, including: production technologies for capturing or digitising electronic information; storage and database management technologies; rights management and security technologies to control copyright requirements and protect stored data; and, client technology to allow users to retrieve and manipulate stored information (Czech, 1996: 212-213), with Ashoor (2000: 32-35) providing an almost identical list.

Garrett also considered the technical challenges associated with virtual libraries. Some of the challenges he foresaw include: how digital libraries will communicate with each other; how users will know where to look for what; how search results will be sorted, selected, merged and transmitted to users; how large distributed systems will learn and evolve; how data integrity and security are to be ensured; how attribution, authorisation and payment are to be handled; how data misuse is to be detected and corrected; and, how systems failures are to be contained and resolved. He further noted that these problems are "complex and interwoven", and much hard work remains to overcome them (Garrett, 1993: 2).

One of the major technological issues facing virtual libraries is the dual challenge of technological change and obsolescence. According to Van Houweling, libraries must focus on providing access to information created in the past, as well as guaranteeing continuing access to current materials. He wrote that as technology advances, libraries must preserve *content*, refreshing it as technologies change, rather than preserving the original information *format* (Van Houweling, 1996: 11).

Likewise, Greenstein noted that the persistence of digital information remains a critical issue for virtual libraries (Greenstein, 2000: 298).

Similarly, Ackerman and Fielding considered that *collection maintenance* would be a significant issue in the success or otherwise of digital libraries - much more so than in traditional libraries (Ackerman and Fielding, 1995: 10). Arms, too, noted that digital archives must not only be managed, but also preserved so that archival files can continue to be used (Arms, 1996b: 7). Pinfield also noted the importance of preservation strategies in the electronic environment, particularly as the number of available electronic-only publications, with no paper equivalent, increases (Pinfield, 2001: 7).

Cox considered that one of the greatest challenges in creating electronic libraries is keeping up with technological developments, a view echoed by Von Elm and Trump (2001: 33). Cox further noted that information services managers are expected to make decisions which require considerable financial investment, and thus he believed that managers should "...take their time, and have an eye to the past as well as the future", as technology has a habit of going full circle over a number of years (Cox, 1996: 164). Griffin believed that decision-making regarding digital library technologies will be easier in areas where infrastructure is stable and "technology trajectories" are more predictable (Griffin, 1997: 142). Arnold stated that "...the initial purpose of an effective new technology may quickly be altered in use. It will outgrow its creators. A new technology should be transformative..." (Arnold, 1994: 7).

The literature in the field notes that properly functioning systems are also fundamental to the success of virtual libraries. According to Cady, "[t]he virtual library makes library services and the people who deliver them very dependent on properly functioning hardware and software". If electronic systems malfunction or go down, virtual library users "...are locked out of liberspace as completely as if we closed the physical [library] buildings at random during the day" (Cady, 1995: 207). Schuyler considered this issue in a similar, if novel, way. He compared the virtual library to a "popsicle". A popsicle requires cold, generated by electricity. Turn off

the electricity and the popsicle goes away: turn off the electricity and the virtual library also goes away (Schuyler, 1998: 28). DiMattia and Blumenstein concurred, stating that when technology is less than optimal or fails altogether, then a library's ability to deliver "authoritative, cost-effective, timely service [through virtual libraries] is compromised" (DiMattia and Blumenstein, 1999: 43).

Both infrastructure and the electronic products themselves may also impose constraints on virtual library development. Van Houweling wrote that electronic libraries require stable, shared infrastructure if they are to serve the constantly changing needs of their clients (Van Houweling, 1996: 9). Priestley stated that "[i]nfrastructure does not come free. It needs development. It needs rolling out further. Networks need increased bandwidth". He then noted that this all costs money (Priestley, 1998: 32). According to Arruda, the lack of infrastructure, as well as the cost of telecommunications, are major barriers to the success of virtual libraries, especially in the developing world (Arruda, 1997: 1).

In a related area, Cline noted that the current state of local infrastructure would necessarily dictate many of a library's other choices in relation to virtual libraries, as computing and communications infrastructure are often those areas over which a library has least control or ability to change. She stated that decisions on the virtual library must therefore be made within the framework imposed by these issues (Cline, 1996: 16). Cline also noted that, quite apart from basic infrastructure considerations, the electronic products themselves may dictate certain constraints on the virtual library, through their technological limitations, limits of software or networking capacities, or limits imposed by publishers on product usage (Cline, 1996: 20).

Many authors have considered the issue of standards. Van Houweling stated that "[a] standards-based environment is fundamental to [the] evolution of [virtual library] architecture and tools" (Van Houweling, 1996: 8). Cathro noted that virtual libraries are concerned, among other things, with the transmission of electronic documents. He believed that to achieve this, there would also need to be adequate standards that would allow "universal exchange" of documents (Cathro, 1991: 181).

Murray (1999: 180), Chowdhury and Chowdhury (1999: 433), Gilbert (1993: 11-12) and Lavagnino (1998: 159-160) also stressed the critical need for standards in the virtual library environment.

However, Priestley noted that while there is much talk about standards and integrated systems, they do not work very well at present, because there is no single way to manage or provide integrated access to systems (Priestley, 1998: 30-31). Likewise, Greenstein (2000: 293) found that while there is a universally felt need for standards and best practices, they area, at present, "so differently defined as to render the objects of desire almost meaningless".

Another major issue is that of systems security and privacy. According to Martin, "[s]ecurity and privacy are important because many people in many places have access to a computer network. The information stored...may be of great value... It must not be lost, stolen, or damaged. It [must be protected] from hardware and software failures, from catastrophes, and from criminals, vandals, incompetence, and people who will misuse it" (Martin, 1981: 517). For Lowry, there are five essential security issues which must be considered, these being that: "users should be identifiable; users' actions must be authorised and monitored; data hardware and software must be protected from harm and unauthorised use; data must be reconstructable, auditable, and tamper proof; and transmission over the network must be failsafe and private" (Lowry, 1995: 42). Pinfield also noted the importance of security and user authentication in the virtual library environment (Pinfield, 2001: 5).

Overall, Fox and Lunin believed that the technical issues associated with virtual libraries will not be overcome quickly, noting that they will demand attention for "decades to come" (Fox and Lunin, 1993: 443).

2.2.4.8. Collaboration Issues

The issues of collaboration and cooperation are also constant themes in the virtual library literature. Numerous different authors have suggested that collaboration is a necessary part of virtual library development, but their reasons tend to vary.

According to Allen, the purpose of cooperation among libraries is to provide "better, faster, easier access to more" (Allen, 1994: 9).

Arnold stated that "[c]ollaborative enterprises will be essential to the invention of the new library, because no one institution can become *the* virtual library. The very concept implies cooperation" (Arnold, 1994: 10). Similarly, Price noted that although there have been some individual efforts that have made a difference, 'synergy' is what is generally needed to create successful virtual libraries (Price, 1996: 58). Prestamo agreed with this view, noting that libraries cannot reach the virtual ideal alone. "Cooperation, collaboration and partnerships" with others are required (Prestamo, 1996: 66). Bunker and Zick (1999: 2) expressed similar views, considering that successful virtual libraries cannot be developed in a vacuum, but must be created in conjunction with both users and information technology experts.

Jennings, however, approached the collaboration issue from the opposite viewpoint. He believed that libraries should not be satisfied having others design or implement their virtual libraries without close involvement by library staff, as libraries have "...a professional responsibility to ensure that the information architecture is sound, that the environment is accessible to all and that future developments are driven by the needs of...users" (Jennings, 1999: 14).

Berring wrote about the need for building bridges. He stated that libraries need to "create mechanisms which will facilitate cooperation" when developing and marketing digital services, otherwise they will not survive (Berring, 1996: 50). Price noted that creators and end users of information can now communicate directly with each other, which means that librarians, publishers and other "information intermediaries" must justify their roles or face extinction. She considered that to a certain extent, this makes them allies (Price, 1996: 53).

Sipe stated that "[t]he increasing complexity of the digital universe has made it clear...that playing the Lone Ranger, whoever and wherever we may be institutionally, is not the desirable way to proceed". She further considered that those libraries that form part of a publicly funded system have "built-in consortial

possibilities" within their system (Sipe, 1999: 360). In a related area, Sylge believed that there is a need to shift from a competitive approach to a more collaborative one, and that "[t]he time for closed development has passed". She believed that seamless integration of internal and external materials is needed, and that all areas of the library industry must work together to achieve such a result (Sylge, 1996: 30).

Similarly, Strong suggested that libraries must build relationships with publishers of both print and electronic materials, so that they have an active voice in what is being produced. Library staff interact with customers every day, gaining insights into what clients need, and they must be able to influence publishers to provide these things (Strong, 1996: 159). In Cline's opinion, libraries have to learn how to collaborate effectively so that they can continue to improve the systems by which they provide access to electronic resources (Cline, 1996: 24). Trolley believed that electronic library partnerships must involve users, library staff, technology managers, and content providers, all of whom can provide invaluable input (Trolley, 1997: 222-224).

Trolley also noted that there are many players developing electronic libraries, including technology companies, publishers, subscription agencies, service providers, publishing technology providers, networking suppliers, libraries, governments and private individuals. However, very few of these players are working independently - rather "partnering" is the predominant approach. She further considered that "the measure of success of these 'partnerships' must go beyond economics. Not only must we share the costs, it is imperative that we share a common vision or goal in the design and testing of these endeavours" (Trolley, 1997: 222). According to Baker, consortia, publishers, libraries and aggregators need to work together, as their interests are not in conflict. She believed that the ideal situation would be for all of these parties to "weave a web of cooperation" (Baker, 2000: 50).

Dews considered the impact of computerisation on libraries in a 1970 paper. He noted that the design of library computer systems was often done by members of library staff, in association with staff of local computing centres (Dews, 1970, 9-10).

Many authors consider this equally applicable to virtual libraries today. Seiden noted that writers considering the virtual library concept in the 1980s and 1990s thought that there was a need for "convergence" between libraries and computer centres. She stated that although the virtual library is not the only factor driving this convergence, it has "…compelled...[libraries] to look more closely at [their] relationships with the computing centre" (Seiden, 1997: 223).

Similarly, Rible stated that "[t]here is a great deal of potential for computing centres and libraries to merge services, philosophies, and personnel". He saw a natural alliance between the people that manage and administer the computers and the people that help others to use them" (Rible, 1999: 22). Blair believed that collaboration between libraries and computer centres would allow libraries to provide user services to those who need them, while the computer centre serves the library as "a technology advisor and as a support for the networking infrastructure" (Blair, 1994: 20). Pinfield also held this view. He considered strong relationships with information technology areas essential, as the virtual library is so dependent on the "infrastructure, hardware and expertise" provided by these areas (Pinfield, 2001: 10).

According to Wallace and Van Fleet, the danger of virtual libraries is that they shift thinking away from local needs and issues. Network strength is not a substitute for local collection building. The virtual library can only work if each part of the network has adequate access to technological support, is able maintain the necessary local collection, and has sufficient staff knowledge to make the virtual library meaningful to library clients (Van Fleet and Wallace, 1993: 308). Roitberg (2001: 17) concurred, believing that "levels of technical maintenance must be assured".

2.2.4.9. Subject Discipline Issues

The issue of subject discipline in virtual libraries has been considered by a number of writers in recent years. The authors in the field have tended to break this topic into two major areas: research and development; and content, with three major

subject specialisations: science and technology; social sciences; and, the arts and humanities.

Griffin found that much of the research on digital libraries has been localised into computer and information sciences venues. However, he found that it is difficult for science agencies, such as the National Aeronautics and Space Administration (NASA), Defense Advanced Research Projects Agency (DARPA) and National Science Foundation (NSF), to make awards to non-scientific disciplines, as such awards are often greeted with protest from the subject communities normally supported by such agencies (Griffin, 1998a: 7).

Levy noted that the current digital library agenda has largely been set by the computer science community, and is closely aligned with its interests and vision. He considered that there are other "constituencies" which must have input. He believed that social scientists could have valuable information to contribute on "the relationship between technological development and the societal benefits that might accrue from it". However, the social science work within digital library research and development has, to date, been largely confined to evaluating prototypes developed by computer scientists (Levy, 2000: 25).

Buschman noted that a type of censorship is occurring in the development of digitised technology-based collections, in that information producers are only investing in product development where there is a potential for profit (Buschman, 1993: 131-132). Noting the profit motive suggested by Buschman, Arnold considered that this trend aids areas such as law, medicine, business and technology transfer, but does not suggest as much hope for the humanities or the social sciences (Arnold, 1997: 26A-26B). According to Seiden, although an all-digital information environment may seem a long way off, in a few professions (including law, medicine, business, physics), this vision is close to being a reality (Seiden, 1997: 213).

At the same time, Tenopir and King noted that although the number and availability of electronic journals are increasing dramatically, there is still far less

scholarly scientific material available in various electronic forms than there is in print. They noted that according to *Fulltext Sources Online,* there were 2,017 scientific, technical, or medical full text sources available from commercial online vendors in 1995. Likewise, the *Directory of Electronic Journals, Newsletters and Academic Discussion Lists* listed more than 2,375 scholarly electronic listservs, newsgroups, and discussion forums in the sciences for 1996. They also found that several scientific disciplines have transferred much of their communication to an electronic environment (Tenopir and King, 1997: 3-4). In further research on the same topic, Tenopir and King found that the number of electronic journals listed in *Fulltext Sources Online* had increased to nearly 9,000 by 1999, with many of these titles being scholarly journals (Tenopir and King, 2000: 341-342).

Similarly, Black conducted research assessing social sciences coverage by four prominent full-text journal aggregators. Part of his study examined the extent of full-text coverage of social sciences journal titles. He found that 412 of the 1,513 journals indexed in the 1996 *Social Sciences Citation Index* (SSCI) were available in these packages. This meant that only 27% of all journals indexed in *SSCI* were available in full-text in any of the four packages (Black, 1999: 416-417).

While more exact up-to-date figures on the state of electronic journal publishing in various disciplines do not appear to be available, an examination of the *Fulltext Sources Online* Internet site in July 2002 showed that the directory then listed over 17,000 electronic fulltext sources (Information Today, 2002: 1). At the same time, the *Ulrich's International Periodicals Directory* database on *Dialog* showed listings for over 200,000 serial titles, with approximately ten percent of these being electronic resources (Thomson Dialog, 2002: 1). Although percentage of electronic fulltext sources to traditional journal titles has obviously increased dramatically in recent years, it would appear from these figures that the trend noted by Black and Tenopir and King has continued.

In a study of academic at the Australian National University (ANU), Milne found that the science, social science and humanities disciplines showed distinct differences in their usage of newer (electronic) library services. Here, the scientific

disciplines showed greatest general usage of these services, while humanities scholars made heavy use of library OPACs (Milne, 1999: 1-3). Hiller reported similar findings in a study of University of Washington library users, with science and health science users assigning considerably greater importance to the availability of electronic resources than their counterparts in the humanities and social sciences (Hiller, 2002: 8-9).

Khalil and Jayatilleke found that there are many scholars for whom research has changed appreciably as a result of new technologies. For some disciplines, technology has made research more efficient, but has had only a limited impact on the kind of research they do. However, in the sciences and social sciences, the nature of research is being significantly altered because technology makes it possible to explore issues that could not otherwise be investigated (Khalil and Jayatilleke, 1999: 242).

Massey-Burzio conducted research in the humanities department at Johns Hopkins University. She noted that one respondent believed that the library "might be following a science model and electronically presenting information as if everyone were a scientist". He believed that technology did not work as well for the humanities because "scientists and social scientists are object oriented in their research, while humanists are browsers" (Massey-Burzio, 1999: 628). Against this, Burrows noted that even when humanities scholars in Australia wish to take advantage of the developments that technology has to offer, they face significant problems. Not only is the availability of humanities-based electronic resources and technologies "patchy", but electronic resources in other disciplines, such as the sciences, are extremely expensive, placing major pressure on library support of the humanities (Burrows, 1999: 250, 254).

Massey-Burzio also noted that while humanities researchers are very interested in receiving digitised copies of ILL articles or articles from the library, they are concerned about living without print journals. They do not want to read articles on the computer screen and printing articles is not considered satisfactory. Likewise, only a few read electronic journals. She stated that "[w]hen they imagine the library

of the future, the humanists hope for a balance between paper and electronic materials...While they appreciate certain aspects and uses of electronic information, an all-digital library does not appeal to them at all" (Massey-Burzio, 1999: 632, 635).

Lester and Marshall also examined the needs of social sciences and humanities faculty in relation to virtual libraries. They found that most researchers were aware of the positive things that the virtual library offered, and were enthusiastic that libraries were on the cutting edge in many areas. However, social scientists and humanists were also keen that things should be "kept in perspective", with some dissatisfaction being expressed about the "mindless rhetoric and hype surrounding technology" (Lester and Marshall, 1998, 1998: 216).

According to Lynch, the availability of library catalogues through the Internet and electronic mail has brought in "a new era of access and communication" for those in the humanities. However, these developments have been irrelevant to many users, especially in the sciences, because their need is for journal articles rather than books or whole journal issues (Lynch, 2000: 63).

2.3. CONCLUSION

Overall, Griffin believed that "[a] proper balance...[in digital library] research, applications, content and collections has yet to be achieved" (Griffin, 1998a: 7). In many respects, the virtual library literature is very fragmented, with different writers considering small elements of the whole. Further, the most casual review of information in this field demonstrates the lack of balance referred to by Griffin, with some topics, such as copyright and technological developments, receiving great interest, while others, such as privacy, barely rate a mention. Given this general absence of holistic treatment, it is difficult to know exactly what a virtual library might look like. In Chapter 3, one potential model for virtual libraries will be formulated, based on the literature discussed above.

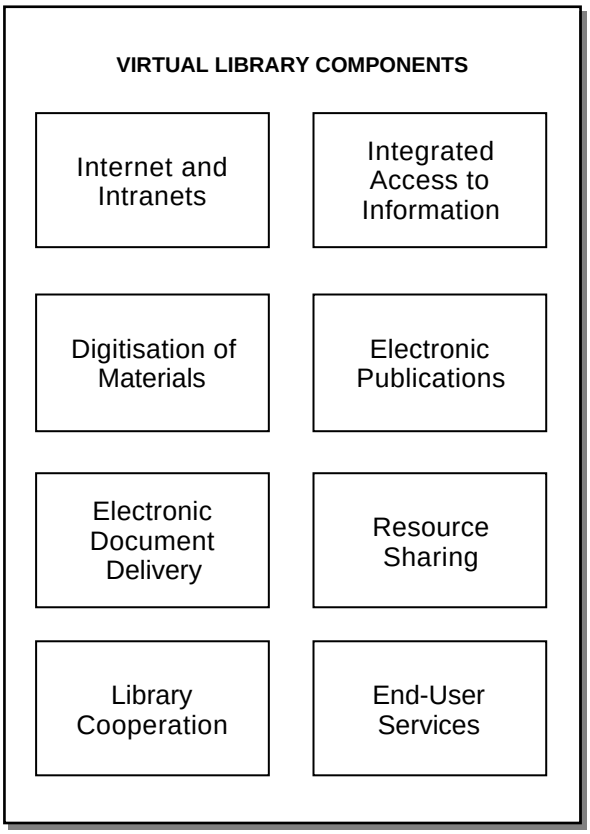
3. THE VIRTUAL LIBRARY

In Chapter 2, the literature on virtual libraries was reviewed. While it is apparent that there is little consensus on what a virtual library is, and what shape it may take, it is also clear that the writers in this field have an expectation that virtual libraries will consist of a number of complementary activities. In this Chapter, one possible model of a virtual library and its environment is formulated, based on the literature discussed in the previous Chapter. The possible applications, importance and problems of each element of the model will also be briefly considered.

3.1. THE VIRTUAL LIBRARY MODEL

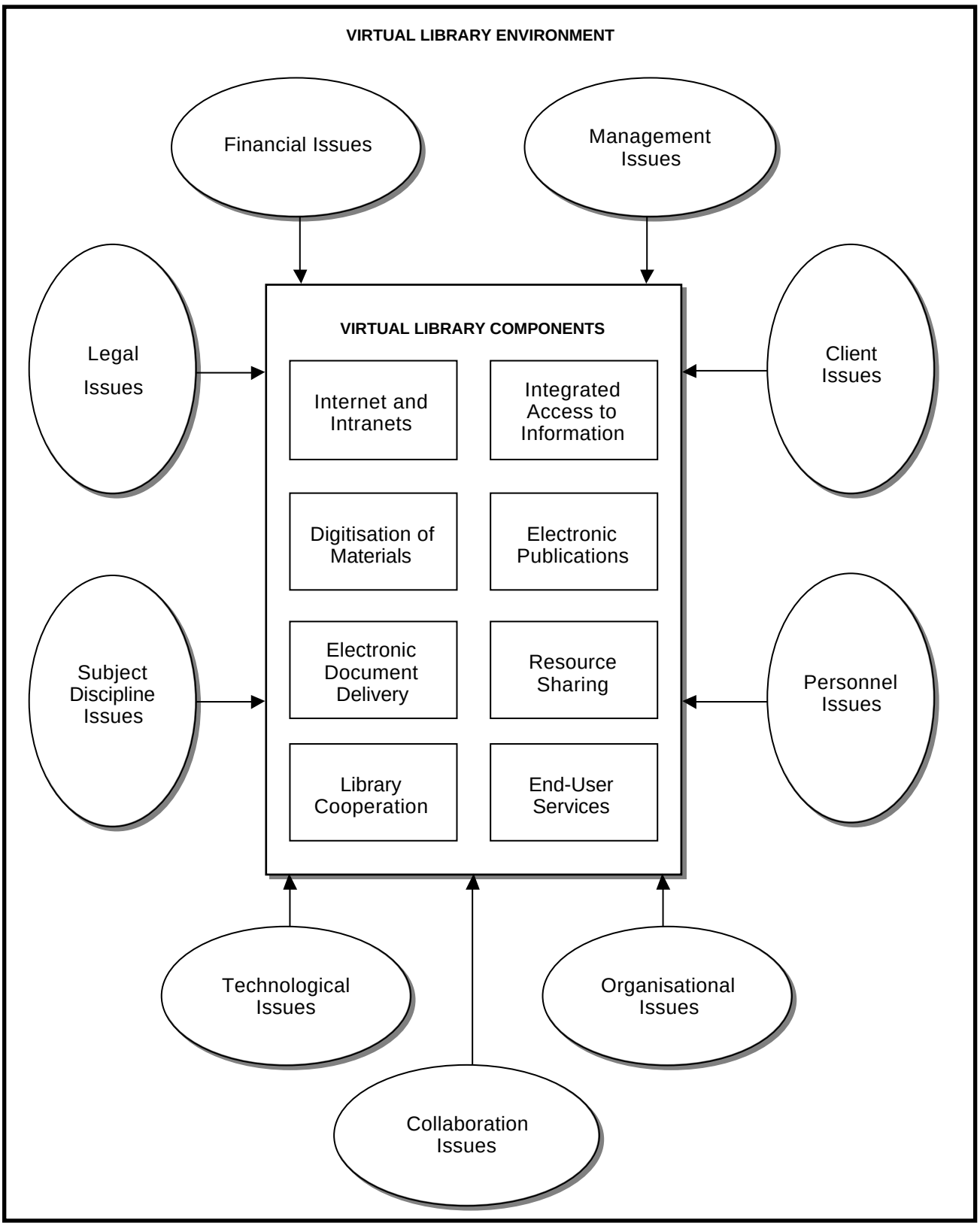
As discussed in Chapter 2, virtual libraries may be made up of a number of components, including: the Internet and Intranets; integrated access to information; digitisation of materials; access to electronic publications; electronic document delivery; resource sharing; cooperative developments; and, end-user services. These elements, then, may be considered the basic building blocks of the virtual library, although the nature and extent of the application of each component will depend upon the circumstances and needs of the library and / or organisation to which the virtual library is attached. One basic virtual library model may then be illustrated as shown in Figure 3.1.

Figure 3.1: Virtual Library Components



Chapter 2 also noted that the development of virtual libraries appears to be heavily dependent on a number of inter-related enabling (or hindering) factors, comprising: legal issues; financial issues; client issues; personnel issues; organisational issues; management issues; technological issues; collaboration issues; and, subject discipline issues. Although writers in the field differ on the importance of the individual issues, it is widely agreed that continued progress and ultimate success of virtual libraries is dependent on their resolution. If this is the case, then these issues make up an environment that surrounds the virtual library itself. This may be modelled as shown in Figure 3.2.

Figure 3.2: Virtual Libraries and their Environment



3.2. COMPONENTS OF THE VIRTUAL LIBRARY

As previously noted, the literature on the topic shows that virtual libraries can be made up of a number of complementary and inter-related components. Given the relative lack of balance in the literature, it is often not clear what the application, importance, and issues / problems with each component may be, however, a synthesis of the available information, as previously discussed in Chapter 2, suggests the following.

3.2.1. The Internet and Intranets

Libraries may use the Internet and Intranets for a variety of applications. Internet and Intranet access can allow libraries to provide access to library catalogues and other databases and information sources to remote users, as well as providing users with access to resources that are remote from the library. They can also allow improvements to existing services or the provision of new services.

The Internet and Intranets may be considered important because they allow libraries to demonstrate that they can still provide valuable assistance in an increasingly online world, as well as meeting client service expectations. Similarly, they allow libraries to show organisational leadership, and thus gain recognition from the parent organisation that libraries still have relevance and value. The Internet and Intranets can also be used as mechanisms to enhance collaboration and communication with library users, other parts of the parent organisation and partners outside the organisation. Perhaps most importantly, the Internet and Intranets can also allow libraries to get the right information to the right person at the right time.

The major difficulty that is apparent with the Internet and Intranets in libraries is that they are often not under the control or jurisdiction of the library. Rather, they tend to be controlled by information technology areas, or by multi-functional teams led by information technology areas. This means that it can be difficult for libraries to gain best advantage from their Internet and Intranet applications.

3.2.2. Integrated Access to Information

Integrated access to information falls into two areas: enhancements to OPACs, and the use of a single workstation to access multiple electronic resources. Catalogue enhancements can include the incorporation of other libraries' holdings within a local OPAC, a gateway facility to external library catalogues, and/or a search facility incorporating multiple library catalogues. Single workstation access can allow the use of multiple resources through a single access point.

Integrated access to information is significant because it provides users with a single starting point for internal and external searching. Likewise, access to many resources can be combined through an integrated front end, promoting ease of use. In effect, it provides users with a "one-stop shop" resource discovery facility.

There are, however, several issues relating to integrated access that must be considered. Full integration can be difficult, because information sources from different suppliers use differing, often proprietary, formats and standards, making it difficult to fully integrate them into a single front-end. This is equally true of library OPACs, which are usually sourced from different suppliers, by different libraries. There are also issues with the incorporation of an external library's materials into a local OPAC, as it could be argued that it is neither efficient nor effective to use scarce staff resources to add external holdings to a local catalogue. If external materials are made searchable, through whatever means, there is also an issue relating to whether the searched materials can be obtained by local clients.

3.2.3. Digitisation of Materials

Digitisation of hard-copy materials has two major applications in virtual libraries. It can be used to create a body of electronic full-text material for client use. It is also valuable in allowing "special" collections, such as manuscripts, maps, photographs, or historically significant or rare materials to be made available.

The importance of digitisation lies in the fact that libraries can create a body of material that clients like, and want to use, in turn allowing them to be better satisfied. There are also advantages in relation to remote access to materials,

wherever and whenever a client wishes to access them. In the area of special collections, digitisation allows materials that would not normally be widely accessible to clients to be made accessible. This has the dual advantage of making rich research materials available to a much wider community, while allowing the better preservation of the hard-copy resource.

There are several difficulties to be overcome by digitisation programs. There is far too much hard-copy material in existence for all of it to be scanned and made available electronically, so strategic decisions must be made about what will and will not be digitised. It is likewise a time-consuming and resource intensive process to scan the selected materials. The scanned materials are often quite large computer files, which places heavy demands on technology capabilities and data storage requirements. It can also be difficult to obtain permission from rightsowners to digitise their copyrighted materials. Even when permission can be obtained, licensing fees can be prohibitive, and the limitations placed on usage can be too restrictive to be practical.

3.2.4. Electronic Publications

Electronic publications can be divided into two distinct groups: electronic journals and electronic full-text. However, the application of the two forms is quite similar, and in many respects, the application and usage of these materials mirrors that of their hard-copy counterparts. Nevertheless, there are some significant advantages to the use of electronic publications over their paper equivalents.

The importance of electronic publications is that they tend to allow greater flexibility of access to materials, which is critical in the virtual library environment. They can allow remote access, and access at any time, day or night. Likewise, they can allow simultaneous access by multiple users, and can permit linking between one part of a publication and another, or indeed, between different publications. They also eliminate the problem of missing, late or stolen documents, and the need for binding of materials.

Despite this, there remain some significant problems to be overcome. There is not yet a critical mass of electronic publications available, making complete conversion to electronic publications problematic. There are also major issues relating to the purchase of such materials, including pricing, copyright, archiving, access / usage restrictions by publishers, continued access to already purchased materials when subscriptions are cancelled, preservation, and integration of electronic resources from multiple suppliers.

3.2.5. Electronic Document Delivery

As with electronic publications, the actual application of electronic document delivery is basically no different from its hard-copy equivalent. However, increasing client expectations and decreasing resources have created a much greater reliance on resource sharing in the electronic era. The importance of electronic document delivery is that it can be used to maintain adequate and rapid access to resources not held locally, in an era of rising costs and declining budgets.

The major issue that affects electronic document delivery is that it needs to minimise the time delay between request and delivery to be useful. Library clients are unlikely to be satisfied with the service offered if electronic document delivery methods do not take less time than traditional hard-copy delivery. The other issue to be resolved in this area is the impact that copyright has, whether on digitisation of existing paper-based materials or the supply of materials that are 'born digital'.

3.2.6. Resource Sharing

In the past, a library's preferred model for accessing information resources was usually to have the necessary materials located onsite. Given the explosion in publishing and the rising cost spiral, this is no longer realistic or affordable. Resource sharing is one possible answer to this dilemma.

The importance of resource sharing in virtual libraries is several-fold. Consortial approaches allow participants to share costs, while maintaining access to resources, with such approaches often favoured by funding bodies. Given the variety of formats and technologies currently available, there are now many ways of

providing access to information – having resources located onsite is only one. Library users generally want to be able to access information, regardless of location and source, and resource sharing fits this model.

There are four main problems inherent in resource sharing models. Where resource sharing arrangements have not been formally created (that is, libraries simply rely on others to maintain their holdings of a particular resource), there is an assumption that a discontinued resource will continue to be held by someone else, which may or may not be true. Also, most libraries are likely to be unwilling to lend their rare, valuable or unique materials or items in very high demand. There is also a need to balance local needs with consortial needs; a consortial arrangement that requires libraries to put consortial requirements ahead of local users is unlikely to be sustainable. Likewise, consortial arrangements require strong policy frameworks to be workable in practice.

3.2.7. Cooperative Developments

Cooperative developments may encompass two main strands, these being cooperative development or purchase of software tools by a number of partners, and joint purchase or development of hardware and other computer technologies. This is particularly relevant to high-use, high-demand materials, as these are generally what libraries want to share.

Cooperative development is becoming important through sheer necessity. It is undeniable that digital resources are expensive, and there are usually no new budget allocations for libraries to purchase or develop electronic resources. To take advantage of what the digital environment has to offer, libraries therefore need to expand cooperation.

There are several problems that can impede cooperative developments, however. Local priorities can be treated as more important, effectively undermining the cooperative arrangement. There can also be unwillingness by participants to cede local autonomy and authority. Geographic location can cause problems in administration and development, especially where participants are widespread.

Where joint purchase of commercial sources is proposed, there can be reluctance on the part of rightsowners to permit sharing.

3.2.8. End-User Services

End-user services in the virtual library environment covers three main elements: end-user access to online tools and electronic full-text, end-user search training, and the facility for direct user requesting of materials. Libraries are tending to offer end-user access to materials because, in the electronic era, users have the expectation of access to materials, in full-text, and on their desktop. Direct requesting is usually applied in the form of loan and inter-library loan functions, often using email and / or the Internet.

In terms of access to materials, users who are able to access resources themselves are advantaged over those who cannot, both in terms of the tools available to them, and the times and places at which they are available. End-user requesting is advantageous because users perceive that external materials do not cost them any greater effort to obtain than local ones, and there is a perception that the process has been made faster. In each case, users are empowered, while library staff can devote time that used to be spent on processing to other matters.

Again, there are several difficulties inherent in end-user services. There are policy implications for what people can and cannot have access to, circulation policies, loan periods, borrowing limits, and other related matters. Likewise, libraries that participate in such schemes need to show commitment to consortial users, not just local users. There is also a danger of wasteful and / or malicious requesting. User support and training must also be increased in the electronic environment, so that clients can effectively use the services that have been put in place.

3.3. THE VIRTUAL LIBRARY ENVIRONMENT

Surrounding the virtual library itself are a number of inter-related issues, which directly impact on the extent to which virtual libraries can be successfully developed. Unfortunately, the literature on the topic does not give an overall view

of these issues. There is also a lack of balance in the literature, with some issues, especially in the areas of law and technology, receiving much attention, while other, equally important, issues are only covered in a very minimal or superficial way.

3.3.1. Legal Issues

The legal issues surrounding virtual libraries can be divided into two areas: copyright and related matters, and privacy.

Of the two, copyright has the potential to impact of virtual library development in a very direct and profound way. There is a threat that virtual libraries can be totally derailed, as rightsowners want current protections to be increased. At the same time, libraries and library users wish the current exemptions, such as fair dealing, to continue in a digital environment. It is perhaps inevitable that current copyright laws will be adapted in the electronic environment, as paper-based models may not be appropriate. In any case, both rightsowners and users have legitimate concerns, and it is important for the success of digital libraries that reformed copyright laws balance the ability of users to access materials at a reasonable price, while bringing reasonable returns to rightsowners, in order to stimulate further production.

It is already apparent that large amounts of data about individuals can be collected in the digital arena; data that the individual may not know exists. In many respects, the increased use of technology exacerbates privacy risks. This leads to new responsibilities for librarians to safeguard the privacy of their users, for while rightsholders need to track the usage of their materials, users need to be protected. Again, current laws are not particularly suited to the realities of the digital environment, and require updating to accommodate them.

3.3.2. Financial Issues

Financial issues are likely to impact the extent to which libraries are able to move to digital models. Complete costs are hard to determine, but it seems unlikely that great savings will exist in a digital environment. Materials may well become cheaper to produce, but the technologies required to support them will doubtless

be more extensive and complex, and thus, more expensive. It also seems likely that more fee-for-service and metered usage models will be used by content suppliers, although working out who owes what to whom is likely to be difficult, due to the sheer scale of information, parties and transactions involved.

Given current constraints on library budgets, it is improbable that there will be large amounts of 'new' money available to pay for electronic developments, so constraints on the amount and types of available services seem likely. Given these factors, and the fact that virtual libraries will be a long-term and ongoing cost, not a one-off add-on, libraries will need to formulate budget strategies to address these issues.

3.3.3. Client Issues

User needs must be treated as paramount if virtual libraries are to work. This is because, on the one hand, user expectations have increased in the electronic environment – perhaps more than libraries can deliver, while on the other, client resistance can potentially delay or derail virtual library development, either partially or totally. Library users must therefore be incorporated in system design, so that the available mix of materials and services offered fits both their information needs and information seeking practices.

3.3.4. Personnel Issues

The introduction of virtual libraries seems set to change the nature of library work. Although the human resource implications are not entirely clear, it seems obvious that the duties, and therefore the skills, of library staff will also change as existing services are altered to become more electronic and new digital services are created. It is quite likely that core competencies will be much more 'technologically' based than might previously have been the case. As duties and responsibilities change, training and development needs for library staff will be similarly altered. The ongoing computerisation of libraries also carries with it the potential for deskilling and / or deprofessionalisation of library staff, which in turn requires librarians to justify their ongoing claim to professional status.

3.3.5. Organisational Issues

Just as library staff will need to make changes in the virtual library environment, so too will organisational structures change. Technology is creating new jobs while eliminating others, and traditional divisions between functional areas are likely to be much reduced or entirely eliminated. Similarly, the mix of library staff needed (professional to paraprofessional) is altering, and the duties performed by the various levels of staff are also shifting. It is difficult to know to what extent organisational size will impact on successful virtual library development, given the apparent disagreement of the literature in this area. However, it is a factor that merits consideration. Overall, organisational structures will need to be less rigid, reflecting the fluid nature of the changing library environment.

3.3.6. Management Issues

In order to accomplish virtual library goals, there are a number of management issues that libraries must consider. Libraries will need better strategic planning than has previously been the case, as it will be impossible to reach virtual library goals if these are not known. Alongside this stands a need for sound financial planning. There will likewise be a need for better performance measurement and statistical measures, as current measures are unlikely to gather all the data that will need to be recorded in a virtual library environment. Perhaps most importantly of all, there will be a critical need for leadership within libraries, as virtual libraries are likely to cause ongoing, perhaps unprecedented change. There will also be a need for libraries to show leadership to their parent organisations, so that they are prepared to adopt new technologies and new ways of dealing with information.

3.3.7. Technological Issues

Technological issues will obviously have a major impact on whether or not virtual libraries can succeed. In this area, there are several major issues that must be considered. One critical need is for 'properly' functioning and stable systems – if the supporting technologies fail or are unreliable, then virtual library access and useability will be partially or totally compromised. For optimum effectiveness and useability, there is also need for seamless integration of the technologies and

digitised materials, supported by appropriate legal and policy developments, as well as technological standards. Another challenge is the rapidly changing technology environment; for virtual libraries to be successful, the dual issues of technological change and technological obsolescence must be properly addressed, and sound data migration and preservation plans put in place.

3.3.8. Collaboration Issues

Another key element in the virtual library environment is collaboration. It is clear that the sheer volume of materials, systems and issues involved make it impossible for a single library to stand alone in the virtual library environment. In order to succeed, partnerships will need to be created, with users, other libraries, and information creators and suppliers. Given the very technological nature of virtual libraries, closer relationships are also likely to be needed with computer centres and information technology experts. It is often thought that libraries will need to create mechanisms to support cooperation, or they will not survive in an era where end-users can obtain much of the information they require without going through library intermediaries.

3.3.9. Subject Discipline Issues

The success of virtual libraries also depends to an extent on libraries' subject specialities. It is quite apparent that when it comes to the availability of electronic content, the material available for the different subject disciplines varies enormously, both in terms of quantity and quality. It is also clear that digital developments are being supported and adopted to differing extents by people within the disciplinary communities, as the needs of the disciplines can vary greatly. Until recently, the computer science community largely set the virtual library agenda, and other disciplinary viewpoints and needs were not necessarily given much consideration. This also impacts on the success of virtual library development.

3.4. CONCLUSION

Having considered one potential model of virtual libraries in Chapter 3, the research design and methods used in the current research on virtual libraries in Commonwealth libraries in Australia will be reviewed in Chapter 4.

4. RESEARCH DESIGN AND METHODS

As discussed in Chapter 2, it was the intention of this research to survey the development of virtual libraries within Commonwealth libraries. As such, it is an exploratory study that examines whether Commonwealth libraries are developing, or intend to develop, virtual libraries as at July 1998-January 1999, and if so, how they are proceeding. The research design and methods that were used to gather data for this research are outlined in Chapter 4.

4.1. DEFINITIONS

As noted in Chapter 2, there are many different terms used to describe the virtual library concept. However, there is no universally agreed upon definition for this concept. In the 1990s, terms such as *virtual library*, *digital library* and *electronic library* became widely used, but considerable uncertainty remains about what they actually mean (Kahin, 1995; 132). Chachra (1994: 50) stated that the terminology is still "fuzzy" because the concepts involved are still developing. Bishop and Starr considered the confusion of definitions healthy because the virtual library world is still emerging, and as such, has multiple agendas. The multiplicity of definitions ensures that no area is excluded (Bishop and Starr, 1996: 304). Similar sentiments were expressed by Borgman, who stated that the various definitions were not mutually exclusive because "[s]ome researchers are focusing on practical problems related to institutions and services, and some practitioners are participating in research…addressing issues of content, collections, and communities" (Borgman, 2000: 35).

A few authors, such as Dijkstra (1994: 267), Oppenheim (1994: 26-27) and Griffin (1998b: 24-25) distinguished between the various terms, defining each one differently. However, such distinctions are relatively rare, with the various terms usually being used to refer to essentially the same thing: that is, shared access to networked information (Zhao and Ramsden, 1995: 199).

The term *virtual library* has been defined both broadly and narrowly. In the narrower form, a virtual library is construed as a mainly, if not wholly, digital

entity. This narrow definition has been offered by many authors, including Covi and Kling (1996: 672), Costers (1994: 317), Lesk (1997: ix), Powell (1994: 260), Pacifici (1997: 1-2) and Stratigos and Strouse (2001: 66). Saunders (1994: 8) and Harden (1994: 99) both noted that this fully digital scenario is dependent on the necessary materials being available in an appropriate format.

Some, however, considered this narrow electronic construction "mythical". Crawford objected that such definitions oversimplify what libraries are and do, and that not everything is, or will be, available electronically (Crawford, 1995: 163; 1998: 28). Similarly, Levy and Marshall (1994: 1) questioned what will happen with the masses of paper that already exist, while King noted that visions of the virtual library seem to have more to do with science fiction than science research (King, 1993: 165). Similarly, Johnson was concerned that:

> The virtual library is supposed to be as good as, and maybe better than the local library, but unlimited by its physical constraints…. [It] has become a trendy phrase….[which] mean[s] everything and nothing and make[s] strategic plans sound impressive (Johnson, 1993: 6).

In the broader construction, the virtual library is defined as a hybrid of traditional library services and new electronic sources and methods. Waters noted the definition used by the Digital Library Federation, which considers digital libraries as organisations that provide services, defining them as

> …organisations that provide the resources, including the specialised staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities (Waters, 1998: 1).

Crawford considered that future libraries would be *extended libraries*: that is, libraries will offer extended access and services, rather than being completely paperless (Crawford, 1995: 162). Similarly, Saffady (1995: 224) noted that in the virtual library, computer-processible information could be used as an alternative, supplement, or complement to traditional materials. Borgman held similar views, stating that digital libraries are "…an extension, enhancement, and integration of both information retrieval systems and multiple information institutions" (Borgman, 2000: 48).

One of the more comprehensive (and more quoted) definitions was put forward by Gapen, who said that

> The virtual library has been defined as the concept of remote access to the contents and services of libraries and other information resources, combining an on-site collection of current and heavily used materials in both print and electronic form, with an electronic network which provides access to, and delivery from, external worldwide library and commercial information and knowledge sources. In essence, the user is provided the effect of a library which is a synergy created by bringing together technologically the resources of many, many libraries and information services (Gapen, 1993: 1).

Many others, including Jajko (Reid, 1995: 213-214), Cloyes (1994: 253) and Liberman and Rich (1993: 33), have described virtual libraries in a similar vein.

For the purposes of this research, no distinction has been made in defining the various terms used to describe the virtual library concept. For the sake of clarity, the term *virtual library* has been used throughout. The current research is based on earlier research conducted by Schiller and Von Wahlde (Schiller, 1992; Schiller and Von Wahlde, 1992a; 1992b; Von Wahlde and Schiller, 1993), which identified 15 elements that together can be considered to form a virtual library. The Gapen definition of the virtual library (above) has been adopted for the purposes of this

research, as it best accords with the elements identified by Schiller and Von Wahlde.

For the purposes of this research, *Commonwealth Government* means the national government of Australia, as elected by the Australian people, which has specific powers in accordance with *The Constitution of the Commonwealth of Australia* (*The Constitution,* 2000: 28-33).

Commonwealth Government agencies or *Commonwealth agencies* refers to the Departments of State, as established by the Constitution, and defined in section 7A and Schedule 2 of the *Public Service Act 1922* (*Australia. Public Service Act 1922,* 1998: 3, 7, 233-234). It includes all agencies, statutory and non-statutory authorities administered by the Commonwealth Government. [Note: The *Public Service Act 1922* was superseded by the *Public Service Act 1999*, but, as the 1922 Act was in force at the time this research was conducted, definitions have been drawn from this Act, rather than its successor.]

Commonwealth libraries refers to libraries which are part of the various Commonwealth agencies referred to above, and which are funded by the Commonwealth Government. This term does not include the National Library of Australia (NLA), for while this is a Commonwealth library, in the sense that the Commonwealth Government funds it, the NLA is a national library, rather than a special library, with differing foci, programs and priorities.

4.2. ASSUMPTIONS

This research was based on three major assumptions. First, that Commonwealth libraries would be affected or controlled by a general 'information policy' issued by the Commonwealth Government. Second, that with the development of virtual libraries, libraries would be developing services in accordance with the Government's requirements for the usage of electronic mechanisms in improvements to, and efficiencies in, the delivery of services. Third, that libraries

would be responsible for the development of virtual libraries in their respective organisations, either singly or in cooperation with other functional areas.

4.3. RESEARCH QUESTIONS

There are six research questions that provide the focus for this research.

- Are Commonwealth libraries developing or intending to develop virtual libraries, and if so, what procedures are being followed?
- What issues do Commonwealth libraries consider important to their development of virtual library procedures?
- What impact is virtual library development having on Commonwealth library staffing and / or organisational structures?
- Is there a relationship between the level of virtual library development and library demographics (including size of client base, subject expertise and level of awareness of government policy)?
- Is there a general model of virtual libraries that can be developed for the Commonwealth library sector?
- Are conceptions of virtual libraries developed in the academic library sector applicable to the special library sector, and in particular, to Commonwealth libraries?

4.4. POPULATION

The population for this research incorporates libraries from all Commonwealth Government departments and agencies, excluding the National Library of Australia (as noted above at 4.1). Libraries were primarily identified from a membership list supplied by FLIN. This was cross-checked for accuracy and completeness against the *Commonwealth Government Directory (CGD)* (Australia. Department of Finance and Administration, 1998) and its electronic equivalent, the *Government On-Line Directory (GOLD)* (1998), the *Australian Libraries Gateway (ALG)* (1998), produced by the National Library of Australia, and where necessary, the *Directory of Special Libraries in Australia* (Fuller, 1995-) and *Australian Libraries: the Essential Directory* (Bundy and Bundy, 1997).

At 15th June 1998, a total of 326 Commonwealth libraries were identified, with these being located across Australia. However, a number of agencies contained more than one library. Where an agency had numerous library branches, which were all part of the same functional area, the main library or head office library (as defined by the agency) was the only library surveyed, as this was usually the area with policy control over the library network. Where an agency had multiple libraries with no centralised policy-making area, or which belonged to differing functional areas, each discrete library was considered to be a separate entity, and thus included in the population. This yielded a total of 168 libraries for inclusion in this research.

These 168 libraries were situated within 106 different agencies. Of these, the largest, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), had 54 libraries that met the inclusion criteria discussed above, while 99 agencies had only a single library included in the population. Five agencies had two libraries each included, with one further agency having five libraries included. When considered according to portfolio: that is, the areas of responsibility assigned to each of the Ministers of State under *The Constitution* (2000: 34); libraries were included as follows:

- Attorney-General (23 libraries);
- Communications, Information Technology and the Arts (13 libraries);
- Defence (2 libraries);
- Employment, Education, Training and Youth Affairs (4 libraries);
- Environment and Heritage (6 libraries);
- Finance and Administration (4 libraries);
- Foreign Affairs and Trade (4 libraries);
- Health and Family Services (8 libraries);
- Immigration and Multicultural Affairs (3 libraries);
- Industry, Science and Resources (68 libraries);
- Parliamentary Departments (1 library);
- Primary Industries and Energy (5 libraries);
- Prime Minister and Cabinet (8 libraries);
- Social Security (1 library);

- Transport and Regional Development (4 libraries);
- Treasury (7 libraries);
- Veterans' Affairs (3 libraries);
- Workplace Relations and Small Business (4 libraries).

4.5. METHOD OF DATA COLLECTION

As previously discussed, the main area of investigation for this research was the development of virtual libraries within Commonwealth libraries. A survey was considered the most suitable method of collecting the required data, as respondents were located across Australia, in urban, regional and remote locations. Given the relatively small population identified (168 libraries), a census survey was used to ensure the reliability and validity of the collected data. At the time of this research, not all Commonwealth libraries had access to electronic mail facilities, so a traditional (paper-based) survey instrument was used.

A questionnaire was developed by adapting from the virtual library questionnaire, discussed in Chapter 2.2.2, which was used with ARL libraries in 1992. This questionnaire identified key areas that make up the virtual library, and asked respondents to identify their activities in each area. Given that more recent studies of virtual library development, or indeed, previous studies based within the special library sector did not exist, it therefore provided a good basic guide to the development of virtual libraries. However, adaptations were made to fit the differing mission and functions of government special libraries (as opposed to the original academic library orientation).

Although there were a number of articles that discussed the 1992 ARL survey (Schiller, 1992; Schiller and Von Wahlde, 1992a; 1992b; Von Wahlde and Schiller, 1993) and the similar 1993 CAUL survey (Schauder, 1994), complete copies of the survey instrument were never incorporated in these articles. Email contact was therefore made with Professor Schiller, the author of the 1992 survey, who returned a copy of the ARL survey instrument used via email.

Some modifications were made to this original instrument prior to pilot testing, to reflect the different library community being surveyed. The new instrument was then pilot tested with a group of post-graduate research students from the School of Information Management and Tourism at the University of Canberra. Further modifications were then made to the instrument, based on the feedback received. The modified instrument was then tested again with members of the ACT Division of the Australian Law Librarian's Group (ALLG), many of who worked in government special libraries. Again, small modifications were made based on the feedback received.

With the passing of time, and the changes in both technology and library environments, some questions from the original 1992 survey were found somewhat unclear in pilot testing. The ALLG members, in particular, sought clarification of the meaning of several questions. Although Professor Schiller was emailed for clarification, no further response was received, and modifications had to be made without the benefit of her insight. For this reason, several questions in the current survey instrument were slightly different to those in the 1992 and 1993 instruments, and thus responses could not always be directly compared. The questionnaire used in the current research may be found in Appendix A. The original survey instrument used by ARL is shown in Appendix B. Modifications and the reasons for them are shown in Appendix C.

4.6. METHOD OF DATA ANALYSIS

The results gathered by the above survey were mainly nominal, but qualitative data (in the form of comments) was also collected. As such, these violated the strict assumptions associated with parametric statistical tests (Levin, 1977; Coakes and Steed, 1999). It was therefore intended that non-parametric chi-square tests would be performed to determine the reliability, validity and statistical significance of the data. However, many of the data groupings contained only small numbers of responses, which rendered statistical analysis of these data unreliable (Connor-Linton, 1998: 5).

Statistical analysis was therefore only conducted when comparing the results of this research with the results from the ARL and CAUL virtual library research (discussed above at 4.5). Chi-square tests were conducted on these data, using the Statistical Package for the Social Sciences (SPSS), version 10. Where results were not whole numbers, they have been rounded to the nearest whole number, with numbers less than .5 being rounded down, and numbers greater than or equal to .5 being rounded up.

4.7. LIMITATIONS OF THE CURRENT RESEARCH

The major limitation associated with this research was that, since the total population of Commonwealth libraries was quite small, the groupings produced from various questions were very small (discussed at Chapter 4.6). Even when these were collapsed to form larger units, groups often remained too small to allow statistical testing to take place. This was especially true for the comparative data discussed in Chapter 6. In order to reach definitive conclusions about the influence of various factors on Commonwealth virtual library development, statistical testing was necessary. Since it was not possible to determine statistical significance, neither was possible to state with complete certainty whether the various factors were truly significant to Commonwealth library activity in this area.

Another, albeit minor, limitation was caused by the fact that, although various questions relating to issues and changes of importance, and staffing and organisational structures were asked of respondents to the American academic libraries study of virtual libraries, these data were neither analysed nor published. It would have been desirable to have these data available, as this would have provided a basis of comparison of responses to the current research, in turn strengthening the conclusions reached for these questions.

4.8. CONCLUSION

The current Chapter has considered the research design and methods by which data was gathered for this research. The findings from the collected data are reported in Chapter 5.

5. FINDINGS AND DISCUSSION

In this Chapter, the findings from a survey of virtual library development in Australian Commonwealth libraries are discussed, and some conclusions about their virtual library activity drawn. Data for this research were collected and analysed using the survey design and methods discussed in Chapter 4. Respondents were asked to complete a survey questionnaire indicating their virtual library intentions, their level of participation in various virtual library activities, and their opinions on various matters affecting virtual library development.

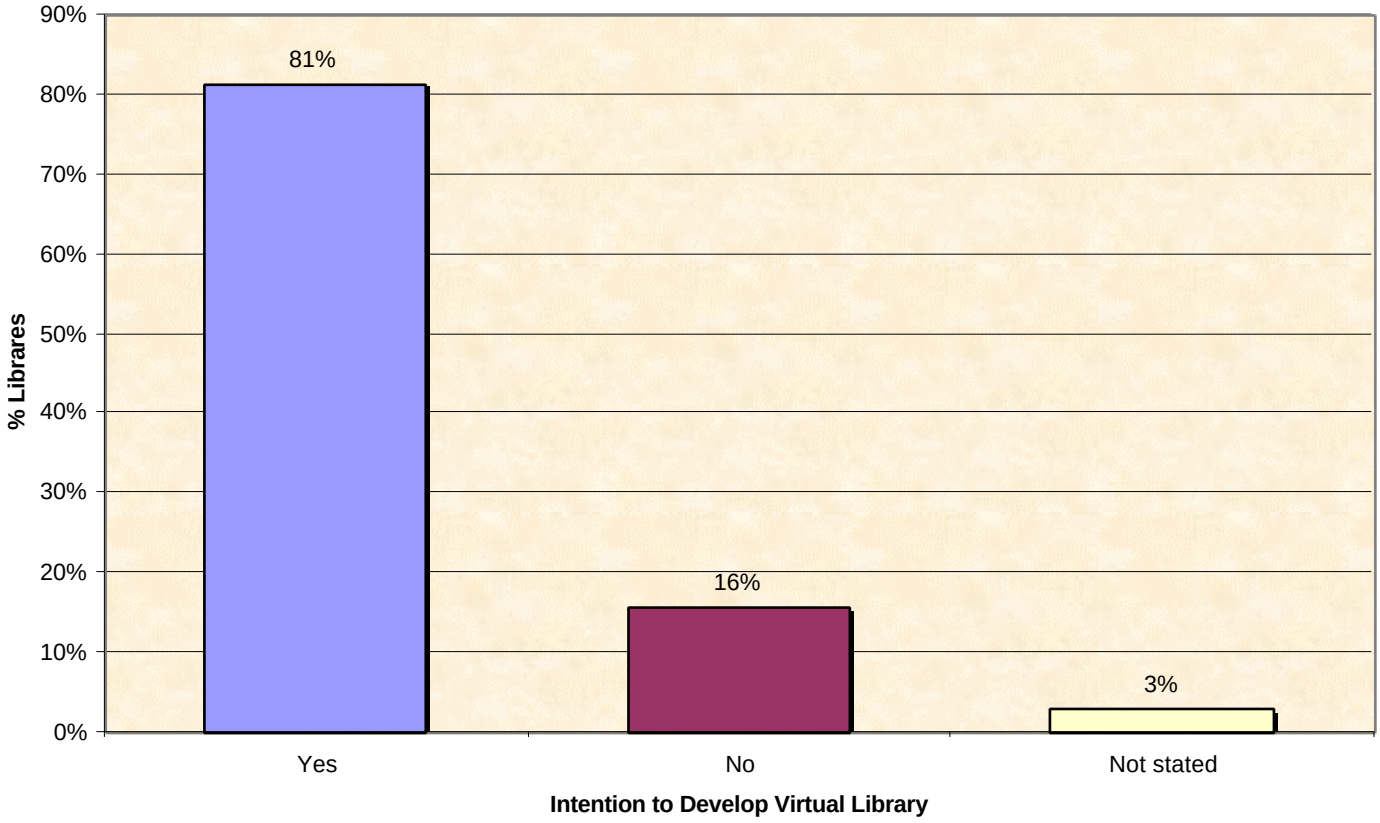
Data were collected from July 1998 to January 1999. The original survey instrument was distributed in July 1998, with a follow-up distribution to non-respondents in August 1998. A third follow-up was done with selected non-respondents (those libraries whose responsibilities and collections were considered substantially different from other agencies) in November 1998. From the 168 potential participants identified, 102 valid responses were received, a response rate of 60.7%. Given that this was a census survey of Commonwealth libraries, this response rate was considered sufficient to reach valid and reliable conclusions.

5.1. VIRTUAL LIBRARY DEVELOPMENT IN COMMONWEALTH LIBRARIES

Question 1(a): Have you or will you develop a virtual library for your library?
(The tables from which these charts were derived appear in Appendix F.)

Of the 102 survey respondents, 83 (81%) indicated that they were, or were intending to develop a virtual library of some kind, while 16 (16%) were not. Three (3%) respondents gave no indication of their virtual library development intentions.

Figure 5.1: Stated Intentions Regarding Virtual Library Development (N=102)



Although there is no research giving definite numbers or percentages of libraries that are and are not developing virtual libraries, the 1996 Bowker Annual noted that virtual library research clearly overshadowed research on any other topic in 1995 (Lynch, 1996). Likewise, a study of information professionals conducted in 2000 found that two-thirds of respondents were developing partially or totally digital libraries (Stratigos and Strouse, 2001). Further, a search for *virtual libraries* and variant terms on the information science databases on Dialog retrieved many thousands of citations on the topic. From the sheer volume of material that continues to be written on the topic, and the numbers of projects and developments reported in more recent years, it appears that this trend in virtual library research has continued.

It may therefore be able to be inferred that many authors believe that the development of virtual libraries is an important issue for libraries, which should be pursued. If this be the case, then the fact that vast majority of Commonwealth

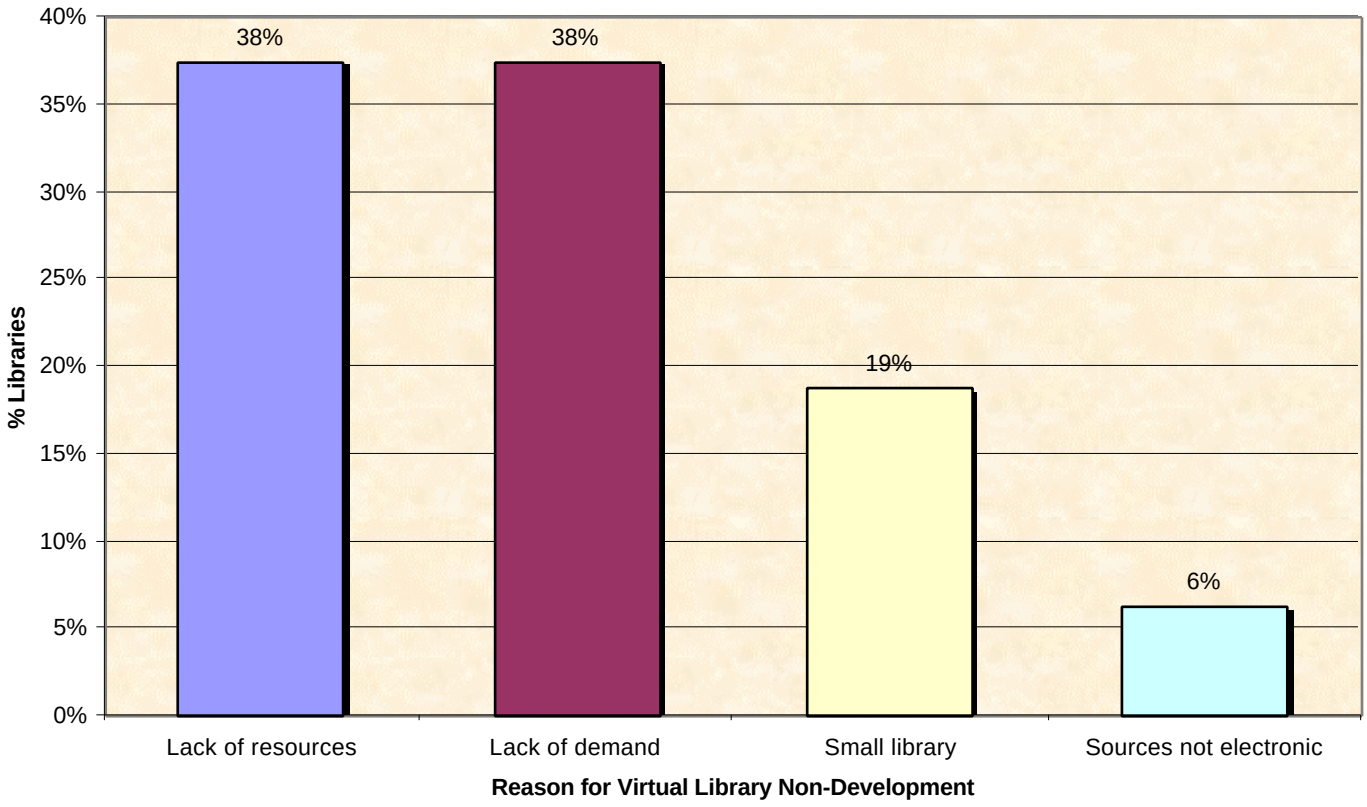
libraries intended to develop virtual libraries would seem to indicate that Commonwealth libraries also consider virtual library development to be important, and as such, is supported by the trend and volume of literature on virtual libraries.

5.2. REASONS FOR DEVELOPING OR NOT DEVELOPING VIRTUAL LIBRARIES

Question 1(b) Why or why not?

Question 1(b) asked respondents to indicate why they were or were not intending to develop a virtual library, with respondents usually giving a number of reasons for their actions.

Figure 5.2: Reasons for Non-Development of Virtual Libraries (N=16)



The small percentage of respondents who were not intending to develop a virtual library generally had common reasons for their decision, as shown in Figure 5.2. In this chart, the total number of respondents was 16. However, each respondent

usually provided several reasons for their decision, and the percentages shown represent the total number of reasons given, and not the population.

Six respondents indicated that there was no user demand or user resistance, with another six noting that they had insufficient staff or financial resources to pursue virtual libraries. Three respondents also noted that their library or organisation was too small to warrant such efforts. Another respondent noted that the required materials were not available electronically. Often these reasons were inter-linked: statements like "no user demand, so no funding", or "small library, so no funding" were not uncommon.

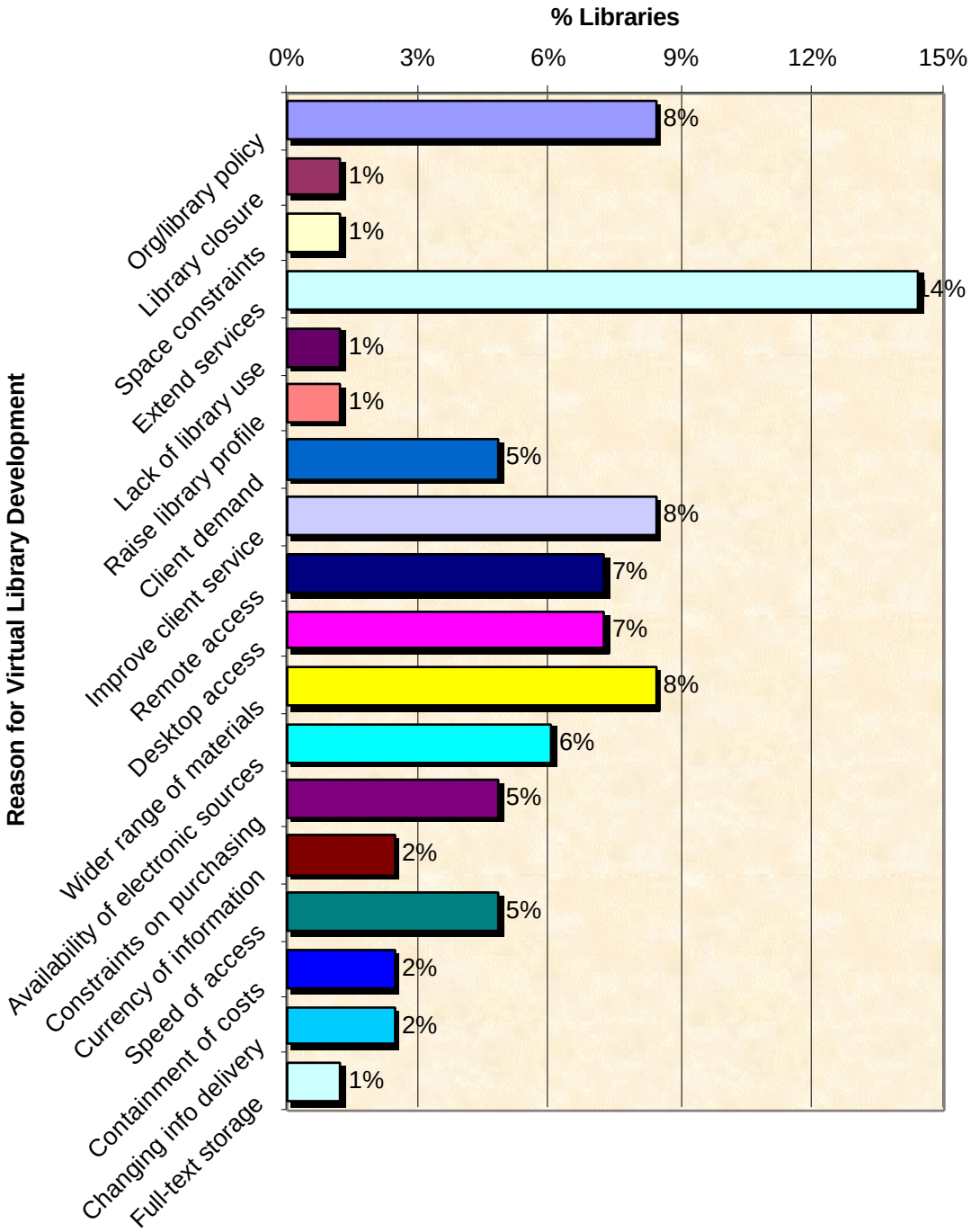
Statements such as these are supported by the literature, although not expressed as reasons for not proceeding with virtual library development as such. It is widely recognised that virtual libraries require a great deal of resources, both financial and otherwise (Campbell, 1996; Cline, 1996; Trolley, 1997; Tebbetts, 2000; Pinfield, 2001). The literature also recognises that not all materials have, or will, be digitised (Priestley, 1998; Mann, 1999; Gertz, 2000; Riggs, 2001), and that virtual library developments will be more suited to some subject disciplines than others (Buschman, 1993; Seiden, 1997; Khalil and Jayatilleke, 1999).

On this basis, the intention of some Commonwealth libraries not to pursue virtual library development could be considered understandable. However, when looking the number of virtual library activities being undertaken (discussed at 5.6 below), almost 70% of respondents who had no virtual library development intentions showed low to moderate-level virtual library development, with 13% recording high-level development. On average, the number of virtual library activities being undertaken by these respondents was close to five.

Despite their stated intentions, it appears that virtual libraries were being developed almost by default in these libraries. This would seem to suggest that there is a failure by some respondents to recognise exactly what the term 'virtual library' means. In this situation, it could be that respondents in this group can overcome their perceived difficulties with virtual library development by

educating themselves, their clients and agency managers as to what a virtual library truly is, and the benefits that it can offer.

Figure 5.3: Reasons for Development of Virtual Libraries (N=83)



Where respondents were intending to develop virtual libraries, their reasons for doing so were much more varied. This was not unexpected, as the number of responses was much higher in this group than for those who had no such intentions. Even so, there were still a number of common responses. These are shown in Figure 5.3. Although not all respondents chose to comment on their development intentions, those who did often had several reasons for their proposed actions. Again, the percentages shown in Figure 5.3 represent the total number of reasons given, and not the population.

Some of the main reasons given by survey respondents for developing virtual libraries were to:

- Improve or extend services;
- Provide clients with desktop access to library resources;
- Improve access to materials;
- Meet client demand for virtual libraries;
- Provide access to materials that had become available in new formats;
- Improve in library efficiency;
- Raise the profile of the library;
- Complement existing library services;
- Counteract the closure of physical libraries; or,
- Meet "management" requirements for virtual library development to occur.

Responses from those who were intending to develop virtual libraries again tended to mirror the literature in this area. The main reasons given in the literature for virtual library development include: improved access to libraries and collections (Keys, 1995; Benton Foundation, 1996), expansion or extension of library services (King, 1993; Manville, 1994; Cram and Allison, 1995; Mitchell, 1997; Stratigos and Strouse, 2001), the increasing availability of materials in digital formats (Malinconico and Warth, 1996; Dowler and Farwell, 1996), client demand (Malinconico and Warth, 1996; Czech, 1996; Noerr, 1998); organisational dictate

(DiMattia and Blumenstein, 1999); and, advances in technology (Mason, 1996; Griffin, 1997).

According to writers in the field, two of the major reasons for developing virtual libraries are that the nature of information is changing to become more electronically based, and that in such a climate, the provision of traditional services is no longer enough to ensure the survival of libraries. Interestingly, neither of these was a stated factor where respondents had decided to develop virtual libraries. One respondent noted that virtual libraries were being pursued because such a development was "inevitable", but beyond this, there was no mention of the changing nature of information or the need for libraries to adopt new service mechanisms in order to survive as reasons for pursuing virtual library development.

Given the frequency with which these issues appear in the library literature, it seems unlikely that respondents were unaware of such arguments. However, these were obviously not explicit factors driving Commonwealth activity in this area. One possibility is that these factors underpin some of the other reasons given, such as the expansion or improvement of services. It may also be that these were such obvious points, that respondents simply did not consider them, or even, that these issues are not as important as commentators suggest. However, given the prevalence of these views in the literature, further research would be necessary before they could be dismissed as underpinning reasons for virtual library development.

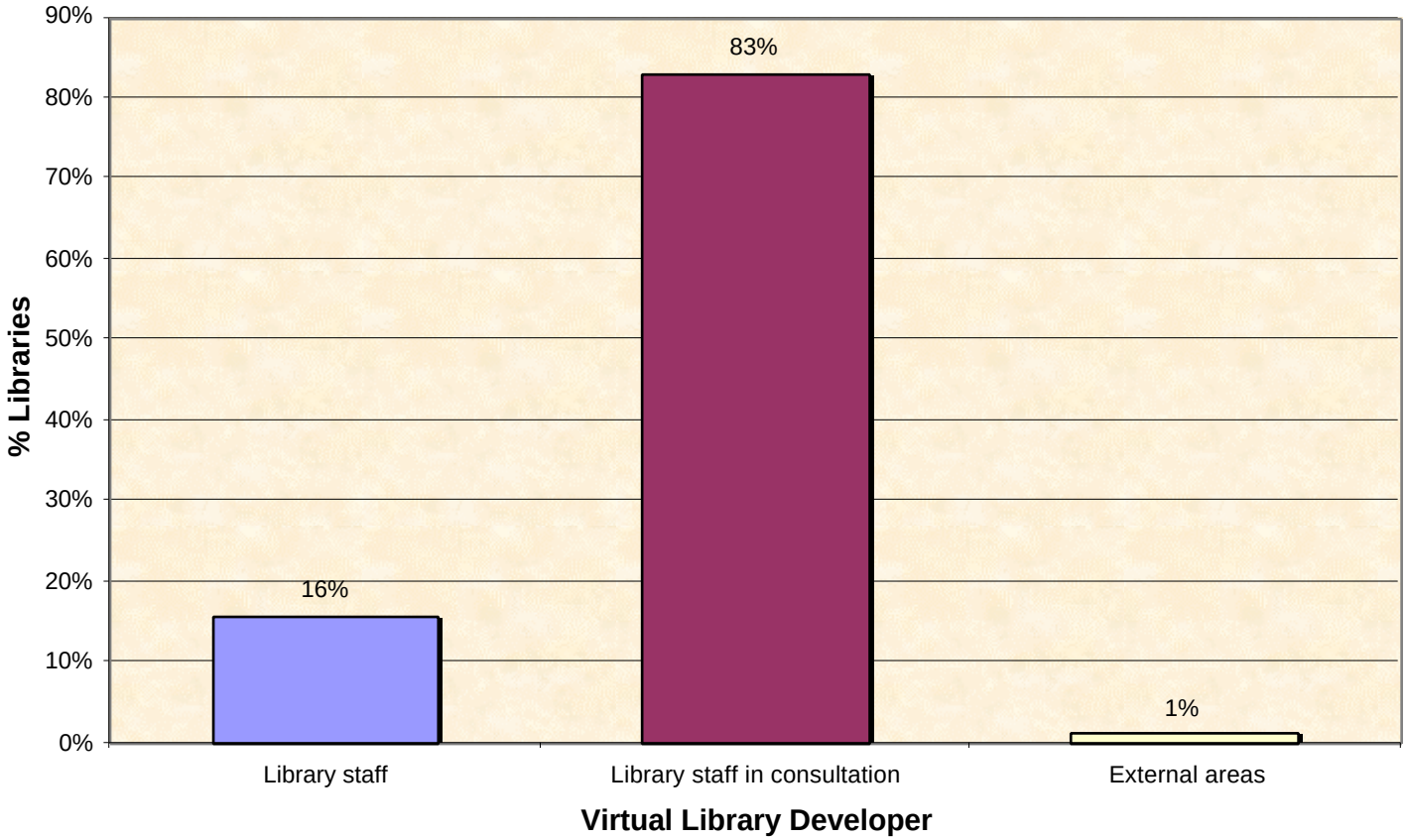
5.3. DEVELOPERS

Question 1(c): If yes, has or will the virtual library be developed by library staff, by library staff in association with outside areas, or by areas outside the library?

Respondents were asked to indicate who would be developing their virtual libraries in Question 1(c), with results as shown in Figure 5.4. Responses were only received from those 83 participants who had indicated that they would be

developing virtual libraries in Question 1(a). Of these, 13 (16%) intended that library staff alone should develop the virtual library, 69 (83%) indicated collaboration between library staff and areas outside the library, while only one (1%) respondent indicated that the virtual library would be developed solely by outside areas.

Figure 5.4: Responsibility for Virtual Library Development (N=83)



Where respondents indicated that the virtual library would be developed collaboratively, the overwhelming majority stated that they were collaborating with staff from information technology areas. The literature on the topic is quite clear that successful virtual library developments depend on collaborative relationships (Arnold, 1994; Prestamo, 1996; Bunker and Zick, 1999), and that the need for cooperation with information technology areas is paramount (Blair, 1994; Seiden, 1997; Rible, 1999; Pinfield, 2001). Many respondents also indicated that they were working cooperatively with publishers, vendors and / or clients. It is equally clear from the literature that collaboration with other libraries, clients and content

vendors is important, as it is only through cooperation and consultation with all stakeholders that successful virtual library outcomes can be achieved (Sylge, 1996; Trolley, 1997; Baker, 2000). Given the emphasis placed on the necessity for collaborative virtual library development in the literature, it was expected that Commonwealth libraries would largely consider collaboration to be important, and this was indeed the case.

Those few libraries that were using only their staff to develop virtual libraries certainly run counter to the trends shown in the literature as being desirable. Indeed, the literature considered the notion of working as a "Lone Ranger" in this area highly undesirable (Sipe, 1999). If that were the case, then these respondents would seem to be acting against what would be considered best practice for virtual library development, which would, in turn, appear to affect the extent to which their virtual library projects could be truly successful. However, a number of respondents who indicated that library staff would develop their virtual library noted that they intended to seek assistance from outside areas (usually information technology sections) as necessary. This would seem to indicate that respondents did not intend to work in isolation from other areas, but library staff were to be the primary virtual library developers. It is also possible that respondents in this group had staff with suitable information technology skills already within the library, and as such, it was less necessary to seek assistance from outside areas.

Only one respondent indicated that their virtual library development was to be undertaken by an outside area. This respondent required a series of quite specialised international materials in its day-to-day operations, and it was these materials, and only these materials, that were being made available through the virtual library.

The literature contains relatively little discussion of virtual libraries that are being developed for libraries by outside areas, with most authors suggesting that collaborative relationships are necessary to achieve optimal results (Arnold, 1994; Prestamo, 1996; Bunker and Zick, 1999). However, it is recognised that libraries have a professional responsibility to ensure that virtual library structures are

sound, that information is accessible, and that they meet user needs, which is unlikely to be achieved without library input Jennings, 1999).

Since the single respondent in this category is dealing with a limited range of very specialist materials from a single supplier, and has reported no other electronic information needs, this may perhaps be considered an acceptable departure from usual virtual library practice. However, may be questionable whether this respondent is fully meeting its professional responsibilities, as it has no reported involvement in the system development process. There may also be implications for future virtual library development for this respondent if their information needs were to change, inasmuch as it is limited to the system requirements of the current vendor, which may not be compatible with system requirements from other vendors.

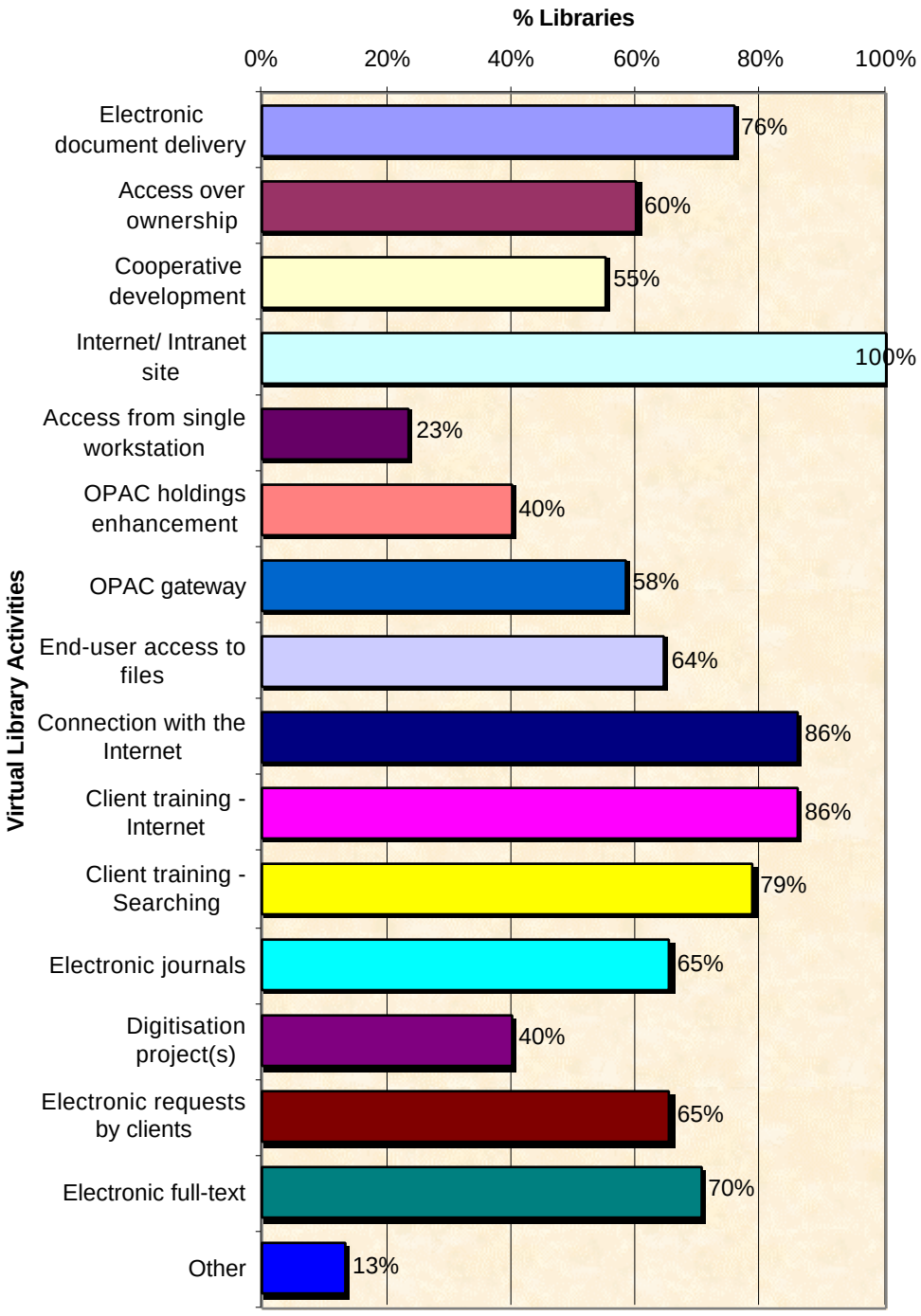
5.4. VIRTUAL LIBRARY ACTIVITIES IN COMMONWEALTH LIBRARIES

Question 2: Please tick any of the following efforts your library is or will be involved in.

(A complete listing of activities is shown in the survey instrument in Appendix A)

Question 2 asked respondents to indicate their participation in a number of identified virtual library activities, and to make comments where appropriate. Valid responses were received from 98 (96%) respondents, while the remaining four (4%) gave no indication of their activities in this area, with responses as shown in Figure 5.5. Here, respondents were asked to comment on their participation in each specified activity, and the percentages shown represent the total number of participants in each activity, and not the population.

Figure 5.5: Virtual Library Activities in Commonwealth Libraries (N=98)



As discussed in Chapter 3, the virtual library literature is quite unbalanced in its coverage, with some aspects, such as copyright and technology, receiving considerably more attention than other issues of equal importance, such as staffing and organisational issues. Nor are there clear, consistent models of virtual libraries

available. As such, it is difficult to know exactly what the virtual library might look like, or what the expected response from Commonwealth libraries should be.

It became apparent from the responses that different Commonwealth libraries were involved in the different virtual library activities to quite varied extents. This would seem to indicate that, rather than being a tightly defined and regimented model, the virtual library concept encompasses a series of loosely connected elements, which can be applied to whatever extent is appropriate for the implementing library and its parent organisation. Responses on each activity are collated below from 5.4.1 to 5.4.16.

5.4.1. Electronic Document Delivery Services

Electronic document delivery services were being used by 74 (76%) of respondents to this question. Of these, many reported using the Ariel electronic document delivery software, with several using email to forward requested documents to clients. Others were using commercial document delivery suppliers such as the British Library, Carl Uncover (now known as Ingenta), FirstSearch and Infotrieve. Several respondents also noted here that while library clients could make requests electronically to their home library, none were allowing them unmediated access to document suppliers. Some respondents also further addressed this particular issue under electronic requesting at 5.4.14.

Almost three-quarters of respondents reported making some use of electronic document delivery services, whether in the form of library-to-library supply or commercial document delivery suppliers. A number of authors have indicated that electronic document delivery is a cornerstone of virtual libraries, whether in terms of discovering where materials may be obtained (Zhou, 1994), in providing access to the discovered materials (Rowley, 1998), or maintaining adequate access to resources in a time of decreasing materials budgets (Dannelly, 1995). As such, this relatively high use of electronic document delivery services by Commonwealth libraries was not surprising.

5.4.2. Policies for Access to Information over Ownership

Respondents were asked to indicate whether they had policies that emphasised access to information over ownership, with 59 (60%) indicating that they did have such policies in place. A number of respondents noted that they were taking this path because they could no longer afford to purchase or maintain all required information, and as such, they were seeking to partner with other libraries in order to share the cost burden.

This certainly supports the major reason expressed in the literature for pursuing information access policies (Friend, 1992; Desmarais and Luther, 1996-1997; Kemp, 1997; Anwar and Al-Jasem, 2001). At the same time, one respondent felt that this sort of approach would be of little use while "publishers and suppliers maintained their positions". This view reflected the thoughts of some writers in the field, who note that much of the information that libraries wish to share is owned by third parties, who do not wish sharing to take place (Atkinson, 1996).

There was little commonality reported between the various libraries in terms of the information sources being used, and this could perhaps suggest that, in many institutions, the commitment to access policies is in name only. However, there is relatively little overlap in the work undertaken by the various Commonwealth agencies, and the subject needs of the parent organisations tend to be quite disparate, particularly for those working in specialised fields. The literature indicates that the access model works best when a core of critical materials is maintained onsite, with more peripheral materials being accessed through other sources (Gapen, 1993). This would suggest that Commonwealth libraries are taking advantage of information access principles, to the extent that it is possible for their subject disciplines.

5.4.3. Participation in Cooperative Development/Purchasing Initiatives

In the area of cooperative purchase or development of software or infrastructure, 54 (55%) respondents were active. Of these, all were willing to consider software and content sharing, but none were involved in infrastructure sharing, save where libraries were part of a library network within the same parent organisation.

Several respondents noted that, although not currently active, they would be willing to consider consortial database arrangements if publishers would permit them, and if the proposed resources were suitable for their needs. Slightly more than half the respondents indicated that they were participating in cooperative resource purchasing initiatives.

Given the high importance placed on cooperation in the virtual library literature (Sipe, 1999; Engle, 1996; McGee, 1998), this could perhaps be considered a rather low figure. However, as noted in Chapter 2.3.1, the Commonwealth Government has certain specific powers under the Australian Constitution. The agencies that administer these powers have differing responsibilities, which do not overlap, or which overlap in only a superficial fashion. The subject resources required therefore tend to vary from agency to agency, which may explain the relatively limited cooperative efforts reported here.

While the literature indicates that infrastructure sharing may be considered highly beneficial in a virtual library environment (Dannelly, 1995), it also indicates that computing and communications infrastructures are usually outside the control of libraries (Cline, 1996). The apparent lack of infrastructure sharing arrangements may be explained by the fact that individual Commonwealth agencies had their own infrastructure policies and budgets in place, and were, at best, only loosely linked. Different infrastructures were therefore developed according to the needs and requirements of individual parent agencies, and doubtless, without particular consideration of virtual library needs. This would seem to be borne out by the fact that common infrastructures were only being developed where there were multiple libraries within the one agency, or where there were separate agency libraries with common interests within a single portfolio.

While it is perhaps arguable that Commonwealth libraries should be doing more to facilitate cooperative initiatives, it is difficult for them to do so where there is no common need for specific resources. Furthermore, in the area of infrastructure development, Commonwealth agencies have tended to become quite restrictive about the extent and type of infrastructures that they are willing to support. It is not

only difficult for libraries to gain access to discussions of this nature, but also to have their specialist infrastructure requirements even taken into consideration.

5.4.4. Development of Internet and Intranet Sites

All respondents to this question indicated that they were involved in the development of Internet and/or Intranet sites, some 98 (100%) in all. The vast majority had some involvement with organisational Intranet and Internet sites, although most were responsible for library pages only, rather than the whole site. The high percentage of libraries with involvement in Internet or Intranet sites corresponds to the high importance placed on library Internets and Intranets in the literature (Bell, 1997; Cohen, 1998; Rible, 1999; Clyde, 2000). It would also seem to reflect the increasing availability of and reliance on the Internet in society generally.

Although relatively few respondents had overall responsibility for organisational sites, many were actively working with other areas within their agency to formulate policy, as well as assisting with site design and content management. This reflected the findings of a study (Corcoran et al., 2000) that found that while a high percentage of libraries contribute to organisational Internet and Intranet policy and development, relatively few lead these programs.

The fact that most respondents were contributing to, but generally not managing their organisational Internet and Intranet sites has some interesting implications for Commonwealth agencies. A number of authors have recognised that while LIS practitioners have skills that are ideally suited for Internet and Intranet content management, organisational managers often fail to recognise this fact (Alderman et al., 1999; Sturges, 1999; Smith, 2000).

On the basis of the above responses, it seems likely that similar attitudes may be entrenched in Commonwealth agencies. If this is the case, then Commonwealth library staff may need to be far more proactive in promoting their skills in this area, as suggested by several authors in the field (Alderman et al., 1999; Marfleet

and Kelly, 1999), so that their agencies can achieve the best results from their Internet and Intranet sites.

5.4.5. Access to Information from a Single Workstation

In respect to access to information through a single workstation, only 23 (23%) respondents hoped to allow such activities. Of these few, most were attempting to make library services and materials available through their organisation's standard computer desktop. Few respondents were attempting to make all resources available through a single interface, such as their library catalogue. The main reasons given by respondents for not moving towards single-workstation access to materials were that not all required materials could be obtained electronically, and the high cost associated with networked provision of electronic resources.

This result could perhaps be considered somewhat unexpected in light of the literature. Commings (1996) indicated, "one-stop shopping has become a library motto". Others in this area have indicated that libraries are, to an extent, failing their clients if they do not offer access to all virtual library resources through a single workstation (Marks and Nielsen, 1993), as the potential benefits are considerable (Miller, 2000). However, some authors have found that a common-user interface is not as beneficial as might be expected, as it must necessarily operate at the lowest common denominator (Arant and Payne, 2001).

If moving to single workstation access is indeed a departure from normal library practices, and respondents hold the opinion that single workstation access to resources is not a normal library requirement, then this would indicate that Commonwealth libraries need to do more to change their thinking, and that of their clients, as to what a 'normal' library service should look like in the Information Age. However it may also be that respondents consider that systems that operate at a lowest common dominator are simply not worth the effort that they would demand of Commonwealth libraries.

Many Commonwealth libraries also indicated that they were unable to gain electronic access to all the materials that they required, which may also go some

way to explaining the relative lack of single workstation access. While libraries can indicate to suppliers that electronic access to materials is desirable, in most instances, suppliers are commercially orientated, and require some return for their investment. Where returns are considered insufficient by vendors, then libraries are unlikely to be able to persuade them to create electronic access mechanisms.

For some, the high cost was also considered an inhibiting factor where electronic versions of materials did exist. In this case, it is arguable that perhaps Commonwealth libraries ought to be doing more to negotiate adequate funding to access these resources. However, budgets for Commonwealth agencies are set by the government of the day on the floor of Commonwealth Parliament, and agencies must live within the funds allocated to them. As such, it is as difficult, if not more so, for Commonwealth libraries to argue for increased funding than it is for other library sectors, since the need to have additional funding appropriations approved by the Parliament could potentially cause political embarrassment to the Government.

5.4.6. Inclusion of External Library Holdings on Local OPACs

Listing of external libraries' holdings in local OPACs was undertaken in 39 (40%) of the respondent libraries. Of these, most were only providing access to materials held by other libraries within their parent organisations or portfolios. Again, this runs counter to what some of the earlier writers considered appropriate in the virtual library environment (Ghikas, 1989; Gilbert, 1993), but this result was not entirely unexpected. Since Commonwealth Government agencies tend to have separate areas of responsibility under the Constitution (and other governing legislation), their subject needs are also relatively disparate. It is therefore understandable that libraries may question the value of adding holdings for library collections that fall outside common subject networks or agency portfolios.

One respondent felt that putting external holdings onto local catalogues was a waste of scarce cataloguing resources (predominantly staff), and that effort should instead be put into skilling end-users to access external catalogues and materials. Corresponding with this, several respondents stated that they were using the

Z39.50 protocol to access other libraries' catalogues, rather than incorporating holdings into their own catalogues. Such attitudes certainly accord with more recent writings in this field (Blair, 1994; Harmsen, 2000).

The trend toward the use of Z39.50 access is explained by the fact that the Internet has grown exponentially in recent years, and modern library management systems generally have the capability to accept Z39.50 access. This, in turn, allows libraries to make their catalogues more easily available through the World Wide Web, providing a sensible alternative to OPAC listings of "foreign" holdings, and eliminating the need for such practices.

5.4.7. Gateway Access to Databases via the OPAC

The OPAC was used as a gateway to other databases or networks by 57 (58%) of respondents. Many respondents indicated that they were using the Z39.50 protocol to gain access to such databases, which is in harmony with the responses received for Question 2E (reported at 5.4.6 above). It is slightly difficult to say whether or not this is truly in agreement with broader library practice, as there is relatively little written in this area. However, Harmsen (2000) certainly believed that OPACs needed to become "hybrid", including using the OPAC as a gateway to other resources, and the activity in Commonwealth libraries would seem to be following this pattern.

Interestingly, a number of respondents reported that they were using their Intranets and / or the Internet as their gateway, rather than their library catalogues. In several instances, the OPAC was a gateway to the organisational Intranet, and vice versa. As with the previous question, responses here may be partially explained by the development of the Internet, and more specifically, the World Wide Web. The development of the Web has led to many changes in information access, including database delivery. The fact that databases can be easily and conveniently delivered through the Web could potentially make the use of the OPAC as a gateway somewhat redundant.

However, the more recent literature suggests that a library catalogue is still an ideal mechanism for allowing integrated access to resources (Huggard and Groenewegen, 2001). By not using their OPACs in this way, it is questionable whether Commonwealth libraries are preventing their clients from true "one stop" access to materials, as well as blocking enhanced searching capabilities.

5.4.8. End-User Access to Online Files

Online files were available to end-users in 63 (64%) respondent libraries. Again, there was little commonality in the sources being offered, with choices being made according to the subject specialisation(s) of the individual agency. Many of the resources offered were provided on CD-ROM rather than through dial-up or Internet connection, due to cost factors. One respondent noted that while end-user access was a desirable goal, it would require "…a considerable shift in the skills and working pattern of many employees".

According to Tenopir and Ennis (1998), end-user access to online materials is now considered a "mainstream" library service. Online services were offered to end-users by slightly more than 60% of Commonwealth libraries, whereas Tenopir and Ennis noted that more than 80% of American academic libraries offered similar services. On this basis, the result for this question could be considered somewhat low.

One explanation for this apparent discrepancy may be the lack of suitable resources. Numerous authors have addressed the issue of electronic availability of materials and the discrepancies in availability between different subject disciplines (Buschman, 1993; Seiden, 1997; Khalil and Jayatilleke, 1999). It may be that the materials needed by some Commonwealth agencies, particularly in less commercially orientated subject fields, are again simply not available as electronic full-text, with a corresponding impact on the availability of materials to end-users.

It is also possible that suitable resources exist, but that libraries do not have the necessary funding to access them. In this case, it may be able to be argued that library staff need to be more persuasive in demonstrating the usefulness of such

tools, so that additional funding can be gained from senior managers. However, as discussed at 5.4.5, Commonwealth agencies have fixed funding appropriations, and the difficulty in gaining variations on these amounts is well recognised.

5.4.9. Connection to the Internet

When asked about Internet connection, 84 (86%) respondents indicated that the Internet was available in their library. In a number of cases, the Internet was only available to library staff, often because access was via a stand-alone, dial-up computer. However, most respondents noted that Internet access was available to the whole of their organisation, with several noting that such arrangements had been in place for some considerable time.

It is quite clear from the literature that access to the Internet is considered highly important to libraries (Bell, 1997; Brümmer and Åstrand, 1996; Brinkley, 1999; Clausen, 1999; Smith, 2002). Further, figures from US public libraries showed that some 76% had Internet connection by 1997 (Cronin, 1998). Given this, it was expected that a high percentage of Commonwealth libraries would have Internet connections, and this was indeed the case.

A number of respondents noted that the Internet was only available to library staff on stand-alone computers. Although not written about in the Internet literature, Commonwealth libraries were initially subject to quite stringent security requirements, imposed by the Defence Signals Directorate (DSD) (the agency concerned with computer security policies for the Commonwealth Government). Due to these requirements, the only way that many Commonwealth libraries could initially obtain Internet access was to use an external Internet service provider, through a computer not connected to their computer networks.

However, this particular policy is no longer a general requirement for the whole of the Commonwealth Government, and Internet connectivity is now more determined by the business policies and security requirements of the individual agencies, which are, in many cases, less stringent than the original DSD requirements. As such, it would seem highly likely that this situation has changed

since this research was conducted. Indeed, it would be surprising if the overwhelming majority of libraries did not now have freely accessible Internet connections in place.

5.4.10. Training Clients in the Use of Internet Resources

Some form of Internet training to clients was provided in 84 (86%) of the respondent libraries. Training tended to be of two types: either in the form of structured training courses or information sessions, or as informal one-to-one training, provided on demand. The two were not necessarily mutually exclusive, with a number of respondents offering both types. Several respondents noted that, while little training had been undertaken previously, the library would be more involved in such training in the near future. A number of other respondents stated that while they did not offer training in how to use the Internet *per se*, they did provide assistance with locating and / or using appropriate resources.

The literature indicates that libraries have been moving toward user training since the advent of end-user access to online resources, and that training must be a key library function in the virtual library environment (Benton Foundation, 1996; Sylge, 1996; Garrod, 2001; Pinfield, 2001). Similarly, librarians have long provided advice to clients about the appropriateness and use of information resources, including the Internet, and this is also a necessary service in the virtual library environment (Campbell, 1996). Given this, it was expected that Commonwealth libraries would be offering some form of Internet training to their clients. Indeed, it is arguable that Commonwealth libraries which provide access to electronic resources, yet fail to provide training in their use, are failing to provide the best service to their clients.

5.4.11. Training Clients in End-User Searching

In the area of end-user searching, 77 (79%) respondents indicated that they did provide some form of training. As with several previous questions, the specific resources for which respondents offered training depended on types of tools required to meet the subject needs of the parent organisation. Likewise, the training offered could be both formal and structured, and / or informal and ad hoc.

This result concurs with the literature, which indicates that libraries have been moving toward user training since the first direct end-user products became available. As such, training is considered highly important in the virtual library environment, where so many of the total available information resources are available electronically, with searching skills being needed to obtain the best results (Benton Foundation, 1996; Campbell, 1996; Sylge, 1996; Garrod, 2001; Pinfield, 2001). The result here also mirrored the results from Question 2J(b) (discussed at 5.4.10 above), and as such, was expected.

5.4.12. Subscribing to Electronic Journals

Subscriptions to electronic journals existed in 64 (65%) of the respondent libraries. Of these, a number of respondents were using free (Internet-based) titles only, while several others had just one or two subscriptions, in order to evaluate the usefulness and useability of electronic journals. Several respondents expressed concerns about the cost and continued availability of electronic journals, while others stated that the lack of relevant material currently available in their subject discipline was hindering moves in this direction.

Several writers in this field have noted that electronic journals have only really existed for a decade or so, and, as such, they are still very much a work in development (Strangelove, 1996). Likewise, although the numbers of electronic journals are increasing rapidly, there is not yet a critical mass of literature available in many subject disciplines (Anderson, 1999; Ashcroft and Langdon, 1999; Chan, 1999). A number of writers have also indicated that the pricing structures associated with electronic journals are far from stable, with higher costs being applied to electronic journals than their print equivalents in many instances (Bandyopadhyay and Chu, 1999; Lynch, 2000; Pikowsky, 2000; Keller, 2001).

Given these facts, it is unsurprising that many government libraries have adopted a ‘wait and see’ approach to electronic journals. By waiting, Commonwealth libraries would appear to be allowing a greater mass of useful titles to develop, as well as permitting pricing structures to stabilise, and perhaps, settle into more reasonable and (less expensive) subscription rates. However, by choosing not to adopt

electronic journals to any great extent, it is arguable that Commonwealth libraries are not only denying their clients access to materials, which do not have some of the inherent problems associated with their paper equivalents (such as missing or mutilated issues), but they are also denying themselves the possibility of influencing the manner and direction in which electronic journals are developed by vendors.

5.4.13. Digitisation Projects

Some form of digitisation project was being undertaken in 39 (40%) respondent libraries. Respondents were mainly digitising publications produced internally by the parent agency, with no-one reporting digitisation of commercial materials. One respondent felt that in the digital environment the emphasis should be on creation, rather than digitisation, with only information of "great value" to be digitised. Another respondent expressed concerns about the copyright situation in this area. Several other respondents noted that digitisation was "under discussion" or "just beginning".

Although relatively low, the percentage of Commonwealth libraries involved in digitisation projects was not unexpected. The literature on the topic has made it abundantly clear that digitisation is expensive, in terms of financial resources, staff resources and technological and infrastructure requirements (Priestley, 1998; Mann, 1999; Gertz, 2000), and that such efforts are often only worthwhile for "special" collections (Lynch, 2000).

It is also apparent that copyright presents a significant impediment to the digitisation of materials where the rights are not owned by the library or its parent organisation (Library Association, 1995). Given these facts, it could be reasonably expected that Commonwealth libraries would generally only be involved in the digitisation of materials for which their parent organisation owns the copyright, and then, only where materials are considered of significant value.

Although digitisation is likely to remain an extremely resource-intensive exercise for the foreseeable future, the copyright part of the equation may soon be altered in

Commonwealth libraries. Under s.183 of the *Copyright Act 1968,* activities undertaken for the "Services of the Crown" are covered by statutory licenses negotiated with the Copyright Agency Limited (CAL), and other relevant copyright collecting societies. New statutory licenses were under negotiation in late 2001, with provisions to be settled by mid-2002. Under the new license for bibliographic materials, Commonwealth agencies (including their libraries) will, for the first time, be able to carry out some digitisation of materials without being subject to infringement actions by rightsowners. It is not entirely clear what impact this will have on digitisation activities in the Commonwealth sector, but it seems likely that Commonwealth libraries will enjoy much greater freedom in this area than has previously been the case, and certainly, greater freedom of activity than is available to libraries not covered by the provisions of s. 183 of the *Copyright Act*.

5.4.14. Client-Initiated Electronic Requesting Facilities

Clients were able to make document delivery, reference or other requests electronically in 64 (65%) of the respondent libraries. The medium used for requesting tended to vary considerably. Some respondents had library systems that allowed electronic requesting by the end-user, while many others accepted electronic mail requests from clients to achieve the same result. In common with electronic document delivery (at 5.4.1 above), several respondents noted that they did not allow their clients unmediated access to third party suppliers.

In the literature, several authors noted user access to unmediated interlibrary loan as one of the benefits of the electronic environment (Preece and Kilpatrick, 1998; Prabha, 1999). However, it has also been noted that unmediated document delivery access can lead to wasteful use of library resources (Jacobs and Morris, 1999; Holleman, 2000), and given the general trend toward static or diminishing library budgets, this may be one reason that federal government libraries have not moved in this direction. Another reason may be that there is much policy consideration required for such systems to work effectively (Hawks, 1995; Shreeves, 1997; Berry, 2000). Given that there is relatively little literature in this area, and much of it is contradictory, it is difficult to say whether Commonwealth library activity is in

accord with library activity elsewhere, or whether these results were to be expected.

5.4.15. Access to Electronic Full-Text

In the area of electronic full-text, 69 (70%) respondents had access to some form of these materials. As with previous responses, the materials being made available depended on the subject interests of the agency concerned. Many respondents were using a variety of full-text CD-ROM titles, while others were making use of Internet full-text sources. A few also noted the use of full-text electronic journals. Several respondents stated that this was an area under consideration or development. In many cases, respondents noted cost as a major factor in their decisions in this area, with many using only freely available Internet resources. In many respects, responses to this question were also quite similar to the responses on availability of online files (at 5.4.8. above), with some respondents again having difficulty with the availability of appropriate subject resources.

As previously discussed at 5.4.8, approximately 80% US academic libraries were making available electronic resources (Tenopir and Ennis, 1998). Yet just 70% of Commonwealth library respondents offered similar access to electronic full-text. One major reason for this discrepancy may lie in the fact that universities have tended to be part of consortia to a greater extent than Commonwealth libraries, whose collections and interests are less homogeneous than those of the academic sector.

It is well recognised that consortial arrangements can lead to discounted prices for products (Shreeves, 1997; Keller, 2001), but the relative lack of consortial arrangements in the Commonwealth library sector means that respondents may be denied such benefits, leading to difficulties in funding the acquisition of such resources, as noted above. It is possible that Commonwealth libraries could overcome some of the difficulties faced in this area by making greater efforts to negotiate consortial contracts.

FLIN, as the consortial body covering Commonwealth libraries, could be of great assistance in this area, and indeed, some consortial activity is already taking place. As with many such libraries bodies, FLIN is currently comprised of volunteers, who are working in their spare time, and this necessarily limits the extent to which it can be active. It seems highly likely that a body with a paid secretariat, such as CAUL, would be able to accomplish more for members, and FLIN has made a preliminary investigation of the possibilities in this area. However, even if FLIN were to adopt this kind of organisational model, it may only partial solve the problems experienced by Commonwealth libraries in negotiating consortial arrangements, as that the subject needs of the various libraries tended to vary quite widely, and many resources would have only limited audiences.

5.4.16. Other Virtual Library Activities

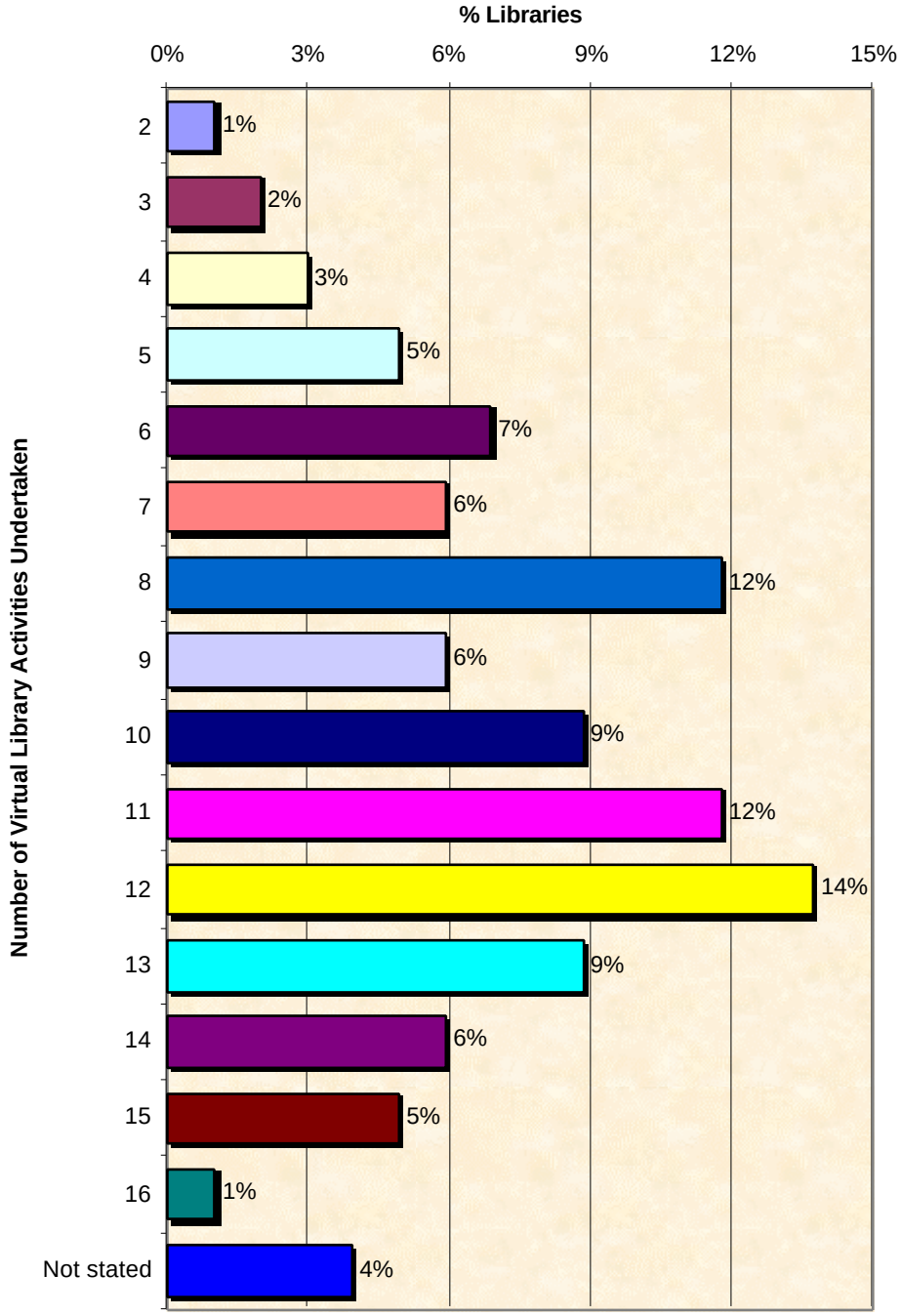
Only 13 (13%) respondents indicated they were involved in any other virtual library activities. The projects listed were quite varied, ranging from the digitisation of images, to electronic current awareness services, to the provision of sophisticated electronic directory structures to support services. There was no particular commonality about any of the projects mentioned; form and format largely depended on the circumstances of the particular agency concerned. Interestingly, the projects listed here usually corresponded with one of the previous 15 categories of virtual library activity, rather than requiring a new, separate, category, and this would appear to indicate that the picture of virtual library activities developed under this model is reasonably complete.

5.5. VIRTUAL LIBRARY DEVELOPMENT IN COMMONWEALTH LIBRARIES

As discussed at 5.4 (above), Question 2 asked respondents to identify their involvement in 16 different virtual library activities, with 98 valid responses being received. This provides a good guide to the nature and extent of individual virtual library activities being undertaken in the Commonwealth library sector. However, by looking at the number of activities being undertaken in each library, it is also possible to gain a picture of the levels of virtual library development occurring in Commonwealth libraries.

Figure 5.6 (below) shows the total number of virtual library activities being undertaken by each respondent. The number of activities ranged from two to 16, with 74 (74%) respondents indicating that they were involved in eight or more virtual library activities. Furthermore, 52 (52%) responses fell between the range of eight and 13 different activities, and the average number of activities in each library was 9.8. This demonstrates quite strong virtual library development in Commonwealth libraries.

Figure 5.6: Levels of Virtual Library Development in Commonwealth Libraries (N=102)



Just as the virtual library literature does not give definitive numbers of libraries that are, and are not, developing virtual libraries, neither does it give a clear indication of the level of development that is occurring. However, as discussed at 5.1 above, it is possible to infer that virtual library development is considered important and necessary from the sheer volume of material being written and published on the topic. If the number of activities undertaken is an indicator of the level of virtual library development that is occurring, it is possible to say that virtual libraries tend to be well developed in Commonwealth Government agencies. As such, this concurs with the level of importance assigned to virtual library development in the literature on the topic.

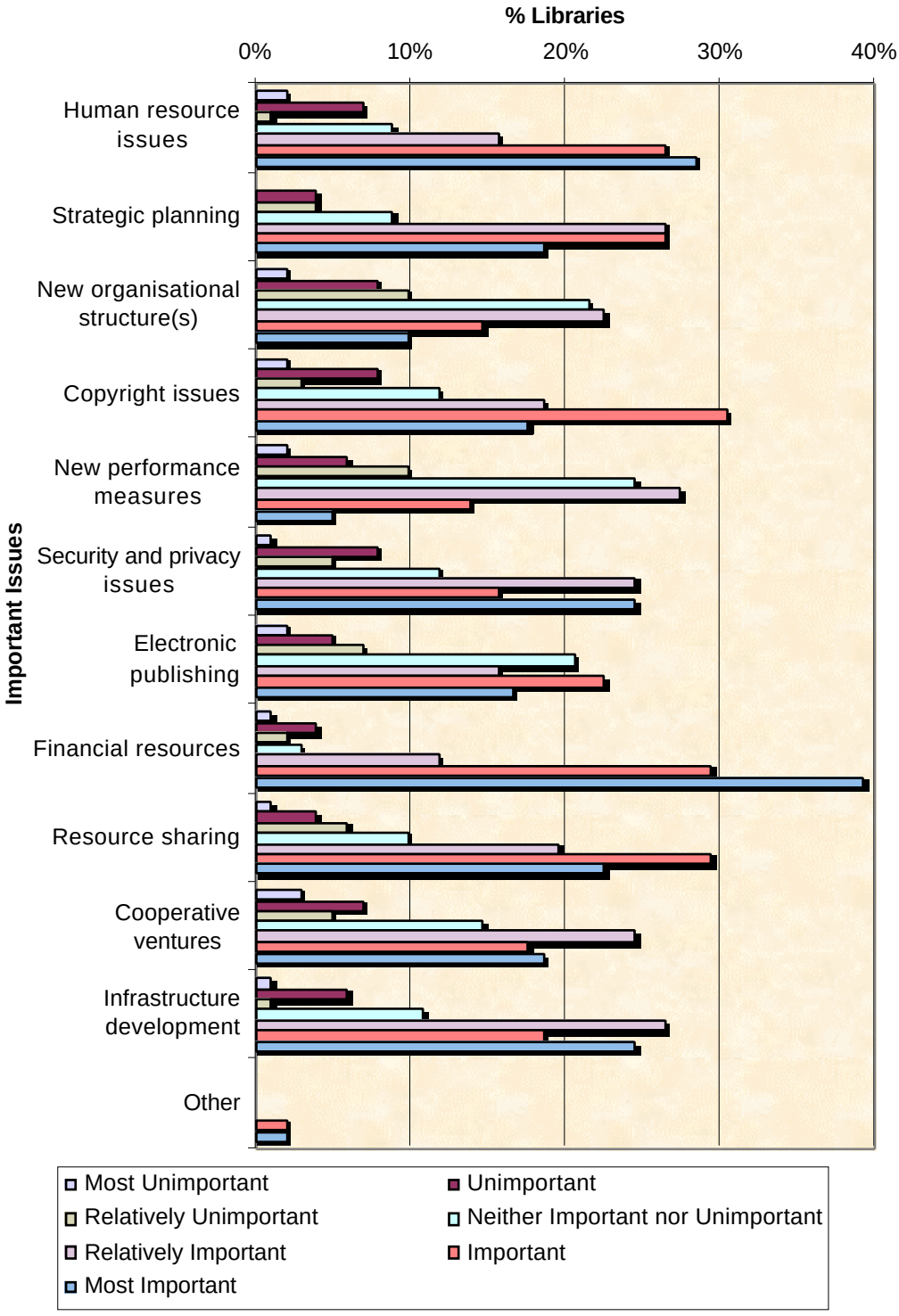
5.6. ISSUES OF IMPORTANCE TO VIRTUAL LIBRARY DEVELOPMENT

Question 3: Please rate each of the areas below in terms of their relative importance in creating the virtual library (scale 1-7, 7 = highest)

(A complete listing of issues is shown in the survey instrument in Appendix A)

Question 3 asked respondents to indicate, on a scale of one to seven, how important they believed various issues were to the development of virtual libraries, with responses as shown in Figure 5.7. It is apparent from this chart that financial issues were considered most important, closely followed by copyright and infrastructure issues, while organisational issues were considered slightly less significant.

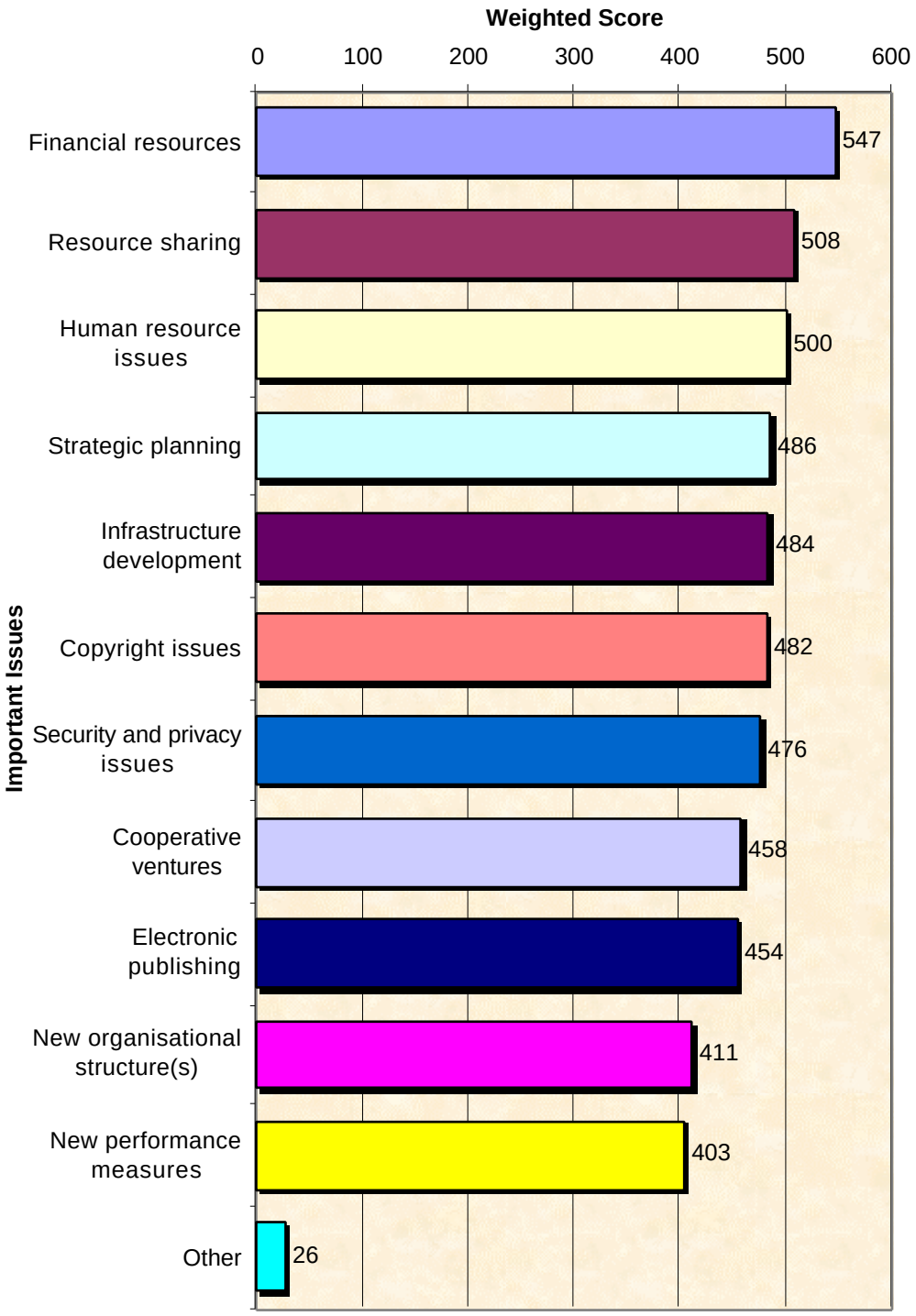
Figure 5.7: Issues of Importance to Virtual Library Development (N=102)



While this provided an interesting assessment of the perceived importance of each individual issue, a clearer picture of the total importance assigned to each issue began to emerge when issues were weighted, relative to one another (as shown in

Figure 5.8). The rankings for each issue (ie. 1 - 7) were multiplied by the number of 'votes' each received to derive a total weighted score.

Figure 5.8: Issues of Importance to Virtual Library Development (Weighted)



When responses were weighted, some interesting changes emerged. Financial issues were still clearly considered most important, but resource sharing and human resource issues were given next highest importance, with legal and infrastructure issues dropping away somewhat. The weighted scores fell within an overall range of approximately 140 points, so, considered in an overall context, it appears that respondents believed the various issues to be reasonably equal in importance.

Each individual issue is considered in further detail below, with the responses having been grouped together. Where respondents rated issues as "most important" or "important", they have been termed *highly important*. Where issues were rated as being "relatively important" or "neither important nor unimportant", they have been termed *moderately important*. Issues that were rated as "relatively unimportant", "unimportant" or "most unimportant" have been termed *unimportant*.

5.6.1. Financial Resources

Financial resources were considered highly important by 70 (76%) respondents, moderately important by 15 (16%), with seven (8%) rating them unimportant. Of the eleven issues rated, financial issues were ranked first on the weighted scale, by a margin of over 40 points.

The issue of adequate financial resources is considered a prime driver for the success or failure of virtual libraries (Garrett, 1993; Arnold, 1994; Campbell, 1996; Feret and Marcinek, 1999). Further, the literature recognises that the information age is shifting the nature of information and the way it is paid for (Ray, 1996; Keller, 2001), with a consequent effect on library financial models and budgeting (Gilbert, 1993; Campbell, 1996; Van Houweling, 1996; Young, 1996; Majka, 2000). It was therefore expected that Commonwealth libraries would identify financial issues as being critical to the success of virtual libraries, and this was the case, with more than three-quarters of respondents considering them highly important. Indeed, it could perhaps be considered surprising that 8% of respondents would

consider financial issues to be unimportant, given the importance the literature places on this issue.

5.6.2. Resource Sharing

In terms of resource sharing, 53 (56%) respondents believed it to be highly important, 30 (32%) finding it moderately important, and 11 (12%) rating it unimportant. Of the eleven issues rated, resource sharing was ranked second on the weighted scale.

In the past, ownership was the preferred model of development for library collections, with resource sharing being considered a second-best option (Kemp, 1997). However, in an era of declining budgets, more and more libraries are recognising that resource sharing has become essential, especially in more electronically based library environments (Smith and Johnson, 1993; Nevins and Nyberg, 1996; Prestamo, 1996; Galbreath, 1997; Anwar and Al-Jasem, 2001). Unfortunately, there are some difficulties implicit in the resource-sharing model, in terms of accessibility of materials (Branin, 1991; Boyle and Davies, 1999), as well as the issue of importance of local priorities (Van Fleet and Wallace, 1993).

When asked about policies emphasising access to information over ownership in Question 2B (at 5.4.2 above), just 58% of respondents had such policies in place. It was therefore expected that Commonwealth libraries would not rate resource sharing as highly important. Yet the issue was ranked second on the weighted scale, with 88% of respondents considering it highly or moderately important. This result may be explained by the fact that funding was rated as the single most important issue to virtual library development. With a number of respondents noting in Question 2 (at 5.4 above) that cost was a factor in their virtual library activities, it may be that Commonwealth libraries consider resource sharing to be one way of stretching their limited resources.

5.6.3. Human Resource Issues

In the area of human resource issues, 56 (62%) respondents considered them highly important, 25 (27%) believed them to be moderately important, while ten (11%)

considered such issues unimportant. Of the eleven issues rated, human resources issues were ranked third on the weighted scale.

Human resource issues appear quite important to virtual libraries, with a strong likelihood of traditional library staff roles and responsibilities changing under their influence, sometimes dramatically (Dawes, 1989; Saunders, 1999; Roitberg, 2001). There is also recognition of the fact that the application of new technologies is altering the way in which library staff work (Von Wahlde, 1993; Pinfield, 2001). Given this, it was expected that human resources issues would be considered highly important to virtual library development in Commonwealth libraries. This proved to be the case, with over 60% of respondents rating this issue as highly important.

5.6.4. Strategic Planning

When asked about strategic planning, 46 (51%) respondents rated it as highly important, 36 (40%) found it moderately important, while only eight (9%) considering it unimportant. Of the eleven issues rated, strategic planning was ranked fourth on the weighted scale.

Numerous writers have noted that strategic planning is necessary in a virtual library context as libraries seek to understand and work in concert with their institutional environment (Steele, 1994; Broering, 1995; Prestamo, 1996; Novak, 2002). Given that virtual libraries can require difficult decisions about what services and products are and are not to be supported, this will also have an impact on strategic planning processes (Cline, 1996). Slightly more than half of the responses received rated strategic planning as highly important, with another 40% considering it of moderate importance. Given the attitude of writers in the field, the relatively high level of importance assigned to strategic planning was expected.

5.6.5. Infrastructure Development

When questioned about the importance of infrastructure development, 44 (51%) respondents rated it as highly important, 38 (40%) found it moderately important, with eight (9%) believing it to be unimportant. Of the eleven issues rated, infrastructure development was ranked fifth on the weighted scale.

In a service model that has so many technological elements, such as a virtual library, it is obvious that libraries will need to develop suitable infrastructure to succeed (Arruda, 1997). More than this, libraries require stable, shared infrastructures if they are to satisfactorily meet client needs (Van Houweling, 1996). In light of this, it was expected that Commonwealth libraries would consider infrastructure development to be important, which was indeed the case, with 91% of respondents rating it highly or moderately important.

5.6.6. Copyright Issues

Copyright issues were rated highly important by 49 (53%) respondents, moderately important by 31 (33%), and unimportant by 13 (14%). Of the eleven issues rated, copyright was ranked sixth on the weighted scale.

Current copyright laws are widely recognised to be inadequate in the virtual environment (Schrader, 1994; Mason, 1996; Wynne, 1996), and the copyright balance has swung too far towards rightsowners (Ray, 1996; Price, 1996; Harper, 1997). Indeed, there is a broadly held view that copyright issues may gravely hinder virtual library development (Ribaudo et al., 1994; Fong, 1999; Lynch, 2000; Pinfield, 2001), with the strong potential to derail it altogether (Kuny and Cleveland, 1996; Mason, 1996; Pacifici, 1997).

Given this, the fact that copyright issues ranked only in the middle of the relative scale was unexpected. This low relative ranking is, however, somewhat belied by the fact that 86% of respondents rated copyright as being relatively or highly important, with just 14% rating it as unimportant. It may also be that Commonwealth libraries feel less concerned about copyright than other organisations, as, under the provisions of section 183 of the *Copyright Act 1968* (*Australia. Copyright Act 1968*, 2001), Australian Government agencies at all levels hold a statutory license for the use of copyright materials for the services of the Crown, which gives much broader latitude than the standard fair dealing exceptions under sections 39-43 of the *Act*.

5.6.7. Security and Privacy Issues

Security and privacy issues were rated highly important by 41 (45%) respondents, with 37 (40%) finding them moderately important, and 14 (15%) believing them unimportant. Of the eleven issues rated, security and privacy were ranked seventh on the weighted scale.

Privacy and security have long been recognised as an important issue in libraries, with library staff being highly conscious of the need to protect users' information (Cottrell, 1999). It is also well understood that much data can be collected about individuals in the electronic environment (Kirby, 1999; Australia. Office of the Federal Privacy Commissioner, 2002), which can render current privacy and security protections ineffective (Merry, 1996).

Given that, at the time of the study, the *Privacy Act 1988* (*Australia. Privacy Act 1988*, 2001) had been applicable to the operations of all government agencies for more than ten years, it was expected that Commonwealth libraries would consider this an important issue, and this proved to be the case, with 85% of respondents considering it highly or moderately important. It was interesting that this issue ranked as low as it did on the weighted scale, but the issues that were ranked from fourth through to seventh were separated by a range of just ten points. This must surely indicate that there was very little difference perceived in the importance of these four issues.

5.6.8. Cooperative Ventures

Cooperative ventures were highly important to 37 (40%) respondents, moderately important to a further 40 (43%), with 15 (16%) considering them unimportant. Of the eleven issues rated, cooperative ventures were ranked eighth on the weighted scale.

The issue of cooperation is constant in the virtual library sphere, with general agreement that individual libraries cannot reach the virtual ideal alone (Arnold, 1994; Prestamo, 1996; Price, 1996; Bunker and Zick, 1999). There is also recognition that libraries and other players in the information industry must begin working

together to achieve the best outcomes, and thus there is a need to shift from competitive approaches to more collaborative ones (Cline, 1996; Sylge, 1996; Trolley, 1997; Baker, 1996). Given the strong emphasis on cooperation, it was surprising that cooperative ventures ranked just eighth on the weighted scale. However, the unweighted responses show that 83% percent of respondents did believe that cooperative ventures were highly or moderately important.

As discussed at 5.4.3 above, Commonwealth Government agencies have differing and separate responsibilities and budgets, with relatively little overlap between them. It may be that the relative lack of overlap between agencies is a limiting factor for cooperation between Commonwealth libraries, with a commensurate effect on its perceived importance.

5.6.9. Electronic Publishing

In the area of electronic publishing, 40 (44%) respondents found it highly important, with a further 37 (41%) rating it moderately important. Fourteen (15%) respondents rated it as unimportant. Of the eleven issues rated, electronic publishing was ranked ninth on the weighted scale.

The issue of electronic publishing is an interesting one. If electronically published materials are not available, then the assumptions about ready, remote access to materials through virtual libraries must fail (Bandyopadhyay and Chu, 1999; Khalil and Jayatilleke, 1999; Stewart, 2000). However, it is well known that, as yet, there is no critical mass of electronic materials available for most subject disciplines (Anderson, 1999), nor are standard pricing models yet in effect (Pikowsky, 2000; Keller, 2001). Likewise, electronic resources can be expensive to procure (Lynch, 2000).

It was expected that Commonwealth libraries would find it important to have access to electronically published materials, and this proved to be the case, with 85% of respondents rating it so. Yet it was the third lowest issue on the weighted scale, ranking ninth. As noted in Questions 2H and 2N (at 5.4.8 and 5.4.15, respectively), Commonwealth libraries have had difficulties with electronic

resources, both in terms of availability of relevant materials and costs, and thus they have been relatively slow to embrace them. Given the reported difficulties, this may form part of the reason for the lack of relative importance assigned to electronic publishing.

5.6.10. New Organisational Structures

In terms of the need for new organisational structures, 25 (28%) respondents believed it to be highly important, 45 (50%) assigned relative importance, with 20 (22%) respondents rating it as unimportant. Of the eleven issues rated, new organisational structures were ranked tenth on the weighted scale.

New organisational structures are considered important in the virtual library context, with current rigid libraries structures being unlikely to support the changing and changeable library of the future (Smith and Johnson, 1993; Arnold, 1994; Prestamo, 1996). It is also well recognised that functional divisions within libraries (for example, client services, technical services) are being changed, and even eliminated, under the influence of virtual libraries (Steele, 1994; Cooley and Goedeken, 1996; Commings, 1997; Novak, 2002). According to the literature, organisational flexibility is one of the keystones for success in the virtual library arena (Van Houweling, 1996; Sokvitne, 2002).

The low relative ranking (tenth) for this criterion was thus somewhat unexpected. However, in the unweighted ratings, 78% of respondents did consider new organisational structures highly or moderately important, with 22% rating it unimportant. From this, it is obvious that organisational structures are considered important, but they obviously have a slightly lesser relative importance to Commonwealth libraries than other issues.

5.6.11. New Performance Measures

On the need for new performance measures, 19 (21%) respondents considered them to be highly important, 53 (59%) found them moderately important, while 18 (20%) believed them unimportant. Of the eleven issues rated, new performance measures were ranked eleventh on the weighted scale.

The whole area of statistics and performance measurement is considered problematic in virtual libraries, with recognition that current measurement systems are often not suited to the electronic environment (Lindahl, 1997; Luther, 2001; Missingham, 2001). However, there is, as yet, no agreement on what measures should be used to replace them (Young, 1997). Given this lack of standards, and the caution that automatically generated electronic statistics may not be particularly meaningful (Gilbert, 2000), it is perhaps not surprising that Commonwealth libraries have ranked this issue last on their relative scale. Despite this, on the unweighted scale, 80% of respondents did consider the issue important, which may reflect the fact that, in an era of static or shrinking budgets, parent organisations are demanding proof of performance from libraries.

5.6.12. Other Areas of Importance to Virtual Library Development

Respondents were asked to rate any other issues of importance to virtual library development. Only four (4%) respondents raised issues other than those already discussed, but those few that did, rated them reasonably highly. Other issues nominated as being of importance to virtual library development included: technology structures and support, technological developments and associated skills developments, the capacity of users to respond positively to virtual developments, the capacity to manage change and keep up with developments, and the need to consider the organisation's core business.

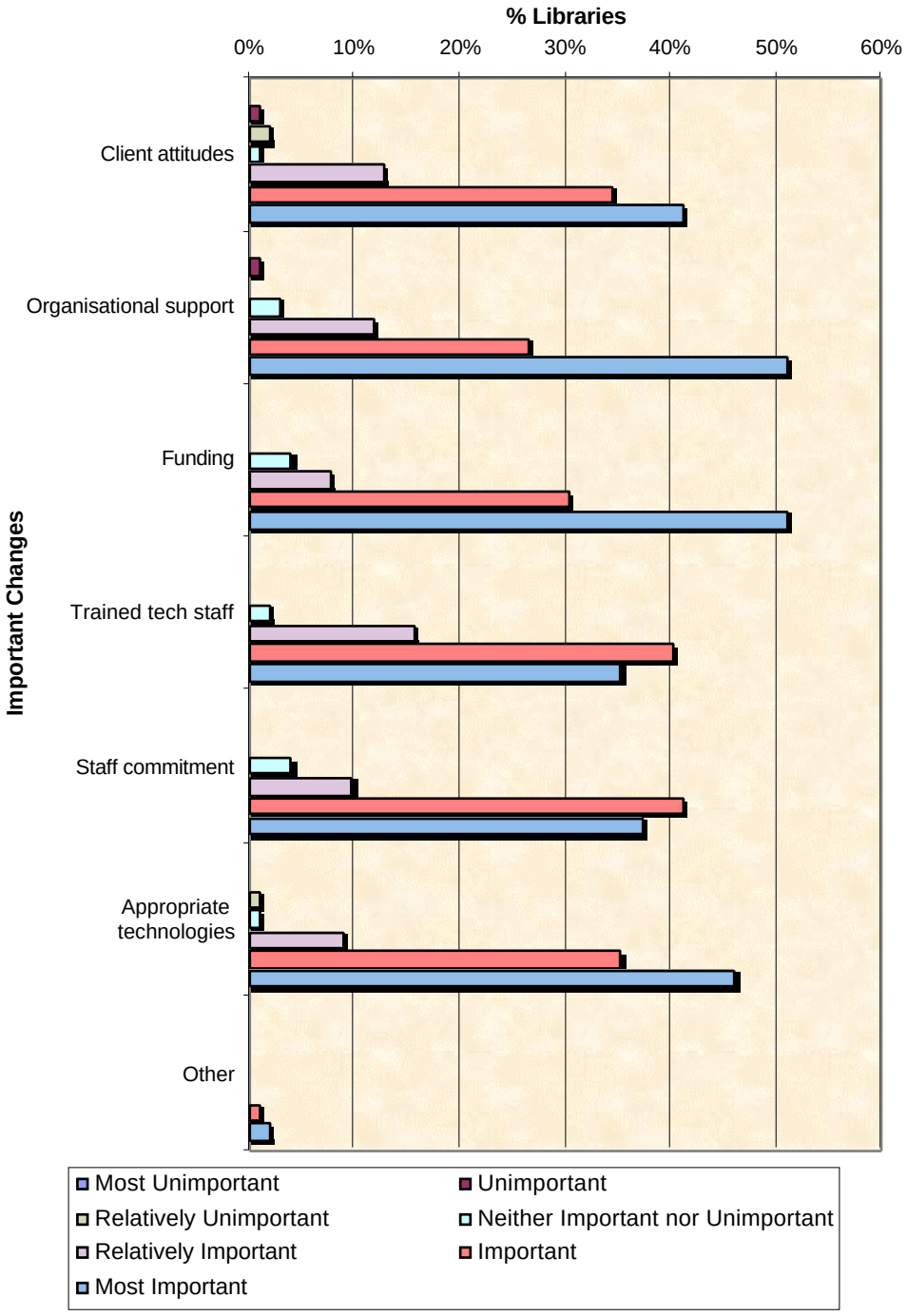
When considered against those issues already listed, the majority of issues were already covered in the list of virtual library activities in Question 2 (at 5.4 above), or were incorporated among the changes of importance listed at Question 4 (discussed at 5.7). This would again seem to indicate that the listing of important issues is reasonably complete.

5.7. CHANGES OF IMPORTANCE TO VIRTUAL LIBRARY DEVELOPMENT

Question 4: On the above scale, how important do you consider changes to each of the following in creating virtual libraries

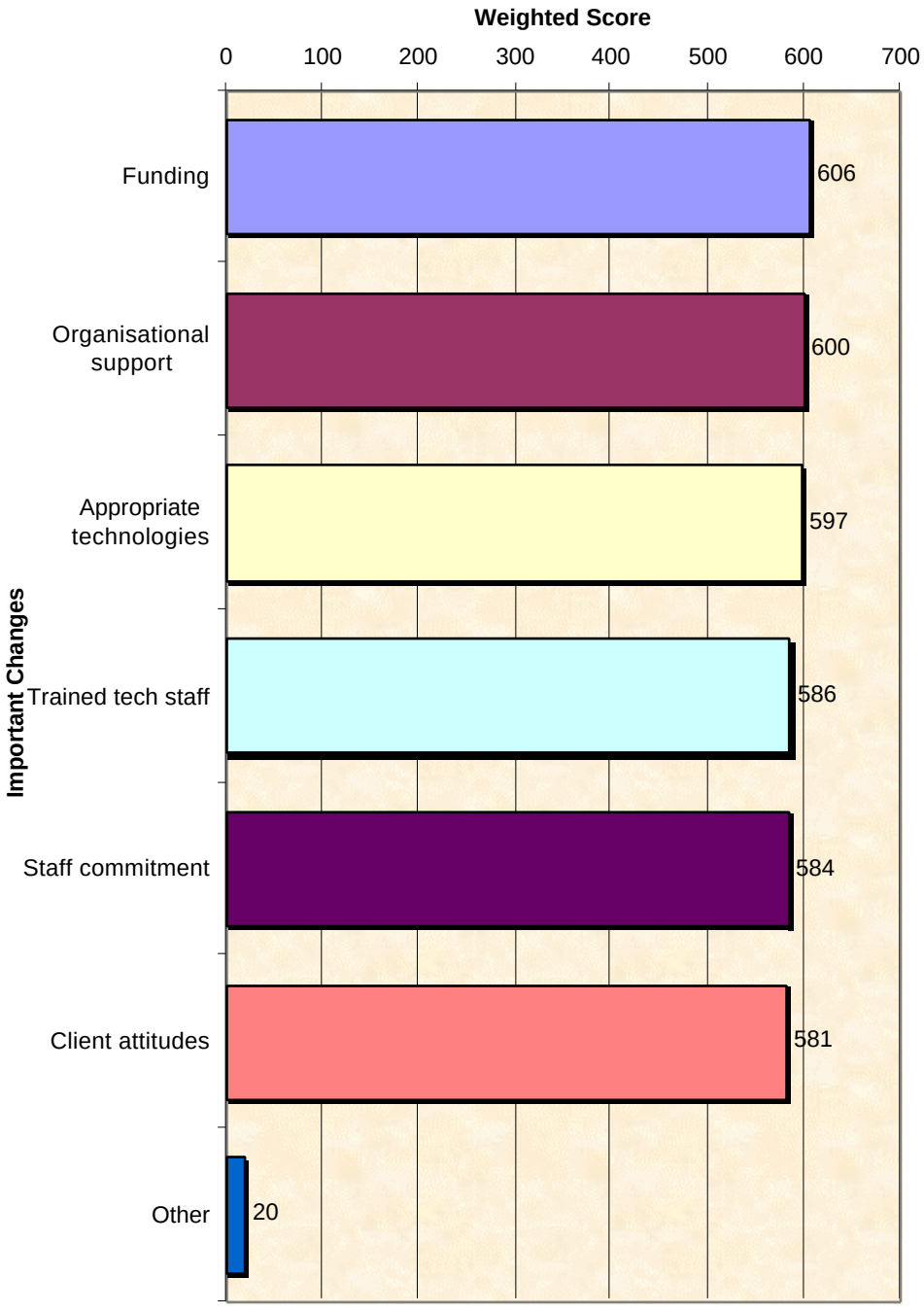
(A complete listing of changes is shown in the survey instrument in Appendix A)

Figure 5.9: Changes of Importance in Creating Virtual Libraries (N=102)



Question 4 asked respondents to rank how important changes to a number of areas were to the successful development of virtual libraries, using the same one to seven scale as in Question 3 (discussed above at 5.6). As shown in Figure 5.9, Commonwealth libraries considered funding and organisational support most important, with appropriate technologies and client attitudes next most important.

Figure 5.10: Changes of Importance to Virtual Library Development (Weighted)



As with Question 3 (at 5.6 above), scores for Question 4 were also weighted to gain a clearer idea of their relative importance, as shown in Figure 5.10. In this case, changes to funding and organisational support remained most highly ranked, closely followed by appropriate technologies. Unlike the unweighted scores, however, client attitudes were behind changes to staff commitment and trained technical staff. Since the weightings for all of these changes fell within a range of just twenty-five points, this would seem to confirm that changes in all of these areas were considered important, with very little difference between them. Given that the unweighted responses were all at the high end of the scale, it was not particularly surprising that the weighted scores were clustered so closely.

Each individual change is again considered in further detail below, with the responses discussed in weighted order. Again, where respondents rated issues as "most important" or "important", they have been termed *highly important*. Where issues were rated as being "relatively important" or "neither important nor unimportant", they have been termed *moderately important*. Issues that were rated as "relatively unimportant", "unimportant" or "most unimportant" have been termed *unimportant*.

5.7.1. Funding

Changes in funding were considered highly important by 83 (87%) respondents, while 12 (13%) rated it moderately important. None considered funding changes to be unimportant. Of the six issues rated, changes to funding were ranked first on the weighted scale.

Funding is considered critical to the success of virtual libraries, with development having the potential to cost very large sums of money, perhaps into the billions of dollars over time (Trolley, 1997). It is also recognised that virtual libraries are a long-term cost, which must be budgeted, not a one-time, add-on cost (Cline, 1996; Kemp, 1997; Noerr, 2000; Tebbetts, 2000; Pinfield, 2001). Given this, and that in Question 3 (at 5.6 above), financial issues were rated on both unweighted and weighted scales as the most important issue for Commonwealth virtual library development, it was expected that changes to funding would also be nominated as

the most important change needed. This was the case, with all respondents rating funding as highly or moderately important.

5.7.2. Organisational Support

The need for changes in organisational support were rated highly important by 79 (83%) respondents, moderately important by 15 (16%), with only one (1%) respondent considering it unimportant. Of the six issues rated, changes to organisational support were ranked second on the weighted scale.

The rate and extent to which virtual libraries are adopted by organisations is dependent, in part, on acceptance, then organisational leadership and support, by decision-makers (Klobas, 1990; Griffin, 1997; Wynne et al., 2001). If organisations are not prepared to accept the changes necessary to the introduction of new technologies, then the process will inevitably fail (Klobas, 1990). Given this, it was expected that Commonwealth libraries would consider changes to organisational support very important to virtual library development. This proved to be the case, with 99% of respondents rating it as highly important or important.

5.7.3. Appropriate Technologies

On the need for changes to appropriate technologies, 83 (88%) respondents considered it highly important, ten (11%) found it moderately important, with just one (1%) respondent rating it unimportant. Of the six issues rated, appropriate technologies were ranked third on the weighted scale.

Given the nature of virtual libraries, appropriate technologies are a very important element to their success (Lowry, 1995). Further, these technologies must be stable (Cady, 1995; Schuyler, 1998; DiMattia and Blumenstein, 1999), secure and easy for clients to use (Garrett, 1993; Czech, 1996). Libraries must also address the issues of technological change and obsolescence, so that their virtual libraries can continue to function over time, and information can continue to be accessed (Arms, 1996; Cox, 1996; Van Houweling, 1996). It was therefore unsurprising that 99% of Commonwealth libraries considered technology changes to be highly or moderately important.

With the overwhelming majority of respondents considering this issue important, it was somewhat unexpected that this issue was ranked only third on the weighted scale. However, just nine points separated the first three issues, with the second and third issues having only three points between them. It is again apparent from this that changes to all the ranked issues are considered important, with very little to differentiate one from another.

5.7.4. Trained Technical Staff

When questioned about the need for trained technical staff, 77 (81%) respondents rated this change as highly important, while 18 (19%) found it moderately important. None rated it as unimportant. Of the six issues rated, trained technical staff was ranked fourth on the weighted scale.

It is widely recognised that virtual libraries are changing the nature of library work, and as staff roles and responsibilities change, so too must training and development change (Young, 1996; Grygierczyk, 1997; Noble, 1998). Further, authors in the field consider that digital libraries will require appropriately trained "digital librarians" (Hastings and Tennant, 1996; Murray, 2000; Pinfield, 2001), and that this need for appropriately trained staff cannot be overemphasised (Tennant, 1995; Garrod, 1998). In light of this, Commonwealth libraries were expected to rate trained technical staff as important, and this was the case, with 100% of respondents rating this issue as being highly or moderately important. Given the total agreement about the importance of this issue, it could be considered surprising that this issue was just fourth on the relative scale. However, as previously discussed, the six issues weighted were separated by a total of just 25 points, so there was obviously little that separated this issue from those that preceded it.

5.7.5. Staff Commitment

On the issue of changes to staff commitment, 80 (85%) respondents found it to be highly important, while 14 (15%) rated it as moderately important. No one found staff commitment to be unimportant. Of the six issues rated, staff commitment was ranked fifth on the weighted scale.

It has been noted that while technology is important to virtual libraries, it is the human resource element that remains critical to their success (Cox, 1996). Furthermore, when implementing new technologies, managers must ensure that library staff understand, and are prepared to accept and work with, any proposed developments, or they are doomed to fail (Johnson, 1991; Shepherd, 2000). Given this, it was not surprising that 100% of Commonwealth library respondents rated this issue as important.

5.7.6. Client Attitudes

Changes in client attitudes were considered highly important by 77 (82%) respondents, moderately important by 14 (15%), and unimportant by three (3%). Of the six issues rated, changes to client attitudes were ranked sixth on the weighted scale.

It is widely recognised that virtual libraries cannot succeed if they do not focus on client needs, because a large part of their purpose is to satisfy client information needs (Piggott, 1993; Van Houweling, 1996). In these circumstances, libraries must consult with clients in developing virtual libraries (Crawford, 1995; Strong, 1996). If virtual services fail to meet user needs and expectations, then clients simply will not use or support them, with consequent effects on libraries (Price, 1996; Sylge, 1996; Wilson, 2000; Stratigos and Strouse, 2001).

With such high importance assigned to this issue by the literature, it was expected that Commonwealth libraries would reflect similar trends. This proved to be the case, with 97% of respondents considering changes to client attitudes important. Given this, the relative lack of importance shown on the weighted scale was unexpected. However, as discussed above, little separated the six ranked issues in Question 4. Furthermore, just five points separated the bottom three issues, so the relative ranking of this issue seems unlikely to be highly significant.

5.7.7. Other Changes of Importance to Virtual Library Development

Respondents were asked if there were any changes that were important to virtual library development. Only three (3%) respondents chose to add anything here, but

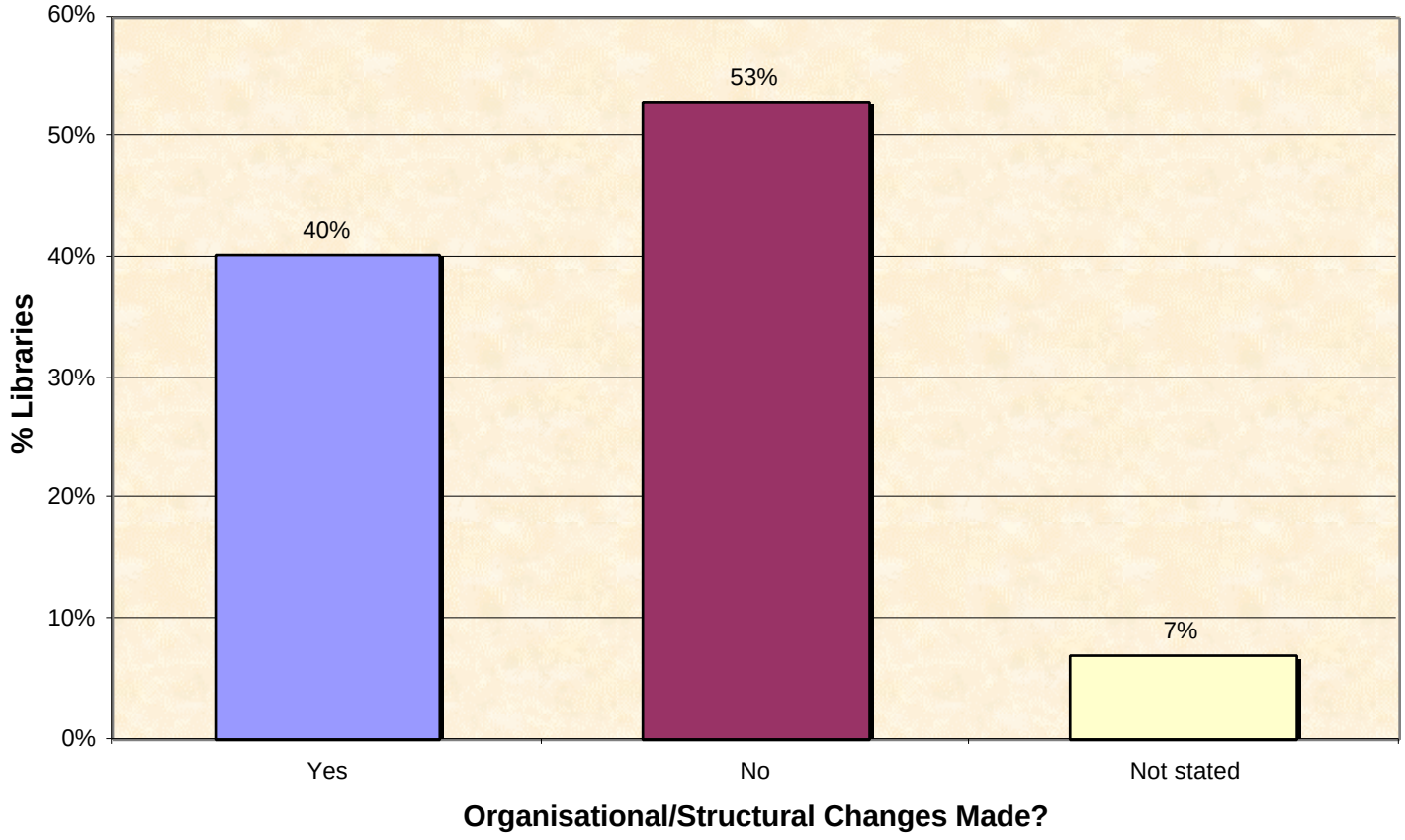
those three all rated their issues as highly important. The issues raised included training in use of electronic products, information sharing between Commonwealth libraries about possible virtual library developments, and the need for government involvement in developing suitable Internet structures.

As with Question 3 (discussed at 5.6.12 above), the issues raised here were again basically covered elsewhere in the list of virtual library activities provided in Question 2 (at 5.4 above). This would again seem to indicate that the list of important changes rated in Question 4 was reasonably complete, with no major changes of significance being omitted.

5.8. VIRTUAL LIBRARIES AND STAFFING/ORGANISATIONAL STRUCTURES

Question 5(a): Has or will your library change or experiment with staffing patterns or organisational structures to support access to electronic resources?

Figure 5.11: Changes to Staffing or Organisational Structures (N=102)



In Question 5(a), respondents were asked whether they were changing or experimenting with staffing patterns and / or organisational structures in order to support electronic resources. Of the 95 valid responses received for this question (shown in Figure 5.11), 41 (43%) respondents had changed or experimented with staffing or organisational structures, while 54 (57%) had not.

Most writers in this field have expected that virtual libraries would lead to structural changes, whether in terms of changed staff roles and responsibilities (Arnold, 1994; Reid, 1995; Griffin, 1997; Burke, 2002), or the way that work teams and workflows are organised (Smith and Johnson, 1993; Arnold, 1994; Prestamo, 1996; Van Houweling, 1996). It was therefore somewhat surprising that just 43% of respondents were making changes in this area.

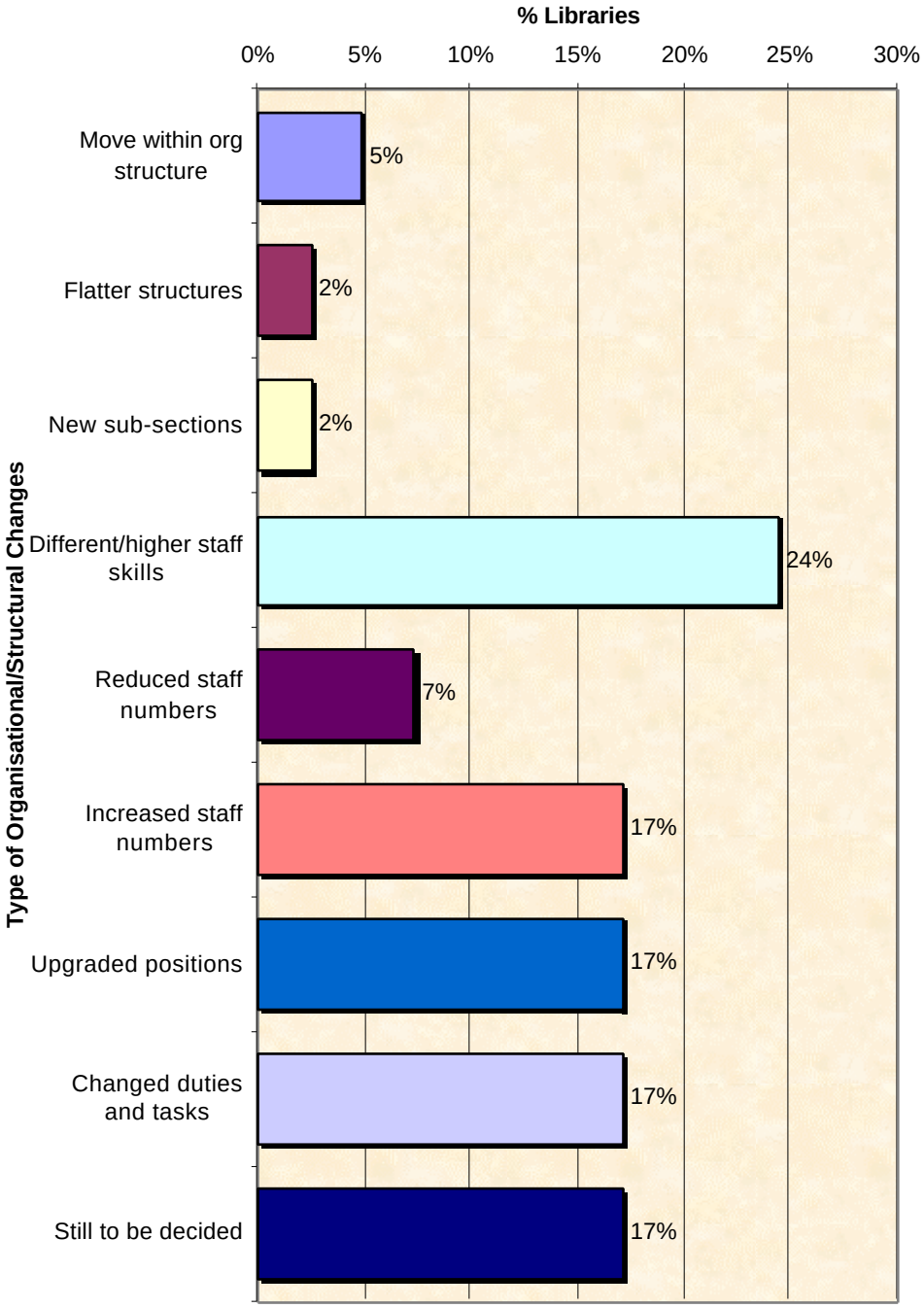
It is not entirely clear why this was the case, but in answer to Question 5(a), several respondents replied that changes were 'possible'. Further, as discussed at 5.9 (below), a number of respondents indicated that although no changes were currently being made, it was likely that changes would be made in future, although their exact nature was yet unknown. From this, it seems probable that it was too early in the virtual library development process for many respondents to know what structural changes they would require. If this is the case, then there appears to be a strong possibility that Commonwealth libraries will show greater unity with the position expressed in the literature in future.

5.9. TYPE OF ORGANISATIONAL OR STAFFING CHANGES MADE

Question 5(b) If yes, what changes have or will be made?

Respondents who answered in the affirmative for Question 5(a) (at 5.8 above) were asked to indicate what type of organisational and / or structural changes would be made, with responses as shown in Figure 5.12 (below). In this chart, the total number of respondents was 41. However, respondents often noted several concurrent changes, and the percentages shown represent the total number of structural changes listed, and not the population.

Figure 5.12: Types of Changes to Staffing or Organisational Structures (N=41)



Relatively few respondents chose to comment on the structural changes that they were making, but those who did usually had several complementary changes occurring at the same time. Although respondents tended to vary in the way changes were applied, there were several common themes in the responses to this question. These included the movement of the library within organisational hierarchies, both reductions and increases in staffing numbers, changes in the skills

and competencies required by library staff, and changes in the duties and tasks undertaken by library staff.

According to the literature, virtual library development can impact on a number of different aspects of library structures. There is wide recognition that virtual libraries will require different skills and training from library staff (Young, 1996; Grygierczyk, 1997; Noble, 1998). As reported under Question 4D (at 5.7.4 above), 100% of respondents rated the need for trained technical staff as important. In light of this, it was expected that respondents would note this as one of the changes being made. This was indeed the case, with numerous respondents noting that both current library staff and "new hires" required higher levels of computer and information technology skills, and that these were often different to the skills that had been required in the past. Alongside this, there was a need for constant training and retraining of library staff to maintain such skills.

Respondents also generally noted a need for increased staff resources: Only three noted decreased staffing, and this was reported to be due more to organisational "downsizing" exercises, rather than virtual library development as such. A number of respondents indicated that positions had been or were being upgraded, whether from part-time to full-time hours, reclassification of positions to a higher level, and especially, upgrading paraprofessional or administrative positions to professional librarian positions.

Some writers have considered that the implementation of technology in libraries leads to deprofessionalisation of library staff (Cottrell, 1999; Mueller and Dyerson, 1999; Riggs and Zhang, 1999), while others believed that technology would free library staff from routine duties, allowing them to concentrate on the more professional tasks (Hanson, 1982; Arnold, 1997). Yet others have indicated that professional staff are still required in a virtual environment (Roitberg, 2001), and some have simply indicated that the mix of professional/paraprofessional staff needs to be 'right' (Dawes, 1989; Garrod, 1998; White, 1998). Since the literature is so varied, it is difficult to know whether this professional upgrading of positions is a common experience in virtual libraries.

However, the reported reclassification of positions reflects a similar trend in ARL libraries (Johnson, 1991), albeit in the context of library automation generally, and was therefore not particularly surprising. The literature contains relatively little discussion on the question of staff hours, so it is not possible to say whether the reported increases in staff hours were to be expected.

It is commonly understood in the literature that even if organisational structures are not changed, virtual libraries can bring changes to the way that work is organised and allocated (Reid, 1995; Campbell, 1996; Griffin, 1997; Von Wahlde, 1993; Pinfield, 2001). This also proved to be the case in Commonwealth libraries. A number of respondents indicated that although organisational and/or staffing structures had not been changed *per se* to accommodate virtual library development, there had been redistributions of labour or staff duties had been changed. Some respondents indicated that technical services staff were being moved into client services and/or information systems areas. Others noted that there were considerable increases in the levels of client training that library staff were performing.

A number of respondents believed that changes would need to be made, but at the time of this research, the nature of these changes was still unclear. This was generally because virtual library developments were not sufficiently advanced for respondents to know what they would need in this regard.

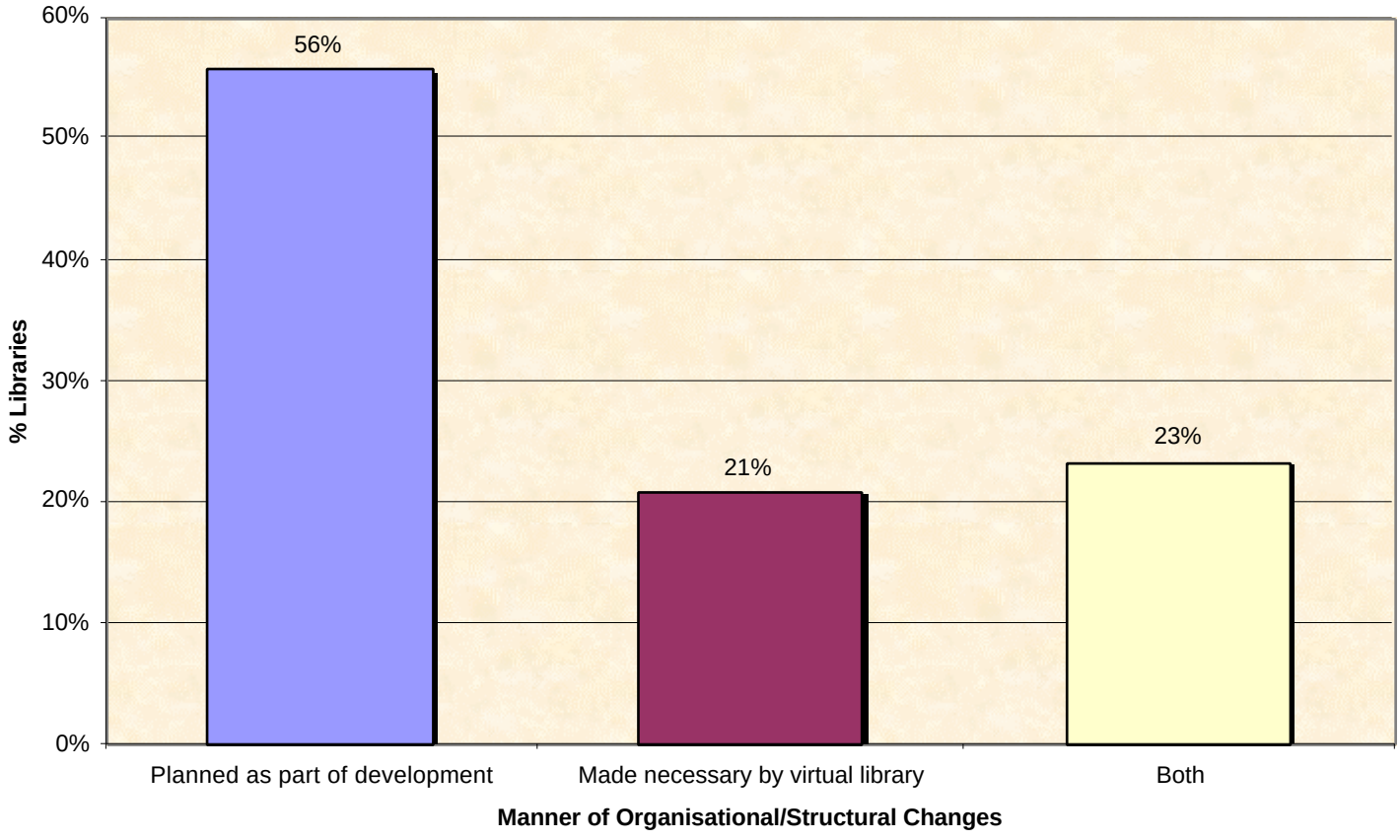
Unfortunately, there was no direct comparison available on the types of structural changes being made as a result of virtual library development. Although this question was asked as part of a 1992 study of virtual libraries in American academic libraries, the data were neither analysed nor published (Schiller, 2000). This means that it is difficult to say with any level of certainty whether the experience of Commonwealth libraries reflects the norm in this area. However, many of the proposed changes certainly seem to accord with changes suggested in the literature, as discussed above.

5.10. MANNER OF CHANGES TO STAFFING AND ORGANISATIONAL STRUCTURES

Question 6: If changes have or will be made to staffing patterns or organisational structures, are they planned as part of the overall development of the virtual library, made necessary by the introduction of the virtual library, or both?

Where respondents had indicated in Question 5(a) (at 5.8 above) that changes were being made to their staffing and/or organisational structures, they were asked whether these changes had been planned as part of their virtual library development process, had been made necessary by the introduction of the virtual library, or a combination of these. Of the 43 valid responses received (shown in Figure 5.13), 24 (56%) respondents had planned the changes as part of their development process, nine (21%) had made changes as a result of introducing the virtual library, and ten (23%) indicated a combination of these factors.

Figure 5.13: Manner of Changes to Staffing or Organisational Structures (N=43)



Relatively few respondents chose to comment about their responses to this question. Where comments were made, they tended to be quite different from one another, with different respondents emphasising different issues. Of those who had planned their changes, one stated that "[c]hanges are seen as responding to changing opportunities…..The library is assisting customers to adapt and take advantage of an expanding range of electronic tools and sources." Another indicated that support staff had been transferred out of the library to other parts of the organisation, so the library was taking the opportunity to operate with professional staff and adjust their processes accordingly. A third respondent noted that resource provision would need to be planned in parallel with technological and functional changes.

For those libraries where changes had become necessary because of virtual library implementation, one respondent believed that there would be less "routine" work, with this to be taken over by (outsourced) suppliers and service providers, rather than being undertaken in-house by library staff. Another stated that "[a]lthough the 'planned' answer is ideal, the rate of technological change, limited resources and inability to change staff quickly have so far made [changes necessary]. However, in future we would hope to move to the ['both' answer]".

Where change was occurring due to a combination of both factors, one respondent noted that this was because "[s]ome developments are planned, others 'happen' because of a new product or system suddenly being released". Another stated that "[t]he virtual library concept is the library's way of trying to make its resources more accessible to its increasing external users [*sic*]. The library is trying to create a 'one stop shop' and make it easier for clients and less work for library staff". A third felt that the changes that were being made would probably result in a better overall use of library staff expertise.

Unfortunately, there is little literature on this particular issue that is relevant to virtual libraries, so it is difficult to say whether the Commonwealth library experience is mirrored in other sectors. However, the general library automation literature indicates that it is far more normal for structural changes to occur as a

spontaneous and ad hoc response to technological developments, rather than being systematically planned (Johnson, 1991). In light of this, the fact that 56% of respondents had actively planned structural changes was somewhat unexpected. However, it is unclear exactly why this was so.

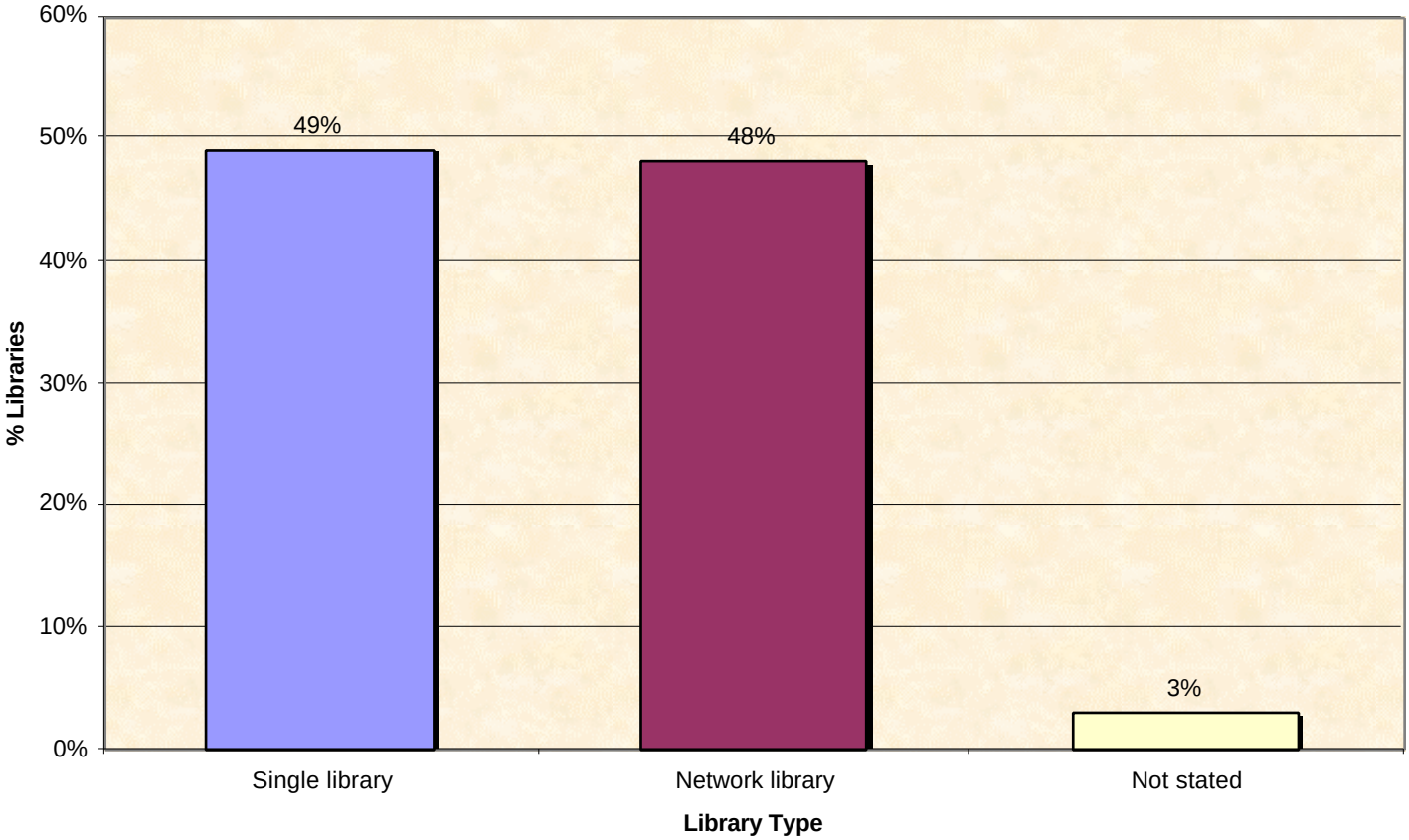
It may be that this level of planning is the norm for virtual library development, as opposed to general library automation. However, it may also be a simple reflection of the fact that Commonwealth libraries considered both strategic planning and new organisational structures to be important to virtual library development (discussed at 5.6.4 and 5.6.10 respectively). It may also be that this result was specific to the Commonwealth library sector. It is similarly possible that virtual libraries differ from general library automation projects in this respect. However, further research would be necessary in this area before definitive conclusions could be reached.

5.11. LIBRARY TYPES

Question 7(a): In your organisation, is your library a single library or part of a library network?

Respondents were asked whether they came from single libraries or libraries that were part of a library network. Responses are shown in Figure 5.14. Fifty (49%) were single libraries, while 49 (48%) were part of a library network. Three (3%) respondents did not indicate their library type.

Figure 5.14: Types of Commonwealth Libraries (N=102)



This result reflects the nature of respondents' parent agencies. While Commonwealth agencies tend to have differing and separate areas of responsibility, some agencies have jurisdiction over areas that are relatively discrete in nature, while others have responsibility for much more multi-faceted disciplines. This, along with the size of the parent organisation, has a corresponding effect on the number and extent of libraries required in each individual agency.

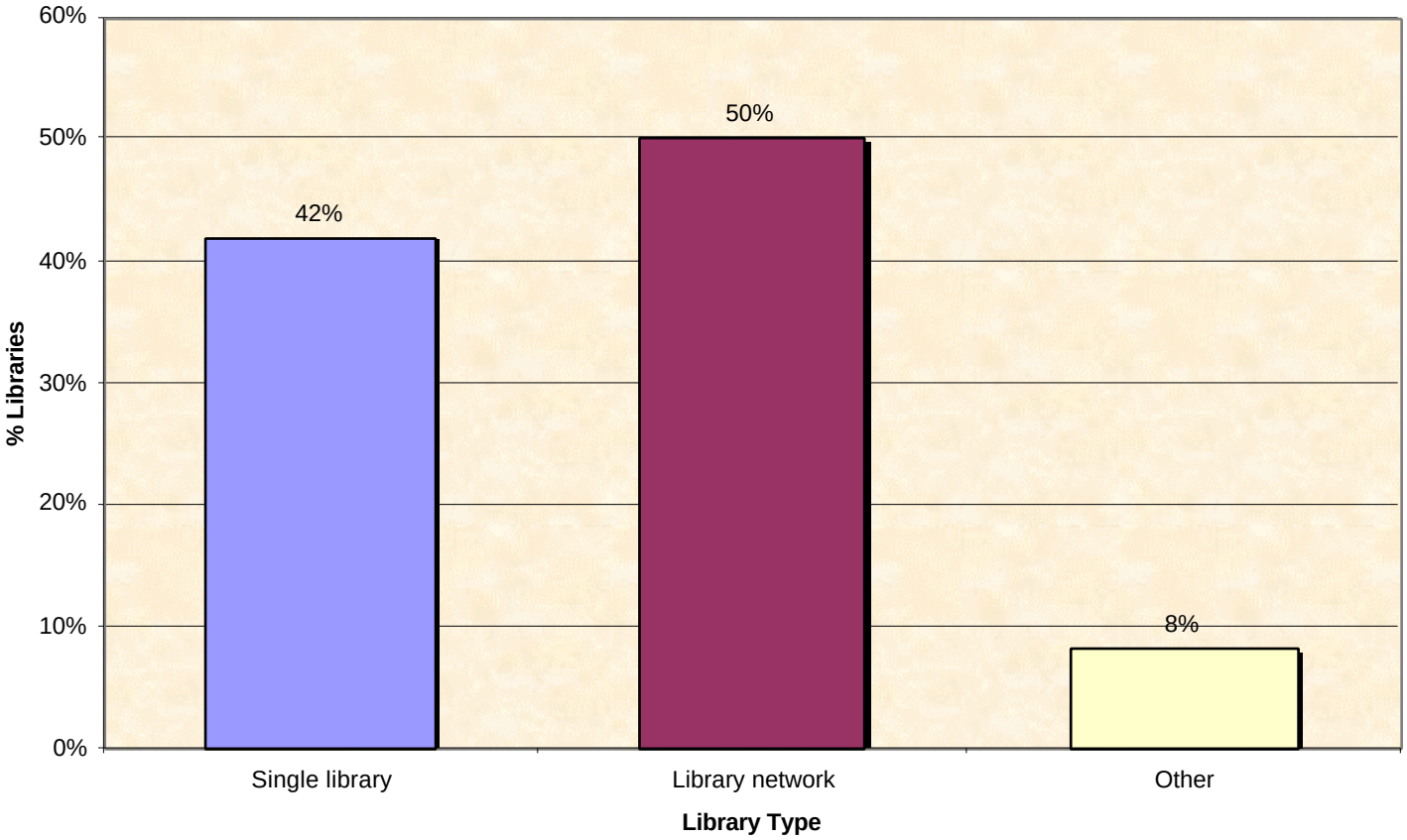
5.12. INTENDED AUDIENCE FOR VIRTUAL LIBRARIES

Question 7(b): Does or will the virtual library serve your library only, a library network or other?

Respondents were also asked to indicate whom their virtual library was intended to serve, as shown in Figure 5.15. Eighty-six valid responses were received, which equates with the number of respondents who indicated that they were intending to

develop a virtual library in Question 1(a). Of these 86 respondents, 36 (42%) intended their virtual library to serve a single library, 43 (50%) intended it to serve a library network, while seven (8%) intended to serve others.

Figure 5.15: Coverage of Virtual Library (N=86)



Generally, responses here were in agreement with the responses given in Question 7(a): that is, single libraries had virtual libraries serving their library only, while network libraries had virtual libraries serving a network. Of those seven who intended their virtual library to serve someone other than the single library or library network, most indicated that it would serve an "extended" network: that is, loose confederations of libraries with common interests, such as law court libraries.

The results here were interesting, inasmuch as the literature indicates that it is not desirable for libraries to "play the Lone Ranger" with regard to virtual library development (Sipe, 1999). The literature also states that cooperative efforts in this sphere are highly desirable (Dannelly, 1995; Engle, 1996; Reger, 1999).

Since nearly half of all respondents indicated that their virtual library was intended to serve their library only, it would seem to that Commonwealth libraries hold a position that is somewhat contrary to that expressed in the literature. However, responses to Questions 2C and 3J (discussed at 5.4.3 and 5.6.8 respectively) indicated that Commonwealth libraries were only pursuing cooperative ventures in a relatively limited fashion, possibly because of the separate and non-overlapping nature of the responsibilities of Commonwealth Government agencies. It therefore seems likely that responses to this question simply reflect the earlier responses from this research.

5.13. SIZE OF COMMONWEALTH LIBRARY CLIENT BASES

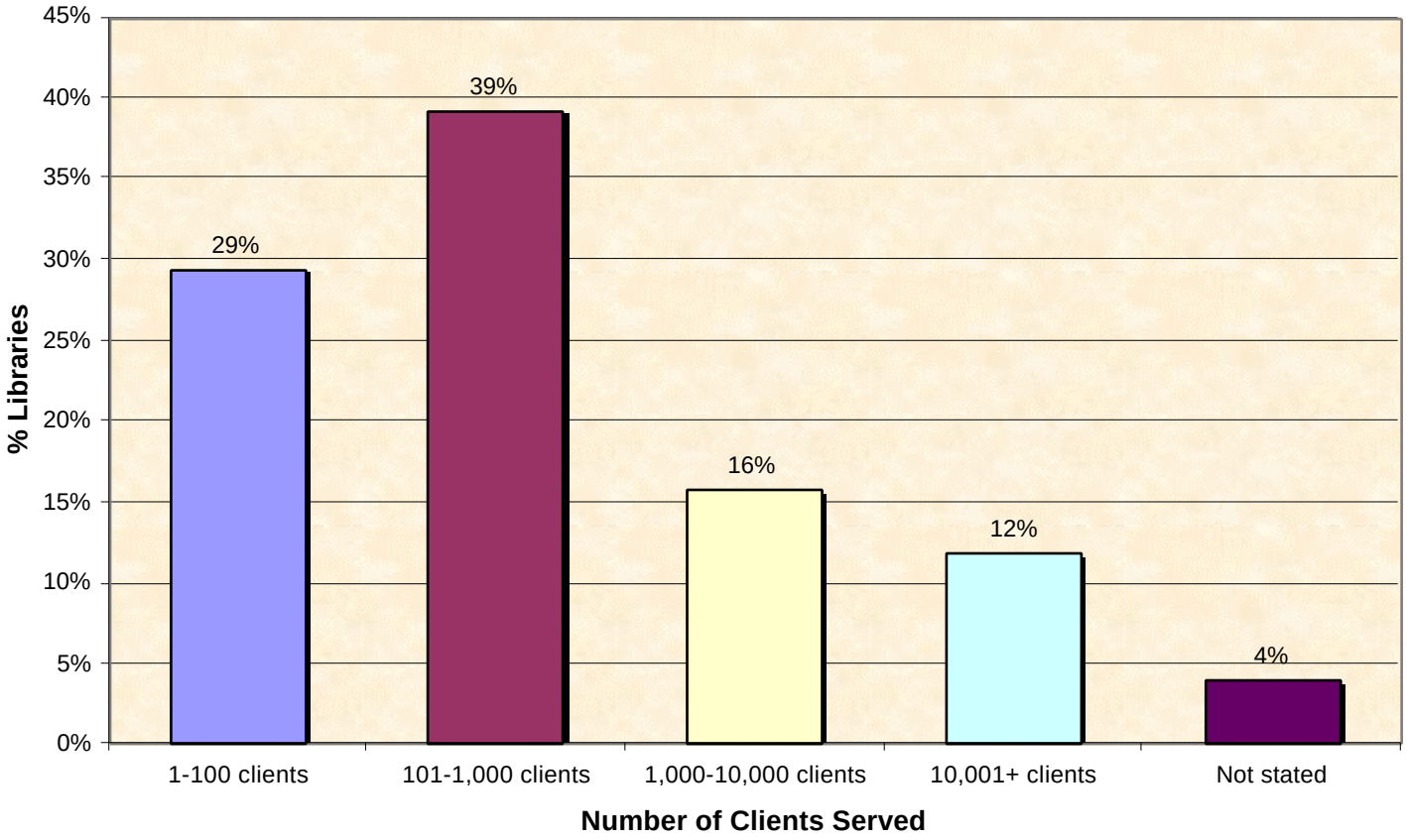
Question 8: Approximately how many clients does your library serve?

Respondents were asked to indicate the approximate number of clients that their library served. A number of respondents gave several figures, for example, numbers of clients within the organisation and outside it. Several libraries also indicated that they served the general public. In cases where multiple answers were provided, the largest number given was used to determine total library size.

Traditionally, library size is measured according to the number of staff within the library, size of library budget and/or by the size of the library's collection. The library literature provides no guidance on how to measure a library's size according to the size of its client base. The Australian Bureau of Statistics (ABS) was also consulted to determine if there was a suitable measure in use in Australian official statistics. The ABS advised that they tended to measure organisational size according to either number of employees or by organisational profit/financial turnover. No categorisation was available for size of organisation by client base. Given that no suitable categorisation was available, four size categories were therefore created for the purpose of this research. Libraries have been categorised as small (1-100 clients); medium (101-1,000 clients); large (1,001-10,000 clients) or; very large (10,001+ clients).

Of the 98 valid responses received for this question (shown in Figure 5.16), 30 (29%) served 1-100 clients, 40 (39%) served 101-1,000 clients, 16 (16%) served 1,001-10,000 clients and 12 (12%) served more than 10,001 clients. Four (4%) respondents did not indicate the size of their client base.

Figure 5.16: Size of Client Base Served by Commonwealth Libraries (N=102)



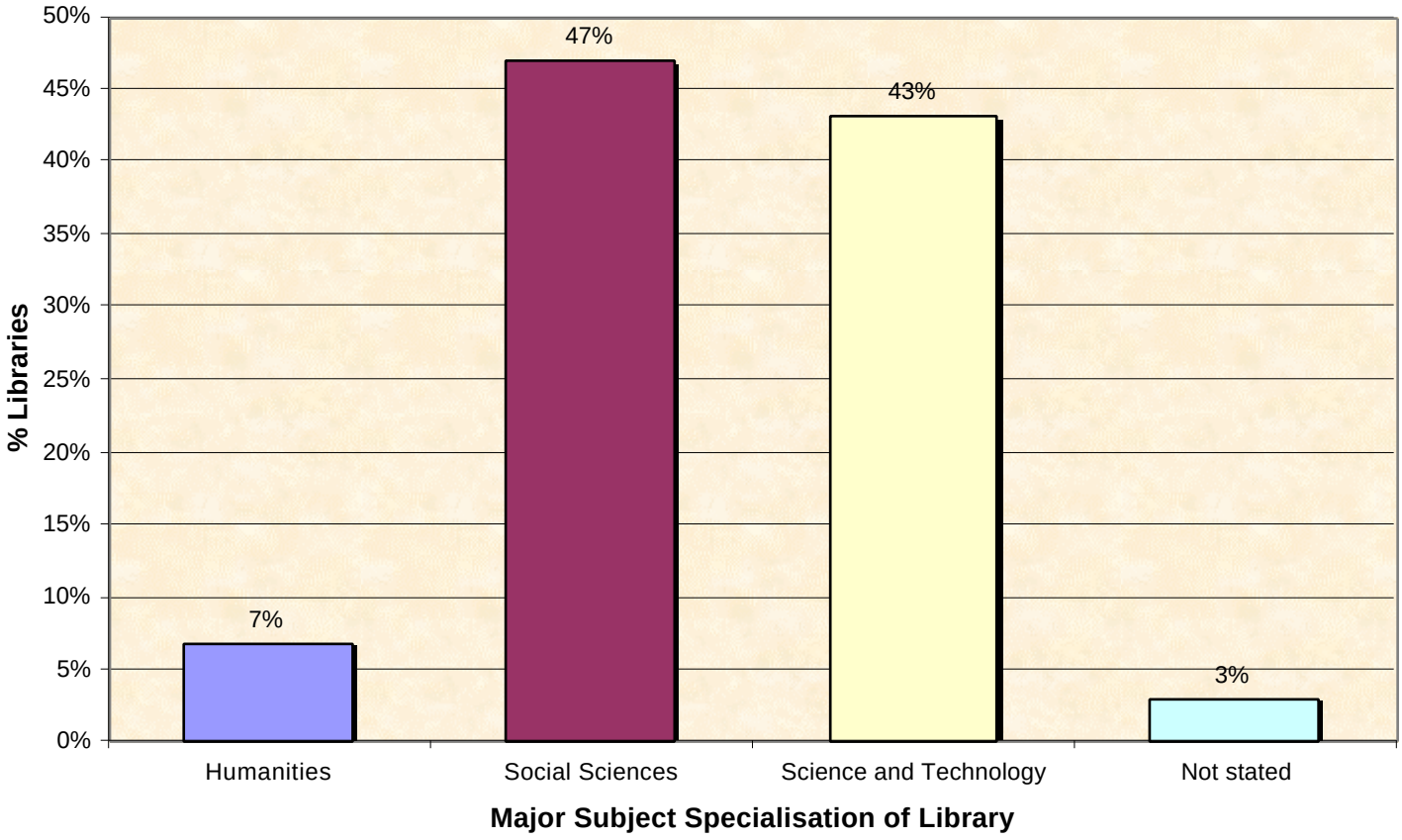
It was assumed that, with the exception of those few agencies serving the general public, the potential client base reported mainly reflected the number of personnel employed by the library's parent agency. On this basis, responses here seem to largely reflect the employee statistics reported by each agency in the *Australian Public Service Statistical Bulletin 1997-98* (Australia. Public Service and Merit Protection Commission, 1998).

5.14. SUBJECT SPECIALTIES OF COMMONWEALTH LIBRARIES

Question 9: What are the main subject areas your library collects in?

Respondents were asked to indicate their main subject collecting areas. Ninety-nine valid responses were received for this question, with the majority of respondents indicating that they collected in multiple subject disciplines. Each response was categorised according to the Dewey Decimal Classification (DDC) "Hundred Divisions" (Mitchell et al., 1996) into which a particular discipline fell. This was crosschecked for accuracy against the full list of subjects used by the Australian Libraries Gateway (Australian Libraries Gateway, 2000). From this, the various subject disciplines were categorised into three major groupings: humanities; social sciences; and, science and technology. Grouped responses are shown in Figure 5.17.

Figure 5.17: Major Subject Specialisations of Commonwealth Libraries (N=102)



On several occasions, respondents collected in subject areas spanning more than one category. In such instances, respondents were assigned to the group covering the majority of their subject field. Based on this categorisation, seven (7%) respondents were collecting mainly in the humanities, 48 (47%) in the social sciences and 44 (43%) in the sciences and technology. No indication of major subject collecting areas was given by the remaining three (3%) respondents.

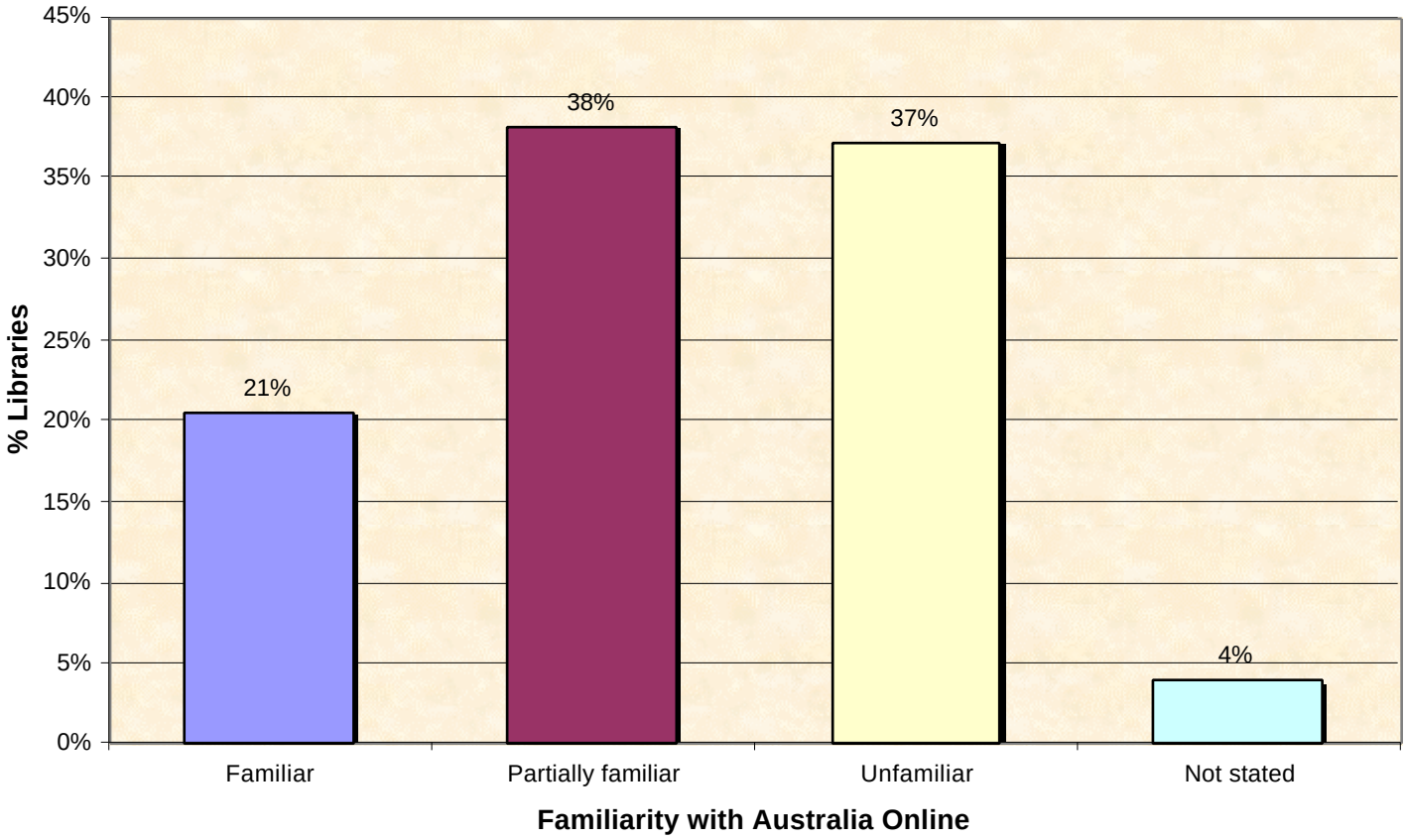
Under *The Constitution of the Commonwealth of Australia* (*The Constitution*, 2000), the Commonwealth Government has jurisdiction over very specific heads of power. An examination of these powers (set down in section 51) shows that they mainly fall into the social science disciplines, including communications, intellectual property, immigration and citizenship, foreign relations, law, social welfare, trade, and taxation. Others fall into the sciences and technology, including astronomical and meteorological observation, fisheries, quarantine, weights and measures, and statistics. Given this distribution of powers, it was expected that most respondents would be collecting in either social sciences or science and technology, which proved to be the case.

Section 51 of *The Constitution* does not mention powers that fall in the humanities disciplines. Those respondents that reported collections in the humanities disciplines were generally the large national museums, and other cultural institutions of a national nature that are the responsibility of the Commonwealth. However, this type of institution is not generally provided for in *The Constitution*, but is instead created and operated through the exercise of specific pieces of Commonwealth legislation, such as the *Australian War Memorial Act 1980*, *National Gallery Act 1995* and *National Museum of Australia Act 1980*.

5.15. AWARENESS OF GOVERNMENT POLICY AMONG COMMONWEALTH LIBRARIES

Question 10: How familiar is your library with Australia Online, the Commonwealth Government's policy statement on online technology?

Figure 5.18: Level of Familiarity with Australia Online (N=102)



Familiarity with the *Australia Online* policy document was another area on which respondents were asked to report, with 98 valid responses received, as shown in Figure 5.18. Of these, 21 (21%) were familiar, 39 (38%) were partially familiar and 38 (37%) were unfamiliar with *Australia Online.* No indication was given by the remaining four (4%) respondents as to their level of familiarity with *Australia Online*. Few respondents chose to make comments on their level of familiarity with *Australia Online*, but those few who did considered that the policy was largely irrelevant to libraries, placing undue emphasis on electronic commerce, copyright and security issues, while neglecting infrastructure development, and access and equity.

Given that *Australia Online* was an election policy document, it is not particularly surprising that the majority of respondents were either unfamiliar or partially familiar with it, as such documents tend not to be widely printed or distributed, and can vary dramatically from election promise to implemented government policy platform. Likewise, it was a quite generic document, covering a wide range of "information" matters, so it is also unsurprising that some would consider it irrelevant to libraries.

At the time that this research was conducted, no formalised government policy document had replaced the *Australia Online* election document. However, it was superseded in 2000 by *Government Online*, the Commonwealth Government's strategy for the development of a seamless national approach to the provision of online services (Australia. Department of Communications, 2000). *Government Online* had a series of deadlines for various activities to occur, as well as formal reporting mechanisms, and as such, it seems likely to have a much greater level of awareness and impact than its predecessor. However, the extent to which *Government Online* is likely to impact virtual library development in Commonwealth libraries remains unclear, and would require further research.

5.16. Other Issues Related to Commonwealth Virtual Library Development

Question 11: Is there anything else you would like to add about your use of electronic resources or your development of virtual library?

Question 11 invited respondents to make comments about any other aspect of virtual libraries that had not already been addressed. Of the 102 respondents, 28 (27%) chose to make further comment. While these comments were obviously driven by the individual circumstances of the respondent's library and / or parent organisation, there were still a number of common issues between libraries. The general themes discussed mirrored not only the trends noted in the general virtual library literature (discussed in Chapter 2), but also issues previously discussed in this Chapter.

Several respondents considered the general factors that were inhibiting their progress in the virtual library arena. One respondent believed that it was being held back by "…lack of staff to release the librarian…for training end users; extra cost of combined paper/electronic; licence provisions, especially for multi-site services...; confusion of interfaces to electronic formats; [the] erroneous belief that electronic is cheaper, free even [*sic*]."

Another said that "[c]ost of access to electronic resources (structure of licensing fees, publishers premiums), copyright considerations, network security and inadequate IT skills of library staff are issues that hamper progress to development of a true virtual library at our site. This is off-set by staff commitment and the need to maximise the use of resources".

The extent of virtual library developments in Commonwealth libraries was perhaps best summed up by the respondent who stated that "[t]he development of electronic resources will depend upon the attitude of clients and the measure of effectiveness the library can achieve in delivering a service that is speedy, efficient and user friendly".

A number of respondents cited technology and infrastructure as key issues for their virtual library development. A common view from respondents was that "[w]hilst more than happy to embrace the new technologies, a constant cry from colleagues is unreliable or non-functioning systems….". There was also a feeling that libraries can be hampered in their attempts to develop a virtual library by overarching factors within the organisation that are outside the control of the library, such as technology policies. Another respondent perhaps summed up the issue best, stating that "[t]echnology is still the key. It has to be reliable, easy to use and fast. Difficulties in browsing large documents still need to be overcome. The resources to support some information delivery means it may not be more economical than paper".

The issue of costs was also raised by a number of respondents. One stated that it was "[h]ard to justify cost of subscribing to online journals instead of a hard copy". This was mirrored by another, who said that:

> The development of a 'virtual library' is very gradual. Working on a small budget, library only replaces the hardcopy of a journal if it is presently used by a large number of staff so that other areas can contribute to the cost, as user licences can be quite expensive…. Material that clients use is often…unavailable electronically, so in the foreseeable future the library will maintain its small physical collection whilst moving towards more electronic sources as they become available and affordable.

For some, the reality of delivering of materials in electronic form caused problems. One respondent comprehensively described the problems experienced, stating that:

> Electronic publications are generally more difficult to access than print for these reasons: publishers are inconsistent in their policy of licensing and access, as they all have different authentication methods which are unstable and do not cover all users or library populations. The archiving of data is in *[sic]* the most part not guaranteed by publishers. The technology requires users to have good hardware and be on good networks. The pricing structures of electronic publications is often prohibitive (especially in biology and chemistry). These issues make the delivery of information via a virtual library very complex.

On the other hand, another respondent believed that "[t]he Internet has made an enormous difference to the library's access to overseas materials, particularly U.S.". They continued to say that "[a]s the rest of the organisation gets online, more resources will be devoted to improving access to the information…There is so much junk on the Internet".

A number of respondents were concerned with the client aspects of virtual libraries. Some noted that much of their virtual library work was being heavily driven by client demand. One respondent believed that virtual libraries were "…vital for the

library as an information service provider, given the increased use of electronic information retrieval by clients".

For others, the reverse situation was true. One considered that "[m]any users still prefer hard copy to browse and it is more portable for their work environment". Another was more blunt in its assessment, stating "[v]irtual libraries pose a significant cultural problem for organisations - a majority of employees are ill-equipped to handle the responsibility of researching information in this new environment (particularly when the search engines are not sophisticated and the metadata poorly organised). Libraries have two roles - skill the end-user up and ensure information is properly described". This view was echoed by a number of other respondents, who cited the importance of client training to their efforts.

The general attitude of Commonwealth libraries towards virtual library development was encouragingly positive, with the overall approach of Commonwealth libraries perhaps best articulated as follows:

> This is an exciting time for libraries. Unfortunately a combination of economic rationalism (resulting in decreasing resources in departments/agencies), increasing costs of resources (Australian dollar falling, huge cost of some e-journals...) and technical issues (mostly relating to network security) plus the independence of agencies limits libraries' abilities to deliver or significantly invest in new technology. The advantages libraries have are that they are small and flexible, generally high technology skills [*sic*], keep abreast of changes in technology and information resources, and a knowledge of the information needs of the whole user community. I see the challenges in prioritising and planning, collaborations, particularly for purchasing, overcoming technical issues, strategic marketing of our roles/potential and promotion of the role of libraries.

5.17. CONCLUSION

In Chapter 5, the findings from the current research have been reported and some possible reasons for Commonwealth library responses examined. Some comparisons between findings on various issues will be made in Chapter 6, and some conclusions drawn about the importance of various factors in Commonwealth virtual library development.

6. COMPARISON OF COMMONWEALTH VIRTUAL LIBRARY DEVELOPMENT FACTORS

In Chapter 5, the responses from Commonwealth libraries about their virtual library intentions and activities were discussed, and some conclusions drawn. In Chapter 6, some comparisons will be made between Commonwealth library responses on various issues (including development intention, library type, size of client base, subject specialisation and familiarity with Commonwealth Government policy) to determine whether any of these factors were of particular significance to either the types of activities undertaken, or the levels of virtual library development achieved in Commonwealth libraries.

6.1. INFLUENCE OF DEMOGRAPHIC FACTORS ON COMMONWEALTH VIRTUAL LIBRARY DEVELOPMENT

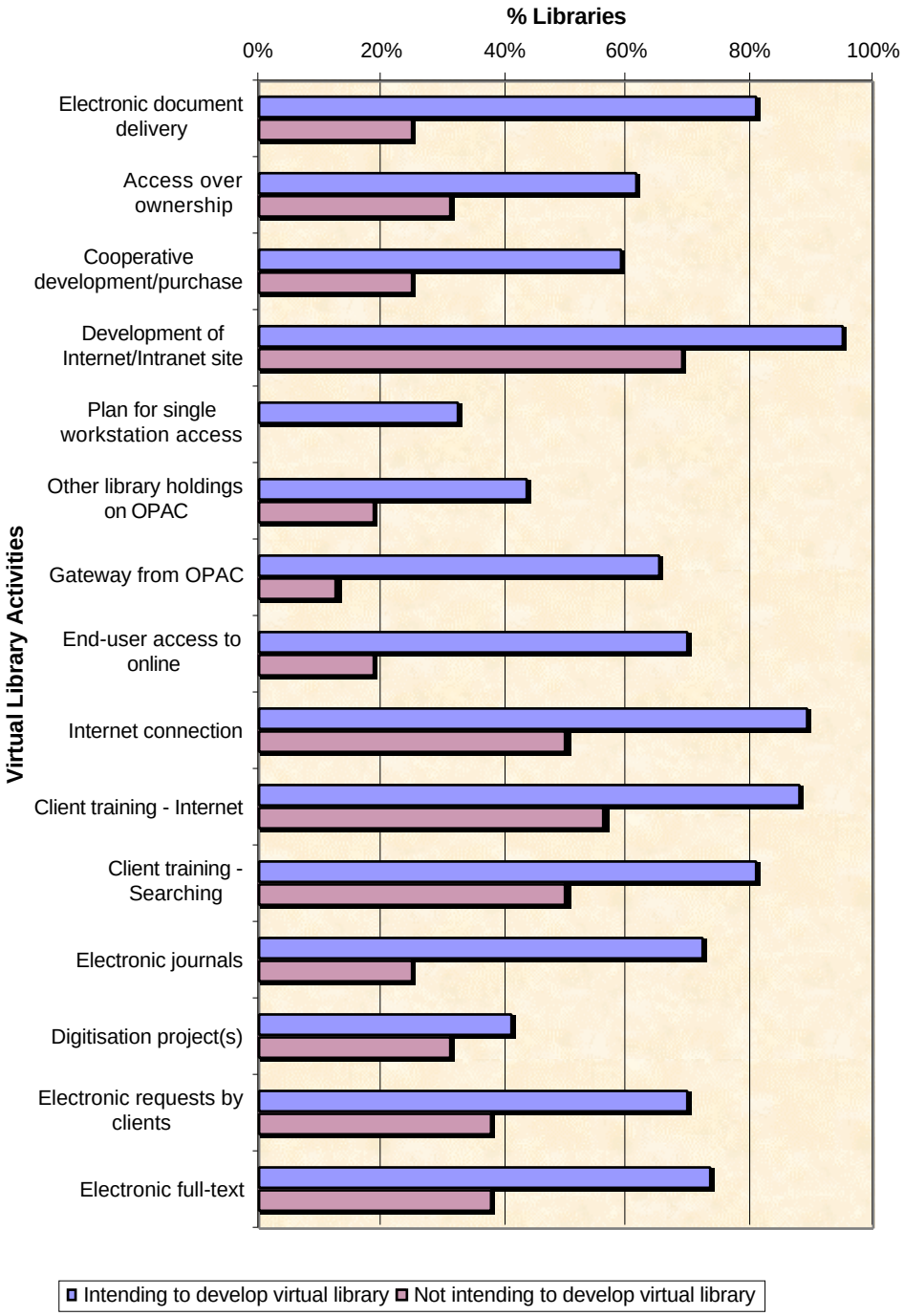
One of the research questions to be answered by this research was whether various library demographics have had an impact on the kinds of virtual library activities undertaken in Commonwealth libraries, and on the levels of virtual library development achieved. It was intended that statistical analysis would be conducted on these results to determine whether a statistically significant correlation existed between different variables. However, as noted in Chapter 4.6, the sample size from this research was too small for the results of statistical tests to be reliable, so it was not possible to determine whether the correlation between variables was significant. Therefore, it is not possible to state as statistically significant the impact factors such as virtual library development intentions, library size, subject speciality or familiarity with government policy have had on Commonwealth library virtual library development. Despite this, a comparison of the results between the various groupings still provides some interesting insights.

6.1.1. Comparison of Virtual Library Development with Development Intention

Figure 6.1 shows the virtual library activities undertaken by Commonwealth libraries that were intending to develop a virtual library, as opposed to those who had no such intention. As expected, those who were intending to develop virtual

libraries showed demonstrably higher levels of activity across all specified activities, with an average gap of 36% between the two groups. Despite this, those who had no intention of developing a virtual library were still active, to some extent, in all specified categories, save single workstation access to materials.

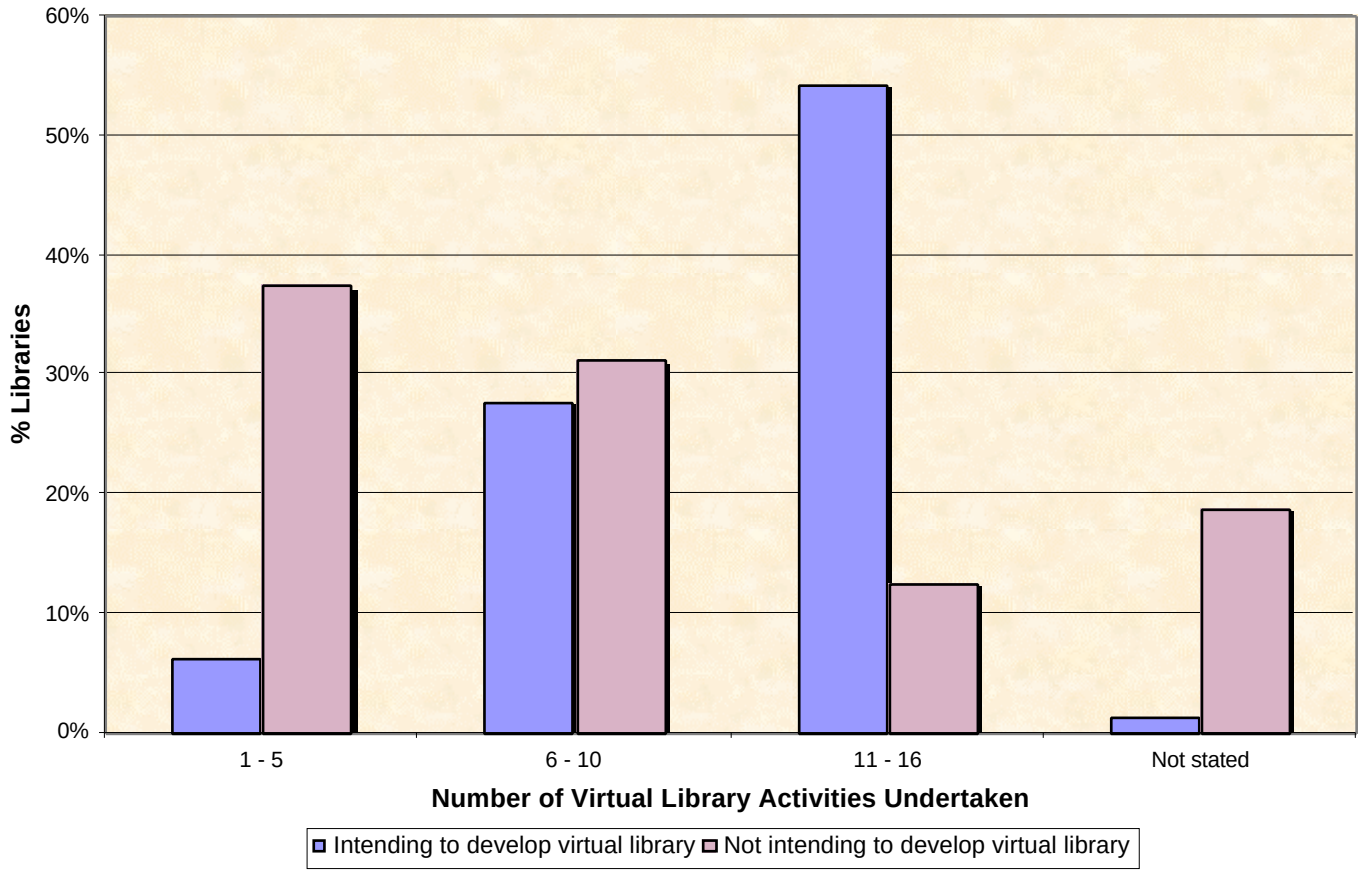
Figure 6.1: Virtual Library Development by Development Intention (N=99)



The gap between those who were developing virtual libraries, and those who were not, was noticeably larger for four activities incorporating: electronic document delivery (56%); use of the OPAC as a gateway to external databases (53%); end-user access to online resources (51%), and; subscriptions to electronic journals (47%).

It is not entirely clear why larger differences existed for these four activities. However, three of the four activities listed here deal with access to, or use of, electronic resources. In Question 1(b) (discussed at Chapter 5.2), almost half of those respondents who were not intending to develop a virtual library did not intend to do so because of a lack of demand by clients. Given that library clients were not reported as showing great interest in access to virtual library services, it would seem to follow that this group of respondents would not be undertaking activities that filled no perceived client need.

Figure 6.2: Level of Virtual Library Development by Development Intention (N=99)



For the purposes of this research, the level of virtual library development has been categorised according to the number of different virtual library activities being undertaken by each respondent. However, the numbers of respondents active at each individual level of activity (0-16 activities) were quite small. To allow for more meaningful analysis of the data, responses were therefore grouped together. Respondents who were undertaking one to five of the virtual library activities nominated in Question 2 (discussed at Chapter 5.4) have been categorised as showing *low* levels of virtual library development. Respondents undertaking six to ten activities have been considered to show *moderate* levels of development, while those undertaking 11-16 activities have been described as having *high* levels of virtual library development. Grouped responses were as shown in Figure 6.2.

Not surprisingly, libraries that had intended to develop virtual libraries showed much higher levels of development than their counterparts, with 54% of respondents in this category showing high virtual library development, and another 28% showing moderate development. What was more interesting was that libraries that had expressly stated that they did not intend to develop virtual libraries still showed strong levels of low to moderate virtual library development, with 38% and 31% respectively. Indeed, libraries with no virtual library development intentions were still undertaking an average of 4.9 activities per library, as opposed to an average of 10.2 activities in libraries that did intend to develop virtual libraries.

As discussed at Chapter 5.5, little guidance was obtained from the literature on the issue of the general levels of virtual library development that are occurring, so it is not possible to say whether such a result was expected. Nor is it clear exactly why respondents whose expressed intention was not to develop a virtual library should, in fact, be developing one. However, it may well be that certain of the identified virtual library activities are not, in fact, recognised as virtual library activities *per se*, with the result that virtual libraries are being developed almost by default, even when respondents had no intention of actually doing so. However, with such a small sample size for this group (just 13 libraries), it is difficult to make generalisations without more detailed research.

6.1.2. Comparison of Virtual Library Development with Type of Library

Figure 6.3: Virtual Library Activities by Type of Library (N=99)

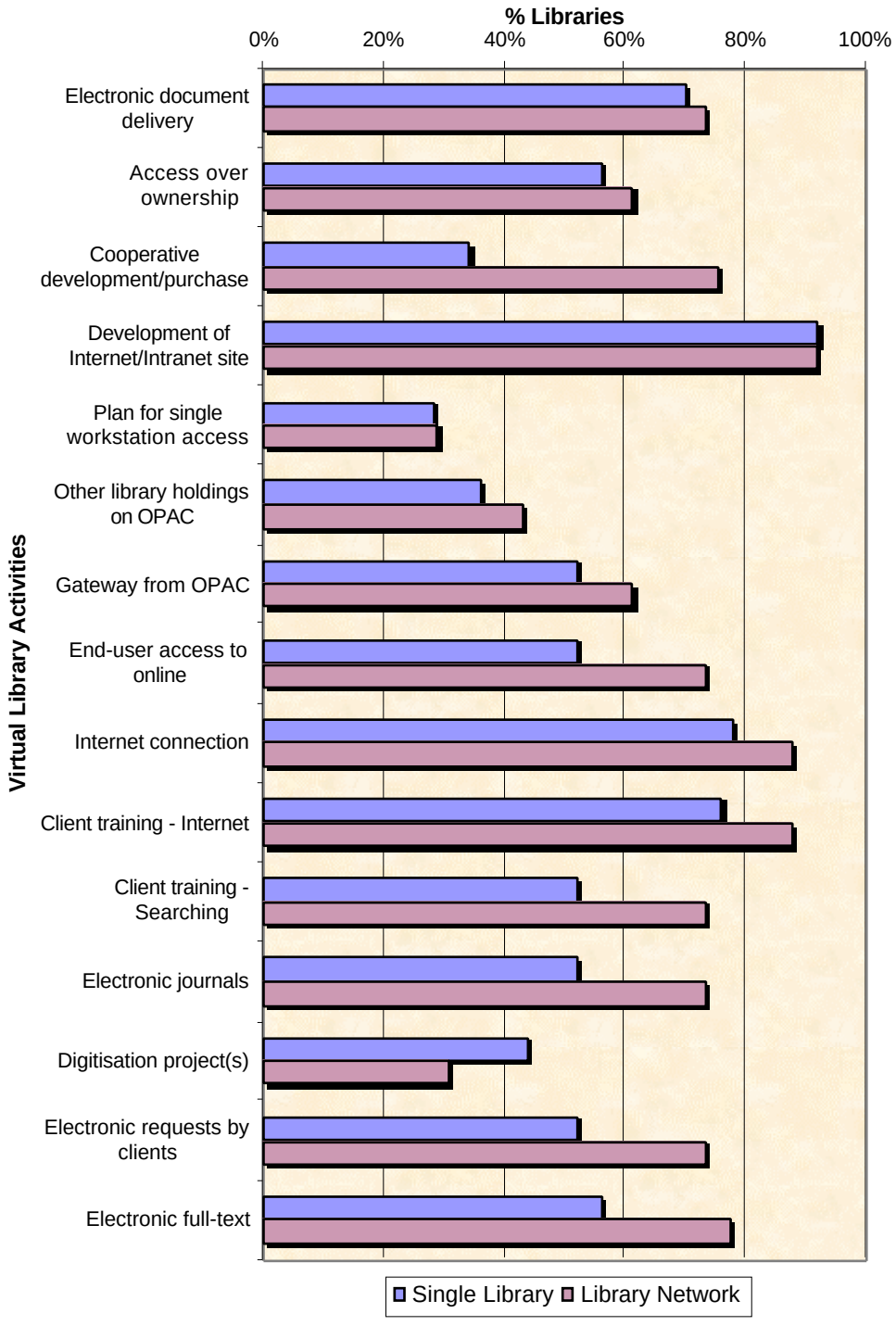


Figure 6.3 shows virtual library activities, grouped by library type. Under normal circumstances, library networks could be probably be expected to have a greater level of resources, both staff and financial, available to them than do stand-alone

single libraries. Since virtual libraries demand high levels of financial and other resources (Campbell, 1996; Pinfield, 2001), it was expected that networked libraries would be generally more active in the various virtual library activities that their single library counterparts, and this was largely the case. The average gap between the two groups was 14%. However, in the area of cooperative development and purchasing of hardware and software, the gap between network and single libraries was 41%. Gaps of around 20% existed for a number of other activities, including end-user access to online resources (21%), client training for searching (21%), electronic journal subscriptions (21%), user-initiated electronic requesting (21%) and end-user access to electronic full-text (22%).

As discussed in Question 2C (at Chapter 5.4.3), Commonwealth Government agencies have differing and separate responsibilities and budgets, with relatively little overlap between them. However, by nature, libraries within a network tend to have common interests, as well as common policies, and often, common infrastructure platforms. As such, there would seem to be an in-built facility for cooperative developments within library networks, and it may be for this reason that cooperative development was so much higher in networked libraries.

In terms of access to electronic resources, the literature suggests that this is a mainstream service for modern libraries (Tenopir and Ennis, 1998). However, it is also widely recognised that there is considerable unevenness across subject disciplines in the availability of materials, with the scientific disciplines being best supplied (Buschman, 1993; Seiden, 1997; Khalil and Jayatilleke, 1999). In this research, the majority of respondents that were part of a library network indicated that they were mainly collecting in scientific subject fields. One explanation for the difference between groups in this area may simply lie in the fact that the networked libraries are working in the subject disciplines that have the greatest availability of relevant electronic resources.

Writers in the field have also recognised that electronic resources are often more costly than their print equivalents (Bandyopadhyay and Chu, 1999; Lynch, 2000; Pikowsky, 2000; Keller, 2001). This may be another reason for the difference

between network and single library use of electronic resources. Since library networks generally exist in larger organisations, then it seems more likely that they would have access to funding levels sufficient to allow the purchase of such resources.

It is unclear why a larger gap existed in the area of electronic requesting facilities for clients. One reason may be that library networks have more geographically distributed collections, as well as a more geographically distributed client base, making access to electronic requesting facilities more necessary. If it is assumed that library networks generally exist in larger organisations, it may also be that library networks have a proportionately lesser number of library staff in relation to the total number of staff within their organisation, making such facilities important for managing customer services. A third reason may be that library networks are using more sophisticated (and more expensive) integrated library management systems, which have greater access to this type of facility. However, in the absence of more detailed research, it is not possible to say definitively why this result occurred.

In the area of end-user training, the literature indicates that this is a key role for libraries in the virtual library environment (Benton Foundation, 1996; Sylge, 1996; Wilson, 2000). Given that the levels of Internet connection (and presumably the ability of end-users to access online resources) are very similar for both single and networked libraries, this result was somewhat unexpected. One possible explanation for this disparity may be that library networks are larger, and therefore have more staff resources than single libraries, making them more able to release staff to conduct client training.

Another possible explanation lies in the fact that the smaller Commonwealth agencies tend to be more specialised in their nature and focus, with higher levels of professional/specialist staff relative to general administrative and clerical staff. If it is assumed that staff employed in professional capacities are required to hold higher level qualifications and training, it may well be that they require less

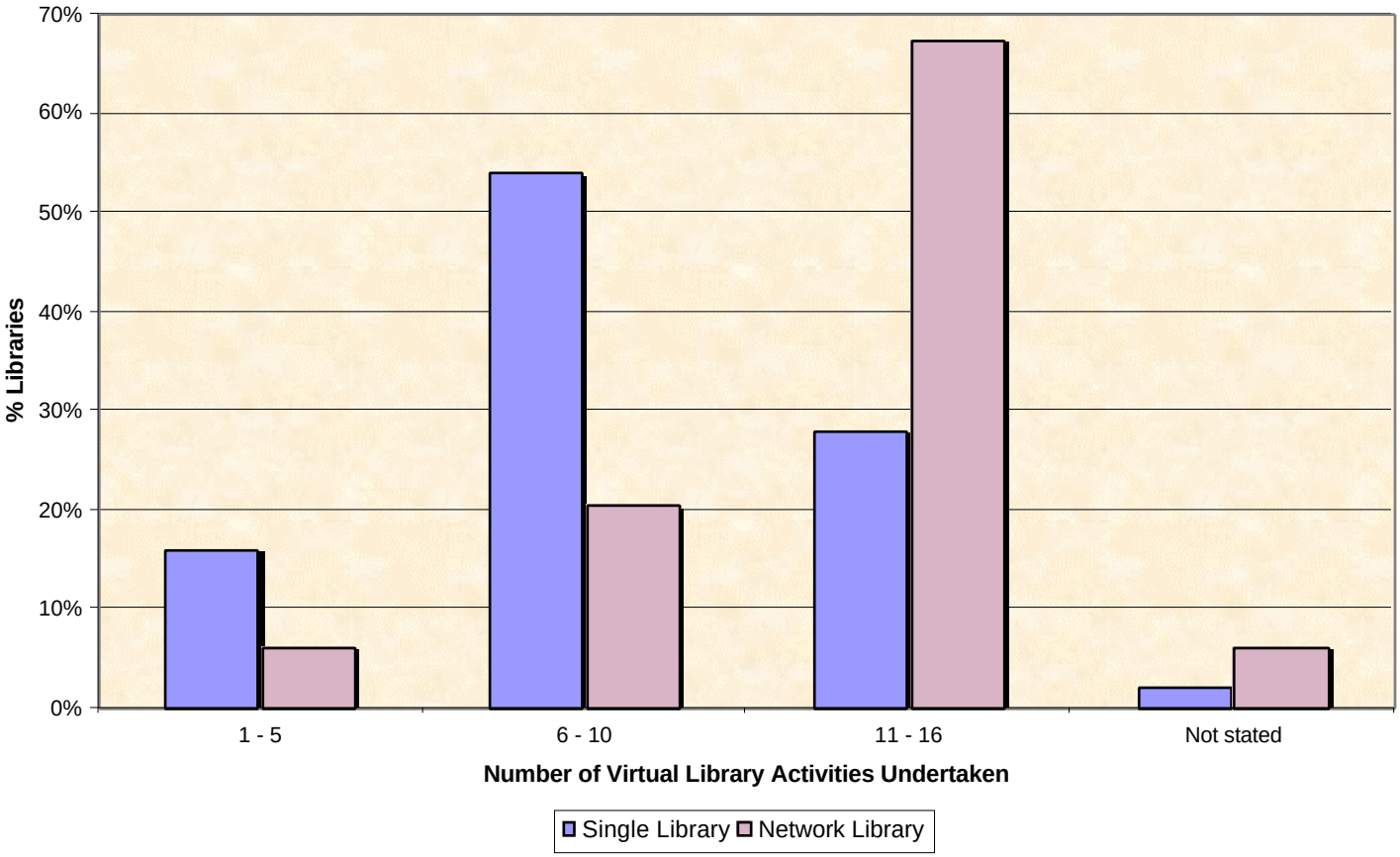
training in the use of electronic resources than their generalist counterparts, with a commensurate effect on the amount of training that libraries must provide.

Interestingly, single libraries showed higher levels of digitisation activity than networked libraries. According to Lynch, libraries are largely using digitisation to make available the unique resources that are often contained in library special collections (Lynch, 2000). Given that Commonwealth library networks generally exist within discrete agencies, and, as such, usually deal with substantially similar subject areas across the entire network, it seems possible that the single libraries could have higher levels of these unique resources per library, leading to higher levels of digitisation activity.

Digitisation levels may also be partially explained by the fact that networked libraries are often geographically distributed, and therefore do not generally need to stretch as far as single libraries to provide adequate services to their clients, especially where a single centralised library serves remote clients. Digitisation of materials would be one mechanism by which libraries could provide more satisfactory access to resources for remote clientele.

Levels of virtual library development were also compared by type of library, as shown in Figure 6.4. Almost 70% of networked libraries showed high levels of virtual library development, with another 20% having moderate development. Despite this, single libraries still showed quite strong virtual library development, with over 50% of single libraries showing moderate development and another 30% showing high development.

Figure 6.4: Level of Virtual Library Development by Type of Library (N=99)



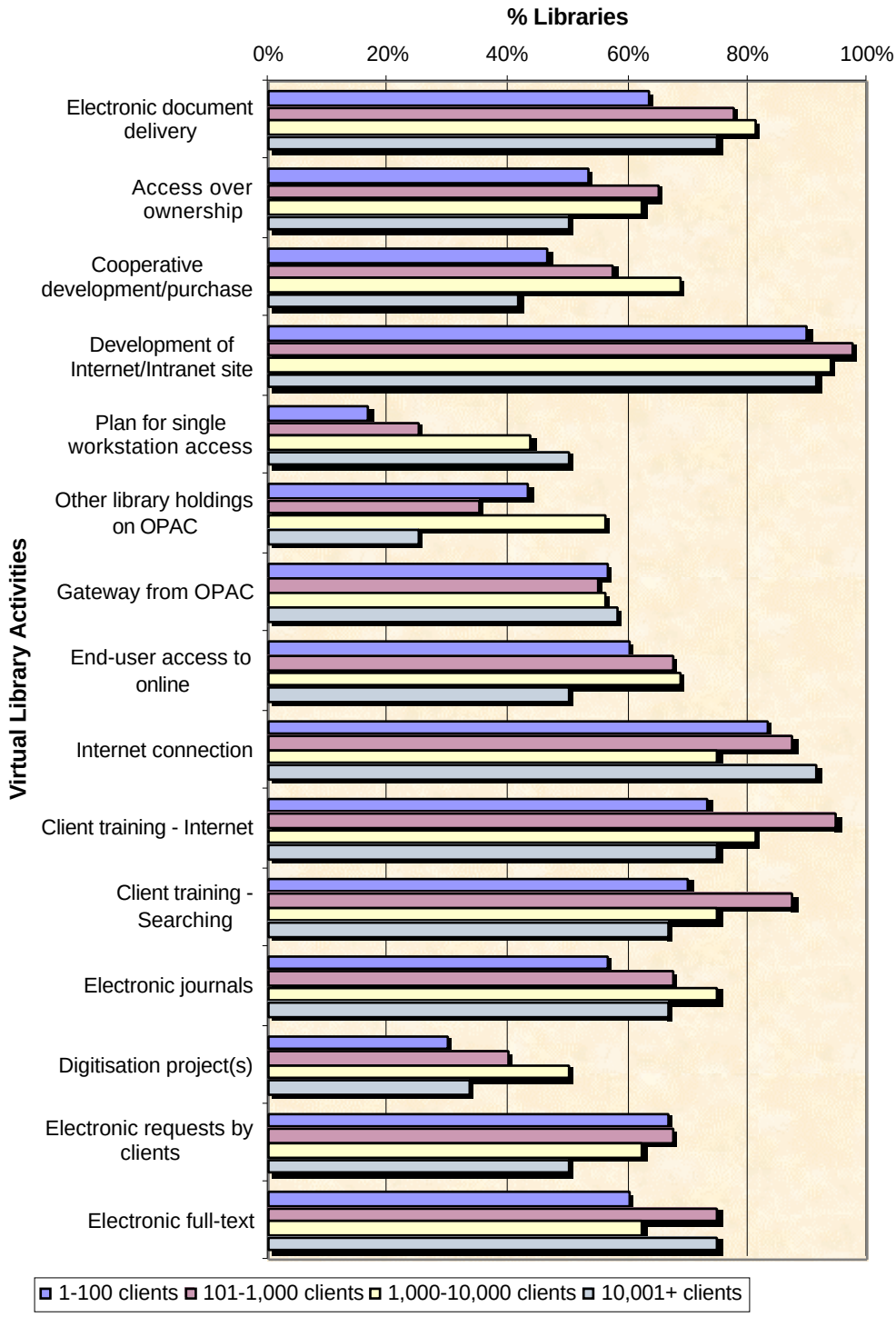
Given that networked libraries generally have greater resources available to them than single libraries, it was expected that networked libraries would display higher levels of virtual library development than single libraries. However, when moderate and high levels of development were added together, 90% of networked libraries showed strong virtual library activity, as opposed to 80% for single libraries. This would seem to indicate that, regardless of library type, Commonwealth libraries are working strongly to develop virtual libraries. Given that more single libraries are showing moderate levels of development, this would suggest that the difference between single and networked libraries is perhaps more in the available resourcing (both financial and staff), rather than intention.

6.1.3. Comparison of Virtual Library Development with Size of Client Base

In the area of library size, the literature is quite contradictory, with some authors indicating that size is important to technological innovation (Mytinger, 1968), while others found that this was not the case (Rogers, 1983; Clayton, 1997). Based on

the assumption that size is an important factor in technological innovation, it had been expected that the larger libraries would generally be more active in the virtual library arena than their smaller counterparts.

Figure 6.5: Virtual Library Activities by Client Base (N=98)



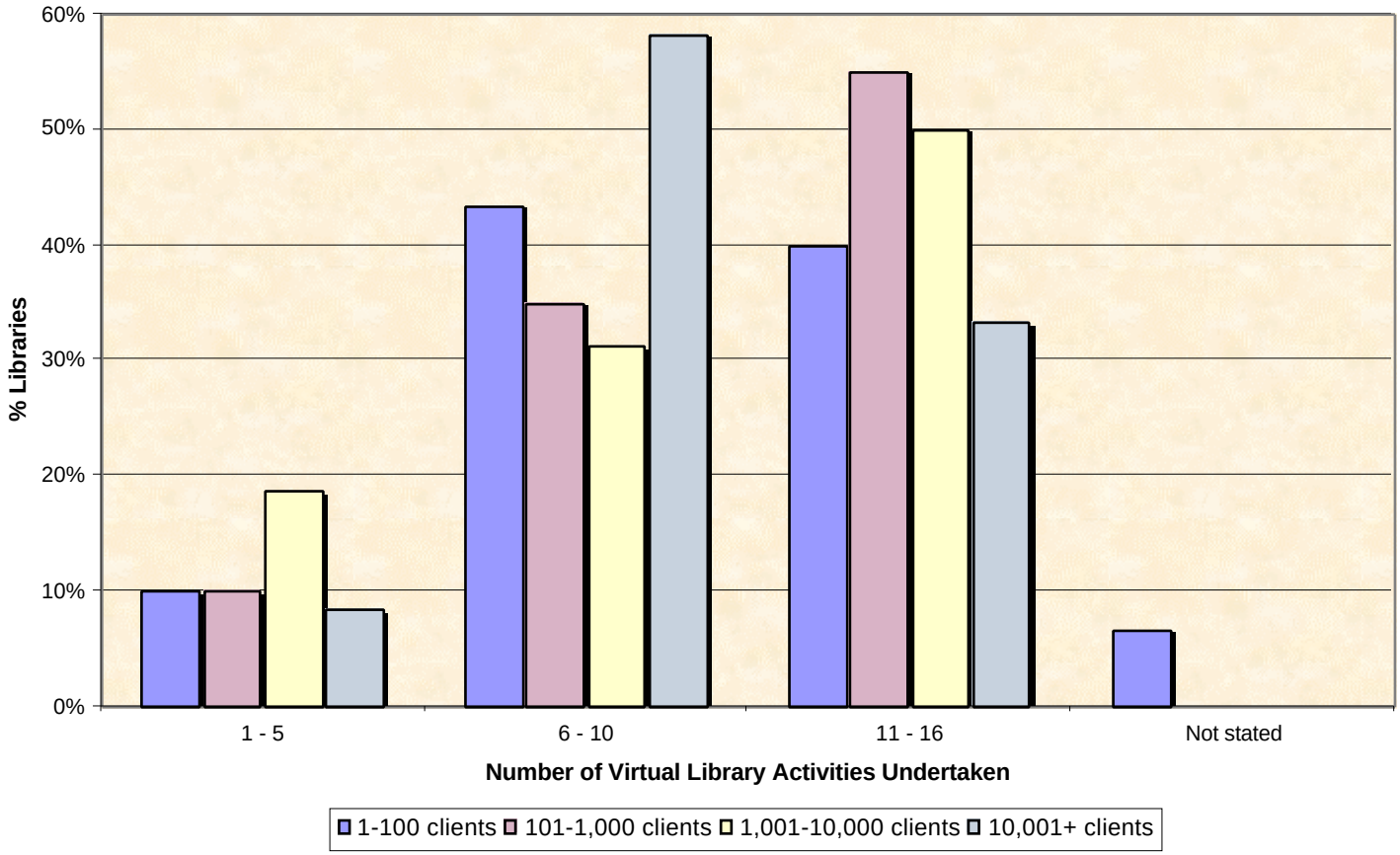
However, this was not the case. Results (as shown in Figure 6.5) were generally quite similar for most activities, regardless of library size. Very large libraries were most active in four of the above groups, large libraries were most active in five, and medium-sized libraries were most active in seven. Opposing this, very large libraries were least active in five of the above activities, large and medium libraries were least active in one group each, with small libraries being least active in seven groups.

In the absence of statistical testing, it is not possible to say definitively whether library size (measured by size of client base) is significant to the type of virtual library activities being undertaken in the Commonwealth Government sector. However, on the face of these results, it would appear that this is not significant to the nature of virtual library developments in Commonwealth libraries.

As discussed at Chapter 5.13, this research has used an unusual categorisation for library size. It could be that library size measured according to more traditional measures, such as number of library staff, size of budget or collection size may yield more useful results for this measure of virtual library development. However, it could also be this result simply confirms Rogers' contention that organisational size is merely a convenient stand-in for other variables of interest, and of itself, has limited value in measuring technological innovations (Rogers, 1983), such as virtual libraries. Further research would be needed for a definitive conclusion to be reached in this area.

When comparing levels of virtual library development against library size measured by client base (as shown in Figure 6.6) results again showed no clear pattern. Here, large libraries (19%) showed the strongest low-level development, with very large libraries (58%) leading moderate development, and medium-sized libraries (55%) most active at the high level.

Figure 6.6: Level of Development by Client Base (N=98)



As discussed above, larger libraries had been expected to show higher levels of development than their smaller counterparts, but again, this was not so. Given that more detailed information was not collected, it is unclear why this was not the case. However, these results would seem to indicate that library size, when measured according to size of client base, was not a significant factor in the level of virtual library development in Commonwealth libraries.

Again, it could be that a more traditional measure of library size may yield different results, but it may also be that Rogers' statements with regard to organisational size and technological innovation (Rogers, 1983) are equally applicable to levels of virtual library development in Commonwealth libraries, as it is to the types of activities undertaken. Again, further research would be needed to reach a definitive conclusion.

6.1.4. Comparison of Virtual Library Development with Subject Specialisation

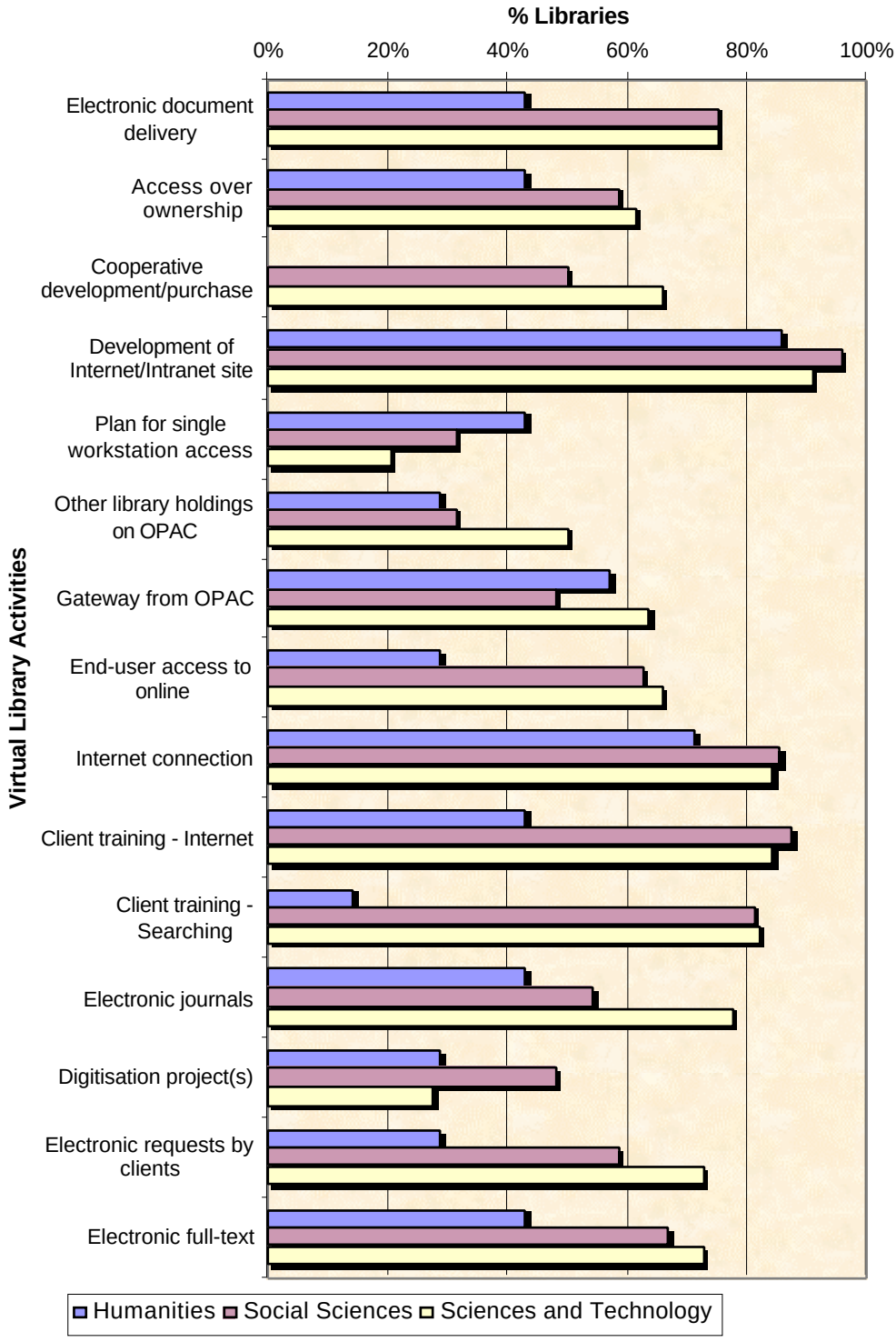
Figure 6.7 shows a comparison of the virtual library activities undertaken, compared by library subject specialisation. According to the literature, the scientific community has benefited most from the move towards electronic information services, with the greatest amount of electronic resources being available in the scientific, technical and medical fields (Arnold, 1997; Khalil and Jayatilleke, 1999). While the development of electronic information services has been considered somewhat less beneficial than in the sciences (Arnold, 1997; Massey-Burzio, 1999), the social science disciplines are still reaping benefits from the way that technology is changing research (Khalil and Jayatilleke, 1999).

Against this, the humanities disciplines have shown a quite strong reluctance to move to electronic information delivery mechanisms, because of a lack of availability of appropriate materials, as well as a perceived lack of benefit (Massey-Burzio, 1999). Furthermore, the availability of electronic humanities resources is considered sketchy at best (Burrows, 1999).

Based on this, it was expected that science and technology libraries would show the highest levels of activity, with social science libraries following reasonably closely behind, while humanities libraries would generally show lower levels of virtual library activity, and this was largely the case.

For the most part, the difference between science and social science libraries was relatively minor, with an average gap of just 9% between respondents in these groups. However, social science libraries showed 19% less activity than science libraries for the inclusion of external library holdings on local OPACs, and 23% less activity for electronic journals. In the use of the OPAC as a gateway to other resources, social science libraries showed 16% less activity than the science libraries and 9% less than the humanities libraries.

Figure 6.7: Virtual Library Activities by Library Subject Specialisation (N=99)



Against this, the average gap between the humanities libraries and the leading discipline for each activity was 32%. The most significant gaps here existed in the areas of cooperative development and purchasing (66%), client training for both use

of the Internet (45%) and end-user searching (68%), and user-initiated electronic requesting (44%).

Interestingly, in the area of digitisation projects, the science libraries showed fractionally less activity than the humanities libraries (approximately 1% less), and 21% less activity than their social science counterparts. At the same time, the humanities libraries showed the highest level of activity for single workstation access to resources, which was 22% ahead of the science libraries, and 12% for the social sciences.

As discussed at Chapter 5.4.3, cooperative development and purchasing initiatives are considered quite important to virtual libraries (Engle, 1996; Sipe, 1999). However, not one humanities library reported involvement in initiatives of this nature. Although there is no obvious reason for this result, it may be because the humanities libraries included in this research were all large cultural institutions. These libraries tend to be with dealing with specific, individual subject matters, which are often embodied in the more non-traditional formats, such as letters and ephemera, pictures and recordings, and other three dimensional artefacts. These materials may have unique storage, access and display requirements, and as such, these libraries may well perceive that they would gain no great benefit from cooperative activities of this nature.

In the area of planning for single workstation access to materials, humanities libraries showed much greater levels of activity than their counterparts. If it is assumed that these large cultural institutions have very specialised and individual collections, then it could perhaps be expected that many of their required resources would be held locally. It would then follow that it would be ideal for users to be able to access all of these specialist materials through a single workstation.

When considering end-user access to online materials, the literature has demonstrated that more appropriate resources are available electronically in the sciences and technology than for other disciplines (Arnold, 1997; Burrows, 1999). If the required resources are either not available or only available to a limited extent,

then the ability for end-users to access online materials must be affected to the same extent. It is therefore understandable that social sciences and humanities libraries would show less activity in this area than their science library counterparts. It is also well documented that, at present, the majority of available electronic journals are currently concentrated in scientific and technical fields (Seiden, 1997; Tenopir and King, 1997). As such, it is equally understandable that science and technology libraries would show higher levels of activity in subscribing to electronic journals than either social science or humanities libraries.

Given that all subject disciplines showed reasonably similar levels of Internet connection, it is not entirely clear why the humanities libraries were so much less active in the area of client training than their counterparts. However, the libraries in this group were often the libraries whose potential client base included whole of the Australian public. As such, it may be that these respondents simply did not have the staff resources or the necessary reach to offer high levels of client training. The result may also be a reflection of the fact that the humanities libraries generally had lower levels of access to electronic resources, and as such, the need for client training may be reasonably limited.

The humanities libraries generally showed a much lower level of electronic requesting by clients than their counterparts, despite the fact that electronic requesting is considered a major benefit of virtual libraries (Preece and Kilpatrick, 1998; Prabha, 1999). As previously discussed, the humanities libraries incorporated in this research tended to be national cultural institutions, with very specialised collections containing unique materials. It may therefore be that these libraries perceive no great need for electronic requesting facilities for clients, because their collections contain materials that cannot generally be borrowed. However, in the absence of further research, it is difficult to be certain that this is, in fact, the case.

In terms of listing external library holdings on local OPACs, science libraries showed considerably higher levels of activity than their counterparts. The literature in this area is somewhat contradictory (Ghikas, 1989; Gilbert, 1993; Harmsen, 2000; Huggard and Groenewegen, 2001), so it is difficult to be certain why this was the

case. However, the majority of the science library respondents to this research were actually located within the one federal government agency. Although they had common policies on various issues, such as electronic information access, they were not considered a unified library network, but rather a loose confederation of individual libraries. Given that all members share a single library catalogue, despite being separate libraries, this may explain the increased listing of "foreign" holdings on local OPACs.

In the area of digitisation, social science libraries were almost twice as active as other libraries, but it is not clear why this was the case. It is well recognised that the greatest availability of electronic journals and full-text is best in the scientific disciplines (Tenopir and King, 1997). It may therefore be that the Commonwealth science libraries are not embarking on digitisation programs because they have sufficient access to suitable electronic resources.

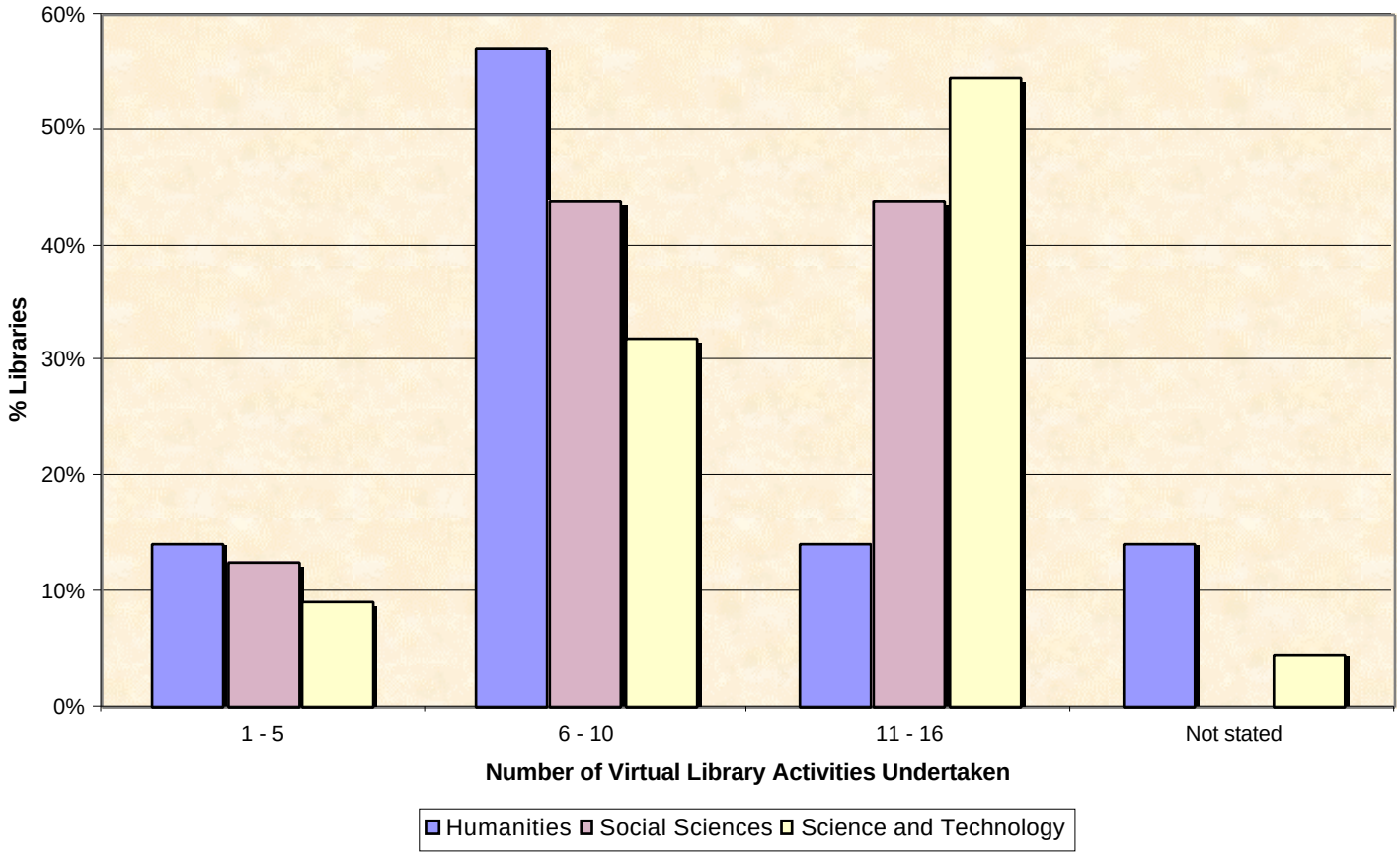
According to Lynch (2000), the materials that are best suited to digitisation are those that are special or unique. It may be that the social science libraries have active digitisation programs because they have high levels of this type of material that they wish to make available. However, it is arguable that a similar situation could apply in the humanities libraries, with their unique cultural and historical collections. Since digitisation is a highly resource intensive activity, even though it has the potential to allow libraries to better satisfy their clients (Priestley, 1998; Gertz, 2000), it seems possible that humanities libraries are unable to afford extensive digitisation activity. When consideration is given to the fact that some of the largest Commonwealth organisations are centred within the social science disciplines, this seems even more likely. However, in the absence of further research, no definitive conclusions are possible.

The virtual library literature indicates that it is important for libraries to offer their clients value-added services through OPAC enhancements, including use of the OPAC as a gateway to other resources (Ghikas, 1989; Morgan, 1999; Veatch, 1999; Harmsen, 2000; Huggard and Groenewegen, 2001). The science and humanities libraries showed comparable levels of activity in this area, so it is unclear why the

social science libraries did not show similar levels of activity. It may be that the social science libraries have instead preferred to use their Internet and Intranet sites as a gateway to external resources. However, there no direct evidence to support this supposition, and further research would be needed before any definite conclusion could be reached.

Figure 6.8 shows levels of virtual library development compared by subject specialisation. When compared by the number of virtual library activities undertaken, science libraries were most active with 55% showing high virtual library development. Similar results were achieved in the social science libraries (44%), but just 14% of humanities libraries showed high levels of virtual library development. However, the humanities libraries were most active at both the moderate (57%) and low levels (14%).

Figure 6.8: Level of Development by Library Subject Specialisation (N=99)



According to the literature (Griffin, 1998a), much of the work on virtual libraries has been centred in the science disciplines, and it may be that these results are simply a reflection of this trend. However, although they had separate functional and budgetary control, the majority of the science library respondents were actually located within the one federal government agency. Libraries within this agency were governed by common policies on issues such as electronic information delivery, and it may well be that this agency had more advanced virtual library policies than other agencies.

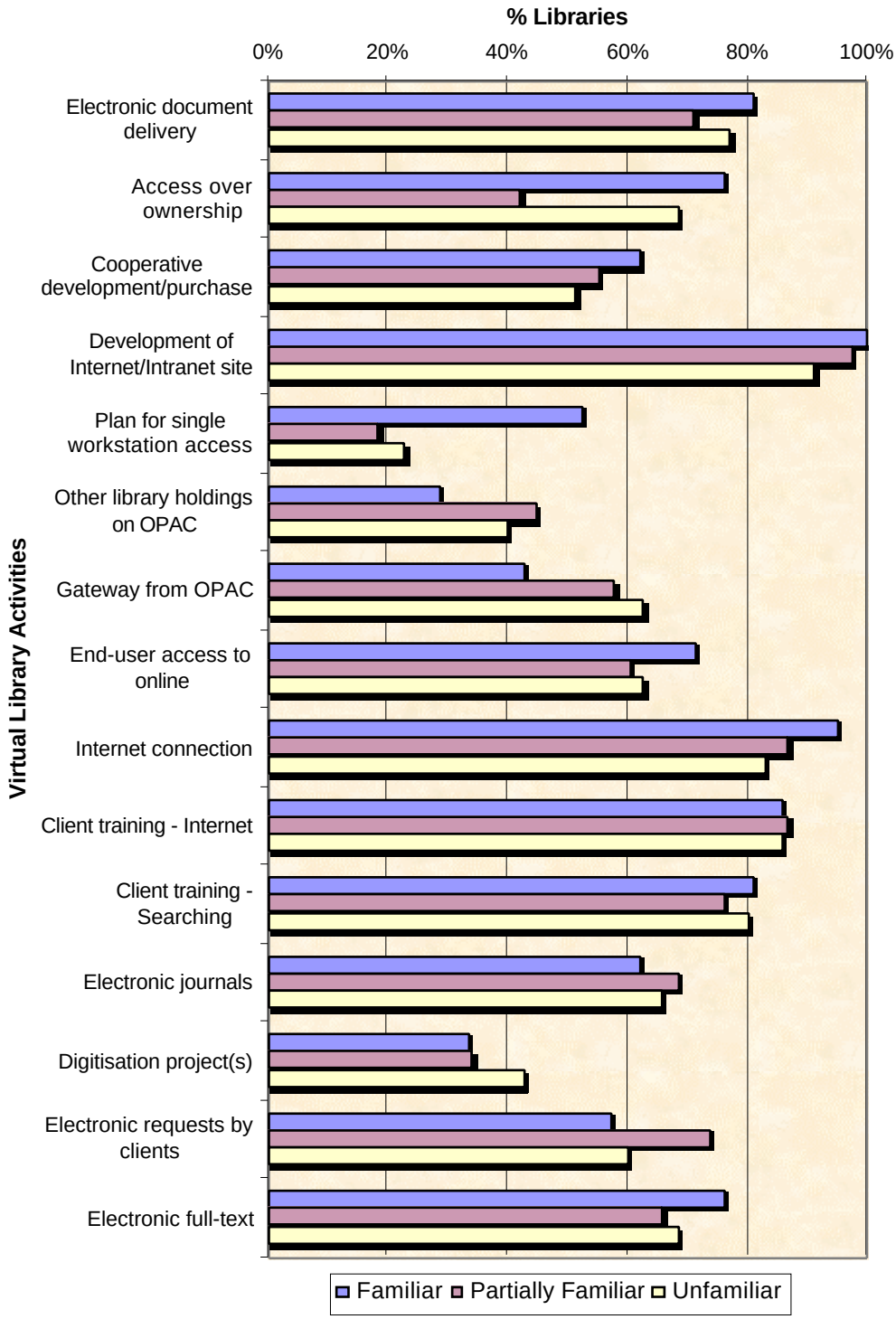
The lower general levels of development in the humanities libraries would seem to agree with the general finding (Massey-Burzio, 1999) that the use of electronic information is considered less beneficial for the humanities than for other disciplines, as well as the reported lack of electronic humanities resources (Burrows, 1999). However, given the small number of respondents (seven) in this category, it is difficult to make generalisations in this area.

6.1.5. Comparison of Virtual Library Development with Familiarity with Australia Online

As discussed at Chapter 4.2, it was assumed that Commonwealth libraries would be affected or controlled by a general 'information policy' issued by the Commonwealth Government, and, that with the development of virtual libraries, libraries would be fulfilling their obligations under such a policy. It was therefore expected that libraries that were familiar with *Australia Online* would show higher levels of activity those who were less familiar the policy. However, this was only partially the case, as shown in Figure 6.9.

Results were generally quite similar for most activities, regardless of familiarity with *Australia Online*. Libraries familiar with the policy were most active in nine of the above activities, those who were partially familiar were most active in four, and libraries unfamiliar with *Australia Online* were most active in two. Opposing this, those who were familiar or partially familiar with *Australia Online* were least active in six of the above activities respectively, while those professing unfamiliarity were least active in four groups.

Figure 6.9: Virtual Library Activities by Familiarity with Australia Online (N=94)



Although respondents who considered themselves familiar with *Australia Online* were those who most frequently had the highest level of activity, there was generally relatively little difference between the three groups, with the average gap between the highest and lowest levels of activity being just 12%. One exception

to this was in the area of access to materials over ownership, with those who were partially familiar with the policy lagging 34% behind those who were familiar and 26% behind those who were unfamiliar. The other exception was in the area of single workstation access to resources, with those who were familiar showing over 30% higher levels of activity than other respondents.

When considering policies for access to information over ownership, those who were partially familiar lagged considerably behind those who were familiar and unfamiliar. There is no particularly discernible reason why this group should have such dissimilar levels of activity in this area. This would perhaps suggest that this result was mere coincidence.

In the area of single workstation access to resources, activity levels were higher in those libraries that were familiar with *Australia Online* by 34%. This may suggest that those libraries that are familiar with government policy are moving further ahead than their counterparts. However, there is no apparent reason why this group should be more active for this particular activity, and yet not show similar results for others. Given that this result goes against the general trend for this comparison, it would seem most likely that this result was again a matter of coincidence.

In the absence of statistical testing, it is not possible to say definitively whether familiarity with government policy is significant to the types of virtual library activities being undertaken in the Commonwealth Government sector. Those who were familiar with *Australia Online* did have higher responses for just over half of the listed activities. However, as discussed at Chapter 5.15, some respondents indicated that they found this particular policy largely irrelevant to libraries. Given this, and the overall closeness of responses between the three groups, it does not seem likely that familiarity with *Australia Online* was highly significant.

As noted at Chapter 5.15, *Australia Online* has now been superseded by the *Government Online* policy. It is possible that this particular policy is having a greater impact of virtual library development in the Commonwealth sector than its

predecessor, but further research would be required to determine whether this is the case.

Figure 6.10: Level of Development by Familiarity with Australia Online (N=94)

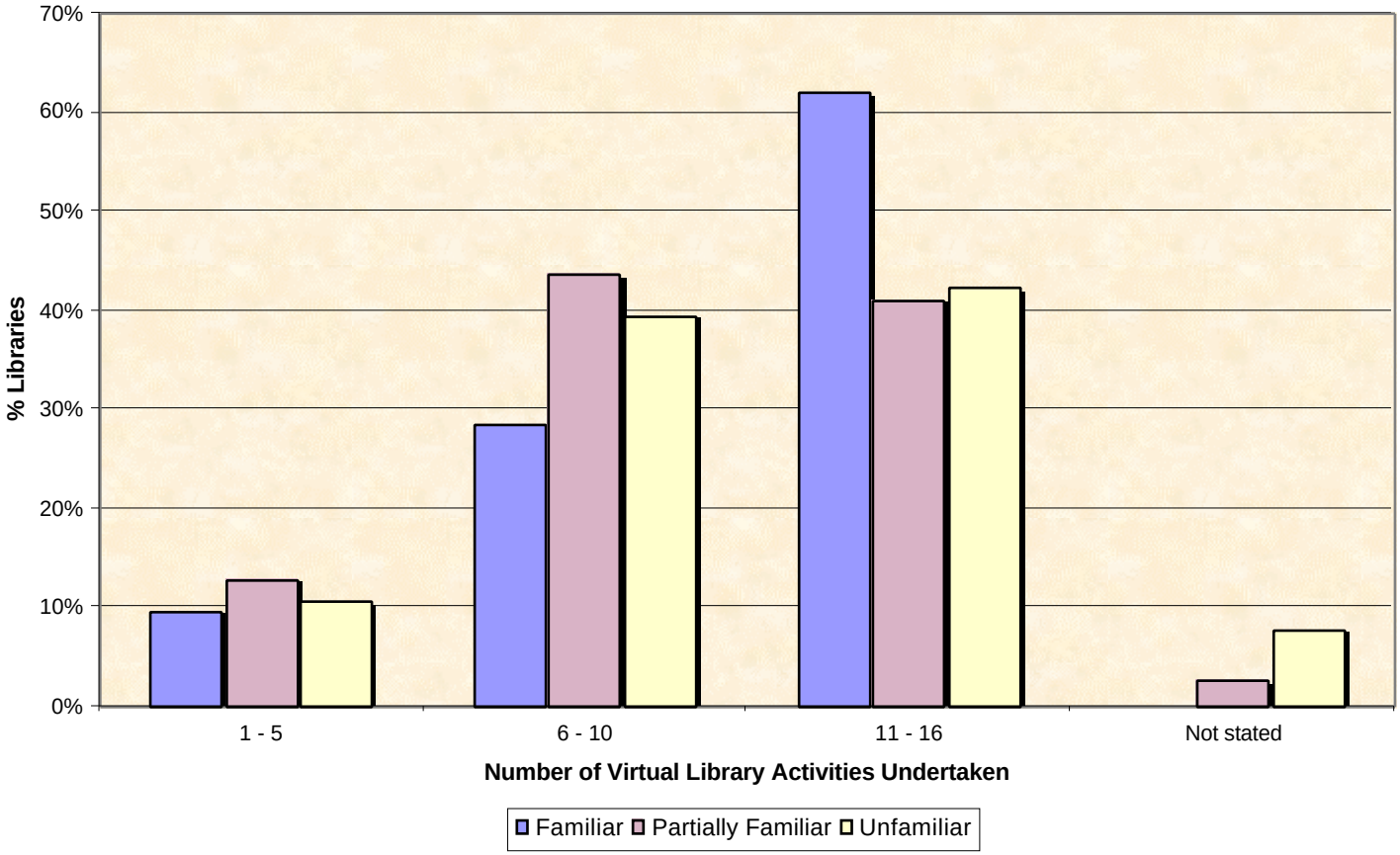


Figure 6.10 shows a comparison of levels of virtual library development by level of familiarity with *Australia Online.* As with the types of activities being undertaken, it was expected that those who were familiar with government policy would show higher levels of virtual library development than other respondents. In this area, those who were partially familiar with *Australia Online* showed slightly higher low-level development than other libraries. Libraries familiar with *Australia Online* were far more active than their counterparts at the highest level by over 20%. Libraries professing partial familiarity or unfamiliarity were most active at moderate levels of development.

Given that relatively similarity between the groups, it does not appear that familiarity with *Australia Online* was significant to virtual library development at

the low and moderate levels. It may be that familiarity with government policy is a driver for moving to higher-level development, but without statistical testing, it is difficult to say with any certainty. Again, *Government Online* may be having a different impact to *Australia Online*, but again, further research would be needed to determine whether this is, in fact, the case.

6.2. IMPORTANT FACTORS FOR COMMONWEALTH VIRTUAL LIBRARY DEVELOPMENT

As discussed at 6.1, it was not possible to conduct statistical testing on the various comparisons, as groupings were generally not large enough to give reliable results. This was unfortunate, as statistically significant conclusions could not be reached, and further, more detailed, research would be required to determine how significant were the results obtained.

Subject to these limitations, it would appear that development intention was the most important factor influencing both the activities undertaken by various libraries, and the levels of development achieved. However, even those libraries that had no stated intention to develop a virtual library still showed significant levels of development for the vast majority identified activities. Other factors, such as library type, size of library client base, subject speciality, and familiarity with government policy showed no discernible pattern, and seem unlikely to have been significant to either the types of activities being undertaken by Commonwealth libraries, or the level of development reached.

6.3. CONCLUSION

Some internal comparisons of Commonwealth virtual library development have been made in Chapter 6. In Chapter 7, the results from the current research will be compared with previous American and Australian academic library studies to determine whether there are significant differences in virtual library activity in different library sectors, or in different countries.

7. COMPARISON OF VIRTUAL LIBRARY RESEARCH

In Chapter 6, Commonwealth library survey responses were compared in order to determine which factors, if any, were important to their virtual library activity. As noted in Chapter 4.5, the current research on virtual libraries in Commonwealth libraries was based on earlier studies conducted in American and Australian academic libraries, since no other relevant or more recent research was available as a basis for validation. In this Chapter, some comparisons will be made between these academic library studies and the current research, and some conclusions drawn about the similarities or differences in virtual library developments between library sectors.

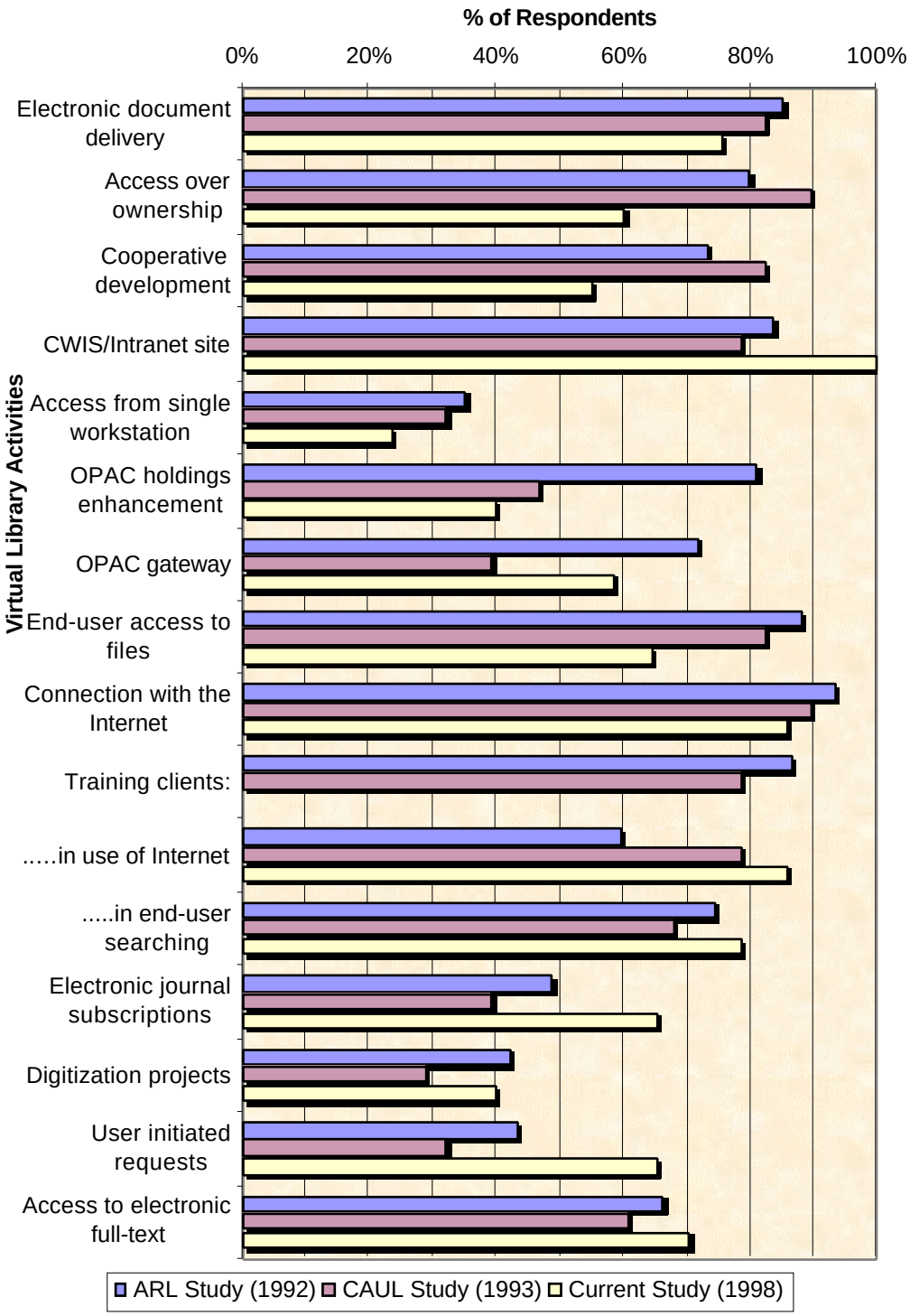
7.1. VIRTUAL LIBRARY RESEARCH

The original virtual library research, conducted by Schiller and Von Wahlde in 1992, looked at virtual library activity within ARL. Respondents were asked to indicate their involvement in fourteen different activities considered essential to the formation of virtual libraries (as listed in Chapter 2.2.2). They were also asked to review a list of issues that were considered important to the development of virtual libraries, and to rank their importance on a seven-point scale. A similar ranking was conducted on a list of important changes needed for virtual libraries. Finally, respondents were asked about organisational and/or structural changes that were taking place as part of the virtual library development process.

Results were widely published for the question about the types of virtual activities being undertaken (Schiller, 1992; Schiller and Von Wahlde, 1992a; 1992b; Von Wahlde and Schiller, 1993). However, data for succeeding questions was not readily available. When the authors of this research were contacted to determine whether these results were available, from either a published source or from the researchers themselves, they indicated that the data were considered too difficult to analyse, and as such, they were neither analysed nor published (Schiller, 2000).

In 1993, Schauder conducted related research in libraries forming part of CAUL (Schauder, 1994). This research was rather more limited than its predecessor, with respondents only being questioned about the virtual library activities in which they were involved. The remaining questions from the original American study were not asked of Australian academic library respondents.

Figure 7.1: Comparison of ARL, CAUL and Current Research Findings



To the extent that they overlapped, the survey instrument used was substantially the same in both the academic library studies. The same basic instrument was also used for the current research, thus providing a useful basis of comparison. Given that a large proportion of the data from the American academic library study was not available, and the Australian academic library study was limited in scope, only the types of activities undertaken in an academic setting, as opposed to those undertaken by Commonwealth libraries, could be compared.

Results from the three studies were as shown in Figure 7.1. This chart shows that there were generally quite strong similarities in the activities undertaken in the American and Australian academic sectors, with the exception of listing external library holdings on local OPACs, and use of the OPAC as a gateway to other resources. Commonwealth libraries, on the other hand, showed no particular pattern, with some results being very different to those from the academic sector, while others were quite similar.

Figure 7.2: Comparison of ARL, CAUL and Current Virtual Library Research

Virtual Library Activities	**ARL Study (1992)** ***n=74***	**CAUL Study (1993)** ***n=28***	**Current Study (1998)** ***n=98***	**Chi-square** ***p=***
Electronic document delivery	85%	82%	76%	
Access over ownership	80%	89%	60%	.002
Cooperative development	73%	82%	55%	.007
CWIS/Intranet/Internet site	84%	79%	100%	–
Access from single workstation	35%	32%	23%	
OPAC holdings enhancement	81%	46%	40%	.000
OPAC gateway	72%	39%	58%	.009
End-user access to files	88%	82%	64%	.001
Connection with the Internet	93%	89%	86%	
Training clients:	86%	79%	-	–
.....in use of Internet	59%	79%	86%	.000
.....in end-user searching	74%	68%	79%	
Electronic journal subscriptions	49%	39%	65%	.017
Digitisation projects	42%	29%	40%	
User-initiated electronic requesting	43%	32%	65%	–
Access to electronic full-text	66%	61%	70%	

A chi-square test was conducted on the data generated by the three studies to determine whether the different responses were statistically significant, with results shown in Figure 7.2. As discussed in Chapter 4.5, there were some minor terminological variations between the instrument used in the two academic library studies, and that used in the current research (these are listed in Appendix C). Where there were variations between the survey instruments, it was not possible to conduct statistical testing of significance, as the questions asked of respondents were not identical. However, the underlying meaning of the questions was substantially similar, and an examination of the results generated in these cases is still of interest.

7.1.1. Electronic Document Delivery Services

In Commonwealth libraries, 76% of respondents were active in the area of electronic document delivery. This compares with 85% of American and 82% of Australian academic libraries. The result here was not statistically significant. Commonwealth libraries were six to nine percent less active than their academic library counterparts, which was interesting, as writers in the field have indicated that electronic document delivery is vitally important in virtual libraries (Zhou, 1994; Dannelly, 1995; Rowley, 1998).

Although relatively minor, this gap may possibly indicate that Commonwealth libraries have not been as quite as quick as academic libraries in embracing electronic document delivery services. Indeed, several Commonwealth library respondents noted that, at the time of this research, they were just beginning to examine the possibility of using the Ariel document delivery software, or beginning to experiment with commercial electronic document delivery services, such as Carl Uncover (now Ingenta).

7.1.2. Policies for Access to Information over Ownership

In American academic libraries, 80% had in place policies emphasising access to information over ownership, while 89% of Australian academic libraries and just 60% of Commonwealth libraries had similar policies. Statistically, this was highly significant ($p = .002$).

The comparatively lower level of activity in Commonwealth libraries may be partially explained by the fact that Commonwealth Government agencies tend to have separate areas of responsibility, and as such, relatively disparate subject needs. This may then mean that, for some libraries, there is no other Commonwealth organisation working in similar areas, and as such, there is no-one through whom appropriate resources may be accessed, thus necessitating a continuation of the ownership model.

7.1.3. Participation in Cooperative Development/Purchasing Initiatives

In the area of cooperative projects, there was activity in 73% of American and 82% of Australian academic libraries. In the Commonwealth library sector, the level of activity was just 55%. This was a gap of 18-27%, which was statistically significant ($p = .007$).

In many respects, Commonwealth libraries have been somewhat slow to embrace the opportunities offered by consortial arrangements. This may partially reflect the fact that FLIN has been, to date, a voluntary organisation, with office bearers carrying out their duties, including the arrangement of consortial deals, when and as their paid organisational duties allowed. Against this, ARL and CAUL have a dedicated secretariat staff, which is able to devote greater time to this type of negotiation.

Another reason for the relative disparity between sectors may again lie in the fact that Commonwealth agencies, and by extension, their libraries, have differing responsibilities and subject needs, as defined under the *Constitution of the Commonwealth of Australia* (2000). Because the Commonwealth library sector is less homogeneous than the academic library sector, there are fewer opportunities available for cooperation.

A third factor lies in the fact that, as a rule, Commonwealth libraries do not control their own infrastructure standards. These are imposed by outside areas, and, as discussed in the literature (Cline, 1996), libraries are often given relatively little input into the platforms that they must use. Indeed, many Commonwealth agencies

have become ever more strict in recent years in relation to the infrastructures and technical environments that they are willing to support, with strong arguments being needed to have variations to standard environments approved. This, in turn, allows Commonwealth libraries little scope for cooperative ventures.

7.1.4. Development of Internet and Intranet sites/Campus-Wide Information Systems

In regard to the development of Internet and Intranet sites/campus-wide information systems, statistical testing was not possible, as the terminology used in the different instruments was not identical. However, 84% of American and 79% of Australian academic libraries were active in this area, as opposed to 100% of Commonwealth libraries. This difference can be explained by the fact that the Internet is now much more widely available than in 1992/1993, especially due to the development of the World Wide Web and web browsers (Zakon, 2002). Given this, and the almost exponential growth of the Internet in the latter part of the 1990s, it seems highly likely that a new study of academic libraries would show similar high levels of activity to that recorded in Commonwealth libraries.

7.1.5. Access to Information from a Single Workstation

In the area of single workstation access to resources, while the result was not statistically significant, only 23% of Commonwealth libraries were active, as opposed to 35% of American and 32% of Australian academic libraries that had such policies. This was a difference of nine to 12%.

It is not entirely clear why this was the case. However, the concept of single workstation access, or the so-called 'scholar's workstation' also appears to have been much more a feature in academia than in other library sectors, with most of the literature in this area describing projects based in academic libraries (Blair, 1994; Veatch, 1999). If the concept is considered more common to the research sector, this may also go some way to explaining its relatively greater use in academic libraries. It may also be that suitable electronic materials are not available in the disciplines required by Commonwealth libraries. As such, it would

not be possible for Commonwealth libraries to provide access to necessary materials through a single access point.

7.1.6. Inclusion of External Library Holdings on Local OPACS and Gateway Access to Databases via the OPAC

In American academic libraries, 81% recorded holdings from other libraries on local OPACs, as opposed to 46% of Australian academic libraries and 40% of Commonwealth libraries. Statistically, this was highly significant ($p = .000$). Similarly, 72% of American academic libraries were using their OPAC as a gateway to other resources, while just 39% of Australian academic libraries and 58% of Commonwealth libraries did the same. Again, this result was statistically significant ($p = .009$).

The reasons for the different results in the area of OPAC enhancement are not particularly clear, and there is relatively little literature in this area to suggest possible causes. However, it seems possible that since the original American research was conducted in 1992, there are now alternatives, such as the use of the Internet, which are more desirable than local OPAC enhancement. Certainly, comments of this nature from respondents to the current research support this conclusion.

However, the Australian academic library research was conducted in 1992 and, despite the time difference, the results from that and the results from the current research were quite similar. Given that the difference is apparently between Australian and American libraries, rather than library sectors, this may suggest that the difference here is, in fact, cultural. However, in the absence of further research, it is not possible to say definitively that this is the case, and indeed, it is not clear why such a cultural difference should exist.

7.1.7. End-User Access to Online Files

End-users had access to online files in 88% of American academic libraries and 82% of Australian academic libraries. Similar end-user access was offered in just 65% of Commonwealth libraries, a result that was highly significant ($p = .001$).

There are several possible reasons for this result. One reason for the relatively lower level of end-user access in Commonwealth libraries may be that the materials required are not electronically available, an argument which is certainly borne out by the literature (Buschman, 1993; Seiden, 1997; Khalil and Jayatilleke, 1999).

Another explanation may lie in the fact that academic libraries tend to have better consortial arrangements than their Commonwealth counterparts, leading to more favourable pricing and licensing arrangements. Further, a casual examination of pricing models for online products will show that vendors usually offer different (and often considerably more affordable) pricing models to the academic sector than for other library sectors. This means that academic libraries are likely to afford to purchase, and consequently, offer their clients access to far greater information resources than is possible for Commonwealth libraries.

7.1.8. Connection to the Internet

In American academic libraries, 93% indicated that they were connected to the Internet, as opposed to 89% of Australian academic libraries and 86% of Commonwealth libraries. This was not statistically significant.

The slightly slower uptake in Commonwealth libraries is explained by the fact that until the latter part of the 1990s, Internet connection was limited to the academic and research community, with access being obtained through the Australia Academic and Research Network (AARNet) (O'Brien, 1994). Since AARNet access was limited to those with a relationship to an Australian academic institution, most Commonwealth libraries were initially unable to gain access to the Internet. When Internet access became commercially available, Commonwealth libraries were then subjected to reasonably stringent security and (in some cases) business case requirements, which further impeded their ability to connect to the Internet.

7.1.9. Training Clients in the Use of Internet Resources

Client training on the use of Internet resources was undertaken in 59% of American academic libraries, 79% of Australian academic libraries and 86% of Commonwealth libraries. Statistically, this was highly significant ($p = .000$).

Here, the disparity was between Australian and American libraries, rather than between library sectors. The most likely explanation for this lies in the fact that the Australian studies were conducted later than the American study. When the American study was conducted in 1992, the Internet was entirely text-based, and just one File Transfer Protocol (FTP) search engine existed. In 1993, when the Australian academic library study was conducted, there were several search engines in place, and a graphically based browser (Mosaic) had appeared for the first time. By the time Commonwealth libraries were studied in 1998-99, not only were there a multiplicity of search tools in place, but the Internet had also grown exponentially in size, largely due to the development of the World Wide Web (Sonnenreich, 1997; Zakon, 2002).

Since there were both more search tools and more information sources available, the need for client training in the use of the Internet was greater for participants in the Australian studies. However, it seems highly likely that if a new American study were to be conducted, it would reflect similar findings to those from the Australian studies, and the apparent disparity would no longer exist.

7.1.10. Training Clients in End-User Searching

In American academic libraries, 74% reported that they offered training for end-user searching, as opposed to 68% of Australian academic libraries and 79% of Commonwealth libraries. This result was not statistically significant.

All three studies showed quite high levels of client search training, but Commonwealth libraries were five to 11% more active than their academic library counterparts. The most likely explanation for this again lies in the time difference between the academic research and the current research. It is well recognised that there has been significant growth, not only in the availability of electronic

resources (Ashcroft and Langdon, 1999; Chan, 1999), but also in the development of delivery systems, such as the Internet (Zakon, 2002). Given that more electronic resources are now available to libraries, this would suggest that there is a greater need for their clients to be trained in their usage. Since the development of both content and technology is universal to all library sectors, it again seems likely that new studies in both American and Australian academic library sectors would show similar results.

7.1.11. Subscribing to Electronic Journals

In the area of electronic journals, 49% of American and 39% of Australian academic libraries subscribed, as opposed to 65% of Commonwealth libraries. This was statistically significant ($p = .017$).

Again, the most likely explanation for this result lies in the time difference between the academic library research and the current research. Although a critical mass of titles still does not exist, there were still significantly more electronic journal titles available in 1998-99 than was the case in 1992-93 (Strangelove, 1996; Anderson, 1999; Ashcroft and Langdon, 1999; Chan, 1999). As such, it could be reasonably expected that Commonwealth libraries would have more subscriptions than their academic counterparts. Again, it seems probable that if new studies were to be conducted in the academic sector today, they would show similar results to those from Commonwealth libraries.

7.1.12. Digitisation Projects

In American academic libraries, 42% reported that they were undertaking some form of digitisation project. In Australian academic libraries, this figure was 29%, while 40% of Commonwealth libraries were conducting similar projects. This result was not statistically significant.

American academic libraries showed 2% greater activity in this area than Commonwealth libraries, and 13% more than Australian academic libraries. It is not entirely clear why this was the case, however, one possible explanation may be that the American library sector generally has taken a more “methodical” approach

to virtual libraries and digitisation, through programs such as the Digital Libraries Initiative (Griffin, 1997; 1998b; 1998a).

By contrast, there have been no centralised programs in the Australian library community; rather, Australian libraries tend to be taking something of an 'ad hoc' approach, as resources and finances permit. Although scanning software and equipment are now more affordable and accessible than was previously the case, it is still well recognised that digitisation is an extremely resource intensive undertaking (Priestley, 1998; Mann, 1999; Gertz, 2000). Given this, and the absence of digitisation project funding, it is unsurprising that Australian libraries showed less activity in this area.

7.1.13. Client-Initiated Electronic Requesting Facilities

Statistical testing was not possible in the area of client-initiated electronic requesting facilities, as the terminology used in the survey instruments was not identical. However, 43% of American and 32% of Australian academic libraries were active in this area, as opposed to 65% of Commonwealth libraries, which is a difference of 22-33%.

It is not entirely clear why such a gap existed between Commonwealth and academic libraries. However it seems probable that the major difference was again that the Commonwealth library study was conducted much later than those in the academic sector. Library management systems are now considerably more sophisticated, and offer much greater levels of functionality than was the case in the early 1990s, including client request facilities and OPACs that are available at the desktop. Similarly, access to electronic mail facilities has become almost ubiquitous, which was again not the case in 1992-93. Given this, it is also possible for library clients to make requests using electronic mail technologies, rather than library system functionality.

Given the more sophisticated technologies that are now locally available to library clients, it was not surprising that Commonwealth libraries showed higher levels of activity in this area. As the availability of these newer technologies is not limited to

the special library sector, it could again be reasonably expected that academic libraries would show similar results if newer research was undertaken in this area.

7.1.14. Access to Electronic Full-Text

In American academic libraries, 66% reported having access to electronic full-text, with 61% of Australian academic libraries and 70% of Commonwealth reporting similar results. This was not statistically significant.

As previously discussed, when the Commonwealth library study was conducted in 1998-99, there was greater availability of online information resources and electronic journals, whether free or subscription based, than was the case in 1992-93. Likewise, the Internet has developed considerably in that time, and the level of both content and search tools has grown exponentially. Furthermore, there are both greater numbers of paper-based materials now being digitised, as well as increasing amounts of material that has been 'born digital' (that is, first, or even solely, published in electronic form).

Given this, it could have been expected that Commonwealth libraries would show higher levels of access to electronic full-text, which was indeed the case. However, the differences between Commonwealth libraries and their academic counterparts were only slight (two to seven percent), and it again seems likely that more up-to-date studies of academic libraries would show higher levels of full-text access than was previously the case.

This would seem to suggest that Commonwealth libraries have been relatively slower than their academic counterparts in the takeup of electronic full-text. There are several possible reasons for this: it may be that, again, there are insufficient suitable resources available in the subject disciplines required in the Commonwealth sector. It may also be that Commonwealth libraries cannot sustain the cost associated with subscription access to appropriate materials.

7.2. DIFFERENCES BETWEEN VIRTUAL LIBRARY RESEARCH FINDINGS

Overall, the differences between the academic library research and the current research appear relatively minimal, despite the sometimes widely differing nature of purpose, clientele and collections between library sectors. While the different results reported were statistically significant for seven of the 15 reported activities, it seems probable that, with the exception of ownership vs. access policies, cooperative resource/infrastructure development, and OPAC holdings enhancement, the recorded differences were mainly due to the five year gap between the academic library studies and the Commonwealth library study. This would, in turn, seem to suggest that the model of virtual library activities proposed here is appropriate to different library sectors, with differences more in the degree to which activities are conducted, rather than in the concept itself.

7.3. CONCLUSION

In Chapter 7, the data from the current research have been compared against results from academic library virtual library research to determine whether Commonwealth libraries have similar levels of virtual library activity to the academic library sector. In light of this, some conclusions about virtual library development in Commonwealth libraries will be drawn in Chapter 8. The model of virtual libraries proposed in Chapter 3 will then be reconsidered, and some recommendations made for further research in this field.

8. CONCLUSIONS AND RECOMMENDATIONS

In the previous Chapter, virtual library activity in Commonwealth libraries was compared with activity in American and Australian academic libraries. In Chapter 8, some conclusions will be drawn about Commonwealth virtual library activity, as well as the validity of the proposed model of virtual libraries. Recommendations for further research in this field then conclude this Chapter.

8.1. COMMONWEALTH VIRTUAL LIBRARY ACTIVITY

8.1.1. Virtual Library Activities in Commonwealth Libraries

Respondents were asked about their participation in 15 different virtual library activities, comprising: electronic document delivery; policies for access to information over ownership; cooperative development or purchase of software and/or hardware; development of Internet/Intranet sites; plans for access to information through a single workstation; addition of external library holdings to local OPACs; use of the OPAC as a gateway to other information resources; end-user access to online materials; Internet connection; client training in the use of the Internet; client training in end-user searching; electronic journal subscriptions; digitisation projects; electronic requesting facilities for clients; and, access to electronic full text.

In 1998-1999, the different activities were being undertaken to different extents, according to library need, but certain interesting patterns did emerge. The highest levels of participation were reported for the Internet-related activities (that is, development of Internet/Intranet sites, Internet connection, and client training on the Internet), with more than 80% of respondents indicating that they were active in this area. This result would seem to reflect the general ubiquity of the Internet in modern Western culture, with its spiralling increase in uptake and perceived importance, and leads to the conclusion that Commonwealth libraries are aware and taking advantage of, the general trends that are occurring in information access and delivery.

The next most popular activities, with 61-80% participation, were those related to electronic information delivery and client use (comprising electronic document delivery, end-user access to online materials, client training in end-user searching, electronic journals, electronic requesting facilities for clients, and access to electronic full-text). As with the Internet-related activities, this result would again seem to support the conclusion that Commonwealth libraries are aware of, and acting upon, library client preferences for electronic information delivery mechanisms and end-user access facilities.

The cooperative activities (including policies for access to information over ownership, cooperative development or purchasing activities, and use of the OPAC as a gateway to other resources) showed moderate activity, with 41-60% of respondents reporting involvement in these areas. As discussed at Chapter 5.4.2, Commonwealth agencies tend to have different areas of responsibility, with relatively little overlap occurring. Given this, it may be that the information needs of the various agencies are simply not compatible with cooperative activity. However, the library literature has indicated a general trend toward the aggregation of information products and platforms, as well as vendors in recent years, and it seems unlikely that there is absolutely no common ground on which Commonwealth libraries may build.

One possible conclusion here is that Commonwealth libraries are showing the 'territoriality' and unwillingness to surrender authority that is reported as common in cooperative activity, or that there is a commitment 'in name only'. If this was the case, then there is an urgent need for Commonwealth libraries to understand the costs of holding such attitudes, and the benefits that can accrue from cooperative activity, with a commensurate need for an adjustment in their thinking.

The other possible conclusion is that, while Commonwealth libraries may be willing to engage in cooperative activity, they are being hindered by outside factors, including agency policies with regard to cooperative activity, information sharing, information technology and security, and vendor attitudes toward information and infrastructure sharing. In these cases, Commonwealth libraries

may be able to achieve more positive results through educating agency policy makers about the benefits that can accrue, as well as negotiating consortial deals with vendors and suppliers. This would seem to be an area in which FLIN, as the consortial body for Commonwealth libraries, could be used to great benefit, since the greatest negotiating strength and persuasive capacity is always gained where parties work in concert to achieve common goals.

The activities that were least undertaken were those related to integrated access to information (that is, plans for single workstation access to information and the listing of external library holdings on local OPACs) and digitisation, with 40% or less respondents being active in these areas. In relation to digitisation, it is well recognised that digitisation projects are both time-consuming and expensive. Given that most Commonwealth agencies are policy departments, rather than research organisations, it is unsurprising that relatively few are actively pursuing digitisation programs. However, Commonwealth agencies arguably have a responsibility for making available those materials that have been created by that agency. It is presently unclear whether areas outside Commonwealth libraries, such as publication and media units, are actively pursuing such programs. If this is not occurring, then, in line with the archiving and preservation responsibilities that have always devolved to libraries, Commonwealth libraries need to either be pursuing the responsible areas, or undertaking digitisation programs themselves, so that relevant materials are both made accessible to Commonwealth constituents, and are preserved for future use.

The result in relation to integrated information access could be considered problematic, as integrated information access is one of the key goals of virtual libraries. It may again be Commonwealth libraries have failed to realise the advantages that are available through integrated information delivery, with a related need for attitudinal changes. However, another possible conclusion is that the concept of integrated information access was developed in the earlier conceptions of the virtual library, which have now been overtaken by technological developments, such as the Internet. As such, it may arguable that the need for a

single interface to all information has been somewhat superseded, and that Commonwealth libraries are correct to show relatively little interest in this area.

8.1.2. Development Factors in Commonwealth Virtual Libraries

Comparisons were made for both the type of virtual library activities undertaken, and the level of virtual library development, as evidenced by the number of activities undertaken in each library, in order to determine which, if any, were important drivers in Commonwealth virtual library development. The factors compared included virtual library development intentions, library type, size of client base, subject specialisation and familiarity with government policy.

When comparing virtual library development intention against both type of activity undertaken and level of development, a strong pattern became apparent. Libraries with the stated intention to develop virtual libraries showed markedly higher levels of activity for all of the specified than those libraries that had no such intention. Furthermore, when the level of virtual library development was considered, libraries that did intend to develop virtual libraries showed much stronger levels of development than their counterparts. This leads to the (not unnatural) conclusion that having a stated plan to develop a virtual library is one of the most important drivers for virtual library development.

However, another interesting trend also became apparent here. Those libraries that indicated that they did not intend to develop a virtual library still showed very strong low and moderate levels of development. Indeed, these libraries were undertaking an average of almost five of the specified activities per library. Since virtual libraries are being developed almost by default by this groups of respondents, it would seem reasonable to conclude that there is a failure on the part of some Commonwealth libraries to truly understand what a virtual library comprises, as well as the benefits that can be gained from their implementation.

Given that libraries that are part of a network generally have access to greater levels of resourcing than single libraries, there was also an expectation that network libraries would show greater virtual library activity and development

than their counterparts, and this was partially the case. Network libraries generally showed higher levels of activity than single libraries for each of the specified virtual library activities. However, the difference between the two groups was usually not great, so it is unlikely that library type was decisive to the kinds of virtual library activities being undertaken.

When considering the level of virtual library activity achieved, an interesting difference emerged. Single libraries showed minor low-level virtual library development, strong medium-level development, and moderate high-level development, whereas network libraries showed slight low-level development, moderate medium-level development and very strong high-level development. Although library type has apparently little connection to lower levels of virtual library development, it may be concluded that the jump from medium to high-level development is quite strongly influenced by whether or not a library is part of a network.

It had been assumed at the outset of this research that libraries with the largest client bases would show higher levels of virtual library activity than their smaller counterparts. It was likewise assumed that libraries that were more familiar with the *Australia Online* policy statement would also show greater levels of activity. Considering the levels of electronic information development in the various subject disciplines, there was also an expectation that libraries working in the scientific and technical disciplines would have more advanced virtual libraries than libraries in the social sciences or humanities. However, there was no discernable pattern for groupings by client base, subject specialty or level of familiarity with *Australia Online,* either in terms of the types of virtual library activities undertaken, or the level of virtual library development taking place. This leads to the conclusion that none of these are significant driving factors in Commonwealth virtual library development.

8.1.3. Comparison of Commonwealth and Academic Virtual Libraries

The virtual library activities studied in this research were largely identical to those studied in research done on American and Australian academic libraries, in 1992

and 1993 respectively, as this was the most recent, relevant research available for comparison. The responses received from the three studies were compared, and testing undertaken to determine statistical significance (as reported in Chapter 7). Although seven of the 15 elements tested did show significant differences, the majority of these appear to be due to the fact that there was a 5-year gap between the academic library studies and the present study, with much technological advancement occurring during that period.

Based on this, it seems reasonable to conclude that, if similar academic studies were conducted today, they would show quite similar levels of activity and development to those recorded in Commonwealth libraries, despite the sometimes widely differing nature of academic and special libraries. In light of this, the researcher has concluded that the difference in virtual library development in different library sectors appears to be more in the degree to which the various activities are undertaken, rather than in radically different applications of the concept. This leads to the conclusion that the virtual library model proposed below is likely to be equally applicable to other library sectors as it is to Commonwealth libraries.

8.2. THE VIRTUAL LIBRARY MODEL

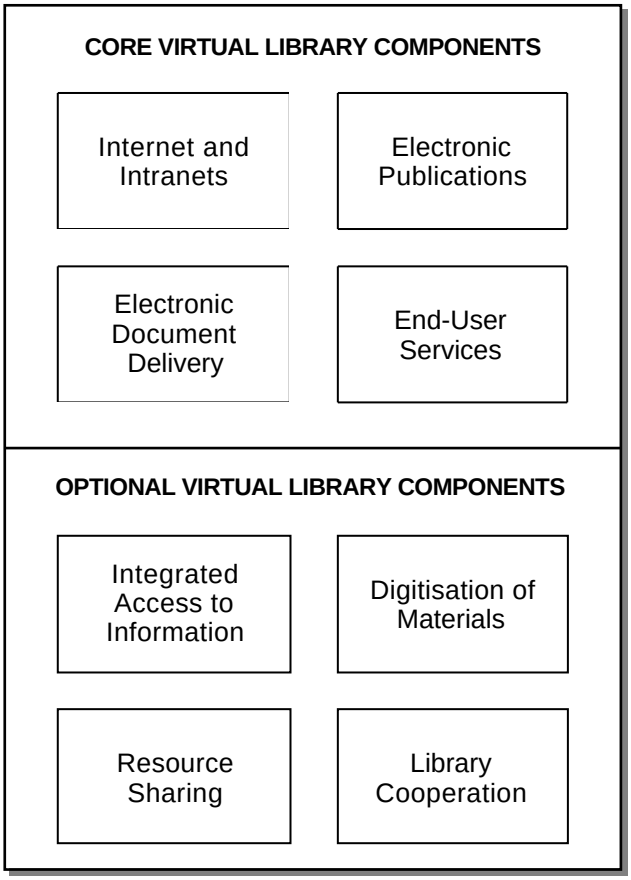
Based on the literature in the field, a model for virtual libraries was formulated in Chapter 3, with the model comprising the components that made up the virtual library and factors that impacted on its environment. This was proposed as shown in Figure 3.2 (at Chapter 3.1), with all components being considered to be equally applicable to all libraries.

However, an examination of the virtual library activities undertaken in Commonwealth libraries showed that some virtual library activities were undertaken by far more libraries than were others. For example, 100% of respondents were involved in the development of Internet and Intranet sites, yet only 40% had digitisation projects. Electronic document delivery was in use in 73% of respondent libraries, yet just 40% listed external library holdings on their

OPACs. Only 23% had embraced the notion of access to materials through a single workstation, yet 86% were conducting client Internet training.

Based on this, it appears that certain activities can be described as being essential to virtual library development, while others may be considered optional. There were eight groups of activities identified as virtual library components, incorporating the 15 virtual library activities specified in Chapter 2.2.2. Those components that were undertaken by an average of 65% or more Commonwealth libraries have been deemed core virtual library components. Those activities that had an average participation rate of less than 65% may be considered more peripheral to virtual library development.

Figure 8.1: Revised Virtual Library Components



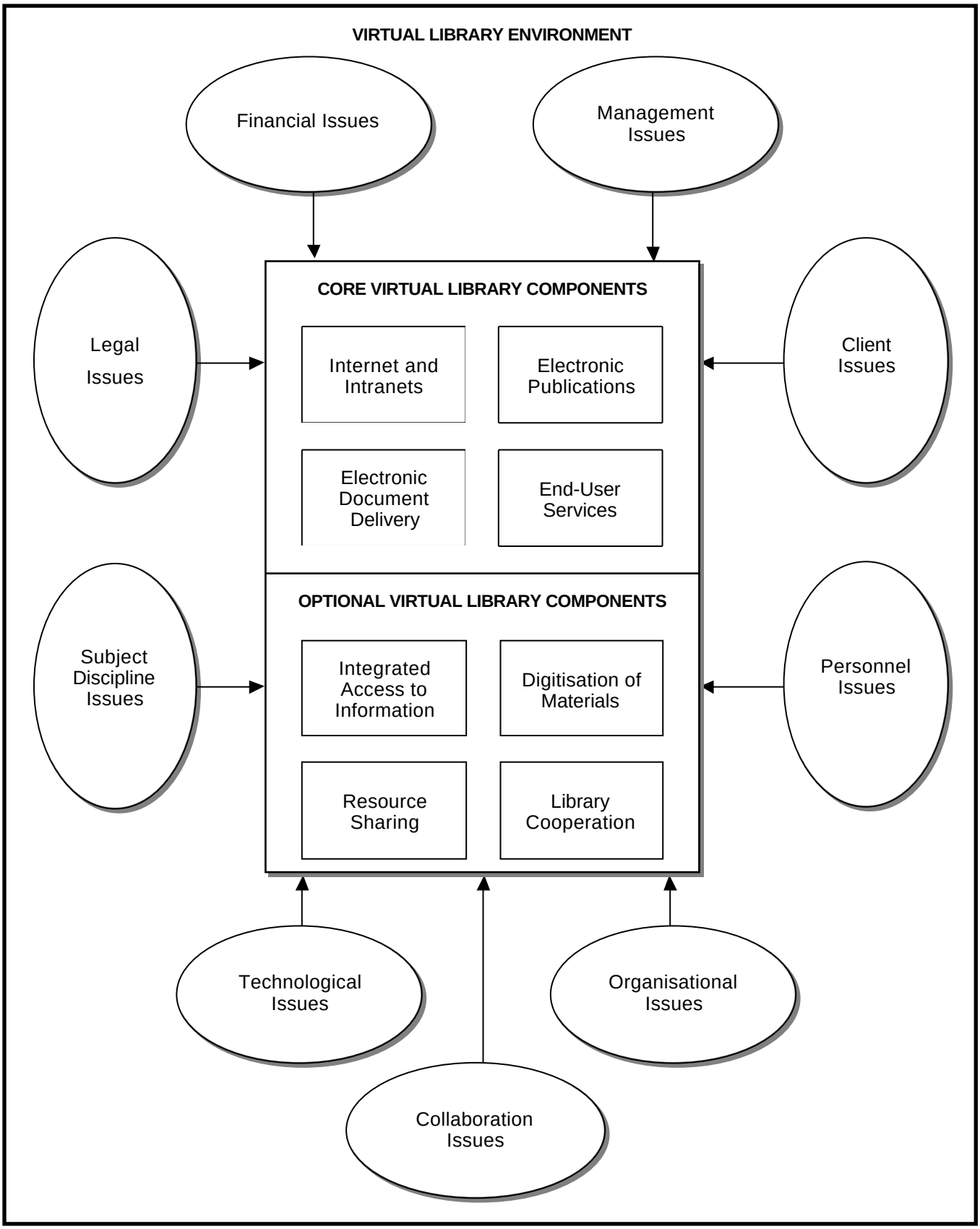
On this basis, Internet and Intranets, electronic publications, electronic document delivery and end-user services comprise the core virtual library components, while integrated access to information, digitisation of materials, resource sharing and library cooperation are optional. This may be illustrated as shown in Figure 8.1.

There were various issues and changes of importance that made up the nine issues that fed into the virtual library environment. Commonwealth libraries ranked these issues from most unimportant to most important, using a 7-point scale. As reported at Chapter 5.6 and 5.7, when these issues were weighted and ranked, there was very little difference in terms of relative score between the first and last ranked issues. This suggests that the various issues that impact on virtual libraries have relatively equal importance, with none being vastly more important than others.

Further, when respondents were asked to nominate other issues or changes of importance, as discussed at Chapter 5.6.12 and 5.7.7, there were no issues suggested which did not already fit either within one of existing groups, or in one of the specified virtual library activities (discussed at Chapter 5.4). This would seem to indicate that the proposed environmental issues are reasonably complete, with no major gaps being apparent. In light of this, the virtual library environment proposed in Chapter 3 has not altered.

Therefore, taking account of the alterations made in Figure 8.1, the virtual library model is now as shown in Figure 8.2.

Figure 8.2: Revised Model of Virtual Libraries and their Environment



8.3. FURTHER RESEARCH

As discussed in Chapters 5, 6 and 7, this research found a number of areas where further research would be required before definitive conclusions could be reached in relation to various aspects of virtual library development. Further, some interesting gaps have been exposed which merit further examination. Some of the possibilities that exist for further virtual library research include the following:

1. As discussed at Chapter 1.3, technological change is occurring rapidly, and respondents in earlier virtual library surveys indicated that their replies could be quite different later on. Because of the rapid developments in this field, interesting results could be gained by conducting time series research. This would allow virtual library developments in the same sector to be compared and contrasted over a period of time.

2. In the current research, library size was calculated using a non-traditional measure, namely size of client base (discussed at Chapter 5.13 and 6.1.3). It may be possible to reach some interesting conclusions about virtual library development by using a more traditional measure of library size, such as collection size, number of staff, and /or library budget.

3. Another area that was examined in the current research was the nature and level of virtual library development that was occurring in libraries with different subject specialisations (as discussed at Chapter 6.1.5), with results being extremely mixed. In this research, statistical testing was not possible, so definitive conclusions could not be reached. If a larger population were examined, then it would be possible to determine whether subject specialisation has any real impact on the development and implementation of virtual libraries.

4. The current research considered the impact of the *Australia Online* information policy on virtual library development in Commonwealth libraries. As discussed at Chapter 6.1.5, this document has now been superseded by *Government Online*.

It could be that an examination of this policy, or indeed, other (international) government information policies in relation to virtual library development could show some interesting results.

5. In Chapter 7, there were several virtual library activities that appeared to show cultural differences in the way virtual libraries were implemented in Australia and the United States. Cultural factors have not previously been studied in relation to virtual libraries, and it could be that there are differences in the way libraries from different countries and cultures are approaching virtual libraries / electronic information delivery, which merit further consideration.

6. As discussed at Chapter 5.2, the literature indicates that two highly important reasons for the development of virtual libraries are that the nature of information is changing to become more electronically based, and in such a climate, the provision of traditional services is no longer sufficient to ensure the survival of libraries. However, these factors were not reported as reasons for virtual library development by any Commonwealth library. Given the prevalence of this view in the literature, it would be interesting to test whether the importance of these factors is as great in fact as writers in the field suggest.

7. One area that showed some interesting trends was how staffing and / or organisational changes are implemented in relation to virtual libraries. As discussed in Chapter 5.10, the literature has indicated that in general library automation implementation, any necessary staffing or organisational changes are not normally planned as part of the implementation process, but are instead undertaken in an ad hoc manner as required. However, more than half of the respondents to this research indicated that they had actually planned the changes that were occurring. It would be interesting to discover whether this is unique to Commonwealth libraries, or whether, in fact, this type of planning is consistent with virtual library development and implementation.

8. The model of virtual libraries proposed in this research (at Figure 8.2) has only been tested in the Government special library sector in Australia. As discussed in Chapter 1.3, special libraries tend to play quite a different role to libraries in other sectors. Testing the proposed model in other library sectors and cultural settings would show whether such a model has universal application.

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APPENDIX A: COMMONWEALTH LIBRARY SURVEY INSTRUMENT

Virtual Libraries in Commonwealth Government Libraries

You are being asked to complete a survey to ascertain what Commonwealth Government libraries are doing in the area of virtual libraries, either as part of a hybrid library or as a totally virtual library. The survey should take 10-15 minutes of your time to complete. Your help in completing this survey is much appreciated.

The information you provide will remain strictly confidential. It will not given to any person or organisation in any way that will identify you or your library. If required, a tabulation of survey results will be sent to respondents when complete.

The ***virtual library*** may also be known as the ***library without walls***, ***electronic library***, ***logical library***, ***digital library***, ***e-library***, ***desktop library*** or ***online library***. For the purposes of this study, these terms are used interchangeably. A virtual library is defined as "the concept of access to the contents and services of libraries and other information resources, combining on-site materials, with electronic access to external worldwide library and commercial information and knowledge sources[1]***.*** The virtual library may be used either remotely or within the physical confines of the library, by both library clients and staff. It may be the entire library or one component of a traditional library.

---

1. (a)Have you or will you develop a virtual library for your library?

❑ Yes.

❑ No.

(b) Why or why not?

_____

_____

(c) If yes, has or will the virtual library be developed:

❑ By library staff?

❑ By library staff in collaboration with areas outside the library?

Please Describe:_____

_____

❑ By areas outside the library?

Please Describe:_____

_____

[1] Gapen, G. Kaye (1993) "The virtual library: knowledge, society, and the librarian". In ***The Virtual library: visions and realities***, edited by Laverna M. Saunders, 1-14. Westport, Conn.: Meckler.

2. Please tick any of the following efforts your library is or will be involved in. Use the space below each choice for comments and/or examples.

	A. Use or development of electronic document delivery services.
	B. Policies, services, or reallocations that emphasise access to information over ownership
	C. Participation in cooperative development or purchase of electronic files or hardware
	D. Participation in the development of an Internet/Intranet site
	E. A written plan that states as its goal access to information from a single workstation
	F. Enhancement of the online public access catalogue (OPAC) to include the holdings of other (external) libraries
	G. Providing a gateway from the OPAC to other databases or networks, such as the Internet
	H. End-user access to online files

	I. Connection to the Internet
	J. Training clients in the use of: (a) Internet resources
	(b) End-user searching
	K. Subscribing to electronic journals
	L. Digitisation of text for electronic storage, retrieval, and/or dissemination
	M. A library system that allows clients to initiate inter-library loan and document delivery requests, suggest purchases, or ask reference questions electronically.
	N. Access to electronic full-text
	O. Other (please describe):

3. Please rate each of the areas below in terms of their relative importance in creating the virtual library within your organisation:

Scale:

1. Most Unimportant 2. Unimportant 3. Relatively Unimportant
4. Neither Important nor Unimportant
5. Relatively Important 6. Important 7. Most Important

	1	**2**	**3**	**4**	**5**	**6**	**7**
A. Human resource issues							
B. Strategic planning							
C. Development of new organisational structures							
D. Copyright issues							
E. Development of new performance measures							
F. Security and privacy issues							
G. Electronic publishing							
H. Financial resources							
I. Resource sharing							
J. Cooperative ventures							
K. Development of infrastructure							
L. Other (please describe):							

4. On the above scale, how important do you consider changes to each of the following in creating virtual libraries?

	1	**2**	**3**	**4**	**5**	**6**	**7**
A. Client attitudes							
B. Organisational support							
C. Funding							
D. Trained technical staff							
E. Staff commitment							
F. Appropriate technologies							
G. Other (please describe):							

5. (a) Has or will your library change or experiment with staffing patterns or organisational structures to support access to electronic resources?

❑ No.

❑ Yes.

(b) If yes, what changes have or will be made?

Please Describe:_____

_____

_____

_____

6. If changes have or will be made to staffing patterns or organisational structures, are they:

❑ Planned as part of the overall development of the virtual library?

Please Describe:_____

_____

_____

❑ Made necessary by the introduction of the virtual library?

Please Describe:_____

_____

_____

❑ Both?

Please Describe:_____

_____

_____

7. (a) In your organisation, is your library:

❑ A single library?

Please Describe:_____

_____

_____

_____

❑ Part of a library network?

Please Describe:_____

_____

_____

_____

(b) Does or will the virtual library serve:

❑ Your library only?

❑ A library network?

Please Describe:_____

_____

_____

_____

❑ Other?

Please Describe:_____

_____

_____

_____

8. Approximately how many clients does your library serve?

_____

9. What are the major subject areas your library collects in?

Please Describe:_____

_____

_____

_____

_____

_____

_____

_____

_____

10. How familiar is your library with *Australia Online*, the Commonwealth Government's policy statement on online technology?

❑ Familiar.

❑ Partially Familiar.

❑ Unfamiliar.

Please add comments as required: _____

_____

_____

_____

_____

_____

_____

11. Is there anything else you would like to add about your use of electronic resources or your development of a virtual library? (If space is insufficient, please attach extra sheets.)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Thank you for your assistance. Your input is appreciated. If you have questions on any of the above matters, please phone Amanda Magnussen on ***(02) 6266 2343 (BH)*** or email ***u885946@student.canberra.edu.au***.

Please return this survey by **7 August 1998** to:

Virtual Library Survey
c/- Dr Leoni Warne
School of Information Management and Tourism
Faculty of Communication
University of Canberra
P.O. Box 1
Canberra ACT 2601

Questionnaires will be identified by the use of a code number in the bottom left hand corner of this page. These numbers will only be used for the purpose of identifying returns, so that non-respondents can be re-approached and reminded to return their questionnaires, and survey results can be sent out.

Do you wish to have a tabulation of survey results sent to you after they have been completed?

❑ **No.** ❑ **Yes.**

APPENDIX B: ARL SURVEY INSTRUMENT

An ARL member library is seeking current information on the evolution of the virtual library in research libraries. In describing the research library of the future, expressions such as *library without walls* or *logical library* have been used. Most recently, the phrase *virtual library* has been applied to a vision of the library of the 21st century in which computer and telecommunications technologies make possible access to information in an electronic format without regard to its location or to time.

The Quick SPEC survey attempts to gauge progress of ARL libraries toward realising the virtual library; to identify critical issues and changes ARL directors feel are necessary to achieving the virtual library; an to identify a network of institutions moving in this direction for further contact and interaction.

Your prompt response would be appreciated by 14 February 1992. A tabulation of survey results will be available to respondents without cost upon request.

- Quick SPEC Survey -

Name: _____ Title: _____

Library: _____ Telephone: _____ Email: _____

1. Please check any of the following efforts your library is involved in and use the space below each choice for comments and / or examples. Please feel free to attach an additional sheet if necessary.

A. ___ Use of or development of electronic document delivery services

B. ___ Policies, services, or reallocations that emphasise access over ownership

C. ___ Participation in cooperative development or purchase of electronic files or hardware

D. ___ Participation in the development of a campus-wide information system

E. ___ A written plan that states as its goal access to information from a single workstation

F. ___ Enhancement of the online public access catalogue (OPAC) to include the holdings of other libraries

G. ___ Providing a gateway from the OPAC to other databases or networks, such as the Internet

H. ___ End-user access to online files from on or off campus

I. ___ Connection with the Internet

J. ___ Training faculty and students in the use of ___ Internet resources ___ End-user searching

K. ___ Subscribing to electronic journals

L. ___ Digitisation of text for electronic storage, retrieval, and / or dissemination

M. ___ An email front-end that allows users to initiate inter-library loan and document delivery requests, suggest purchases, or ask reference questions from within the OPAC

N. ___ Access to electronic full-text

O. ___ Other (Please describe):

If you have documentation to share on any of the above areas, please enclose.

2. Please rank (scale 1-7; 7 = highest) the areas below in terms of their relative importance in creating the virtual library.

A. ___ Human resource issues

B. ___ Strategic planning

C. ___ Development of new organisational structures

D. ___ Copyright issues

E. ___ Development of new performance measures

F. ___ Security and privacy issues

G. ___ Electronic publishing

H. ___ Financial resources

I. ___ Resource sharing

J. ___ Cooperative ventures

K. ___ Development of the necessary infrastructure on campus

L. ___ Other (Please describe):

3. What changes do you see need to be made to create the virtual library? Please rank your choices (scale 1-7; 7 = highest).

A. ___ Faculty attitudes

B. ___ Institutional support

C. ___ Funding

D. ___ Trained technical staff

E. ___ Staff commitment

F. ___ Appropriate technologies

G. ___ Other (Please describe):

4. Has your library changes or experimented with staffing patterns or organisational structures to support access to electronic resources?

___ Yes (Please describe):

___ No

5. Please indicate a contact person for follow-up (if different from above):

Name: _____ Title: _____

Telephone: _____ Fax: _____ Email: _____

Thank you for your assistance. Please return this survey by 14 February 1992 to C. Brigid Welch, Program Officer for Information Services, ARL/Office of Management Services, 1527 New Hampshire Ave., NW, Washington, DC 20036 PHONE (202) 232-24664 FAX (202) 462-7849

APPENDIX C: ALTERATIONS FROM ARL SURVEY INSTRUMENT TO COMMONWEALTH LIBRARY SURVEY INSTRUMENT

ARL Survey	Commonwealth Survey	Reason for Change
1D: Participation in the development of a campus-wide information system	2D: Participation in the development of an Internet / intranet site	Campus-wide information system is a term specific to academia. Equivalent function is provision of Internet / intranet sites.
1F: Enhancement of the online public access catalogue (OPAC) to include the holdings of other libraries besides those held locally	2F: Enhancement of the online public access catalogue (OPAC) to include the holdings of other (external) libraries	During pilot testing, there was confusion about what it meant to add other libraries' holding to OPAC. Added the (external) to clarify.
1H: End-user access to online files from on or off campus	2H: End-user access to online files	Removed reference to on or off campus, as again, not relevant outside academia.
1J: Training faculty and students: (a) in the use of Internet sources; and (b) in end-user searching	2J: Training clients in the use of: (a) Internet resources (b) End-user searching	Reference to faculty and students changed to clients, as not relevant outside academia.
1M: An e-mail front-end that allows users to initiate interlibrary loan and document delivery requests, suggest purchases, or ask reference questions from within the OPAC	2M: A library system that allows clients to initiate inter-library loan and document delivery requests, suggest purchases, or ask reference questions electronically	During pilot testing, question caused much confusion about what was actually meant. Clarification was sought from Prof. Schiller, but unfortunately, no reply was received. Email reference was removed, as client requesting does not actually have to require an email front-end. In some systems, the requesting facility is inbuilt into the OPAC.

ARL Survey	Commonwealth Survey	Reason for Change
2K: Development of the necessary infrastructure on campus	3K: Development of infrastructure	Reference to infrastructure on campus removed as not relevant outside academia.
3A: Faculty attitudes	4A: Client attitudes	Reference to faculty changed to clients to reflect non-academic environment.
3B: Institutional support	4B: Organisational support	Institutional support changed to organisational support, as this is the more used term in Australia.

APPENDIX D: COMMONWEALTH LIBRARY SURVEY COVERING LETTERS

C/- AIMA
National Library of Australia
Parkes Place
CANBERRA ACT 2600

13 July 1998

Dear Colleague,

You would, no doubt, be aware that the subject of virtual libraries is one of great interest to the library and information profession at the moment. Indeed, large amounts of the current research in the field is devoted to this very topic.

Enclosed is a survey relating to the development of virtual libraries by Commonwealth Government libraries. This research is being conducted by Amanda Magnussen, herself a government special librarian.

I urge you to spend a few moments of your time to completing this survey, and assisting with research in this important area, which will benefit us all as we approach library and information science in the 21st Century.

Roxanne Missingham

Roxanne Missingham
Convenor, Federal Libraries Information Network

C/- AIMA
National Library of Australia
Parkes Place
CANBERRA ACT 2600

16 August 1998

Dear Colleague,

You should recently have received a questionnaire regarding the development and use of the virtual library by your library, from which we have had no reply. Any one of a number of different contingencies may have occurred - perhaps you mislaid the questionnaire, or it may have miscarried in the mail. In any event, we have enclosed is another copy of the questionnaire.

We hope that this study will provide valuable information about Commonwealth Government libraries, and their use of technology as we face the challenges of the 21st Century for the library and information profession. Please will you help us in this important research by completing the questionnaire and returning it in the envelope provided as soon as possible? Your kind assistance shall be much appreciated.

Yours Sincerely,

Amanda Magnussen

Amanda Magnussen

federal libraries FLIN
INFORMATION NETWORK

C/- AIMA
National Library of Australia
Parkes Place
CANBERRA ACT 2600

«Title» «FirstName» «LastName»
«Company»
«Company2»
«Address1»
«Address2»
«City» «State» «PostalCode»

23 November 1998

Dear «Title» «LastName»,

You should recently have received a survey examining the development of virtual libraries in Federal Government Libraries. To date, no response has been received from your library. The «Company2» deals with a clientele or subject matter that is dealt with by few other Federal agencies. As such, data from your library would be a very valuable addition to the current study.

If you could spend approximately 10-15 minutes of your time filling out the attached form, I would be deeply grateful. The completed form can be returned in the enclosed postage paid envelope.

Thanking you for your kind assistance,

Amanda Magnussen

Amanda Magnussen

APPENDIX E: TABLES

Figure E1: Chart Data for Figure 5.1

1(a). Have you or will you develop a virtual library for your library?

Yes	83	81%
No	16	16%
Not stated	3	3%
Total	102	100%

Figure E2: Chart Data for Figure 5.2

Q1(b). Why or why not?

Reasons for Not Developing Virtual Libraries		
Lack of resources	6	38%
Lack of demand	6	38%
Small library	3	19%
Materials not available electronically	1	6%

Figure E3: Chart Data for Figure 5.3

Q1(b). Why or why not?

Reasons for Developing Virtual Libraries		
Organisational/library policy	7	8%
Closure of physical libraries	1	1%
Space constraints in physical library	1	1%
Extend/complement existing library services	12	14%
Lack of usage of physical library	1	1%
Raise library profile	1	1%
Client demand	4	5%
Improve client service	7	8%
Remote access to information/services	6	7%
Desktop access to information	6	7%
Access to wider range of materials	7	8%
Increasing availability of electronic resources	5	6%
Inability to purchase all desired materials	4	5%
Currency of information	2	2%
Speed of access	4	5%
Containment of costs	2	2%
Changing nature of information delivery	2	2%
Means of storing full-text materials	1	1%

Figure E4: Chart Data for Figure 5.4

1(c). Has or will the virtual library be developed by:

Library staff	13	16%
Library staff in consultation	69	83%
External areas	1	1%
Total	83	100%

Figure E5: Chart Data for Figure 5.5

2. Indicate any of the following efforts your library is or will be involved in.

Virtual Library Activities		
Electronic document delivery	74	76%
Access over ownership	59	60%
Cooperative development or purchase	54	55%
Development of Internet/ Intranet site	98	100%
Plan for single workstation access	23	23%
Other library holdings through OPAC	39	40%
Gateway from OPAC	57	58%
End-user access to online	63	64%
Internet connection	84	86%
Client training - Internet	84	86%
Client training - Searching	77	79%
Electronic journals	64	65%
Digitisation project(s)	39	40%
Electronic requests by clients	64	65%
Electronic full-text	69	70%
Other	13	13%

Figure E6: Chart Data for Figure 5.6

2. Levels of virtual library development in Commonwealth libraries

Number of Activities		
2	1	1%
3	2	2%
4	3	3%
5	5	5%
6	7	7%
7	6	6%
8	12	12%
9	6	6%
10	9	9%
11	12	12%
12	14	14%
13	9	9%
14	6	6%
15	5	5%
16	1	1%
Not stated	4	4%
Total	102	100%

Figure E7: Chart Data for Figure 5.7

3. Rate the following in terms of their relative importance in creating virtual libraries

	Most Unimportant	Unimportant	Relatively Unimportant	Neither Important nor Unimportant	Relatively Important	Important	Most Important	Nil Response	Total
Human resource issues	2 2%	7 7%	1 1%	9 9%	16 16%	27 26%	29 28%	11 11%	102 100%
Strategic planning	0 0%	4 4%	4 4%	9 9%	27 26%	27 26%	19 19%	12 12%	102 100%
New organisational structure(s)	2 2%	8 8%	10 10%	22 22%	23 23%	15 15%	10 10%	12 12%	102 100%
Copyright issues	2 2%	8 8%	3 3%	12 12%	19 19%	31 30%	18 18%	9 9%	102 100%
New performance measures	2 2%	6 6%	10 10%	25 25%	28 27%	14 14%	5 5%	12 12%	102 100%
Security and privacy issues	1 1%	8 8%	5 5%	12 12%	25 25%	16 16%	25 25%	10 10%	102 100%
Electronic publishing	2 2%	5 5%	7 7%	21 21%	16 16%	23 23%	17 17%	11 11%	102 100%
Financial resources	1 1%	4 4%	2 2%	3 3%	12 12%	30 29%	40 39%	10 10%	102 100%
Resource sharing	1 1%	4 4%	6 6%	10 10%	20 20%	30 29%	23 23%	8 8%	102 100%
Cooperative ventures	3 3%	7 7%	5 5%	15 15%	25 25%	18 18%	19 19%	10 10%	102 100%
Infrastructure development	1 1%	6 6%	1 1%	11 11%	27 26%	19 19%	25 25%	12 12%	102 100%
Other	0 0%	0 0%	0 0%	0 0%	0 0%	2 2%	2 2%	98 96%	102 100%

Figure E8: Chart Data for Figure 5.8

3. Rate the following in terms of their relative importance in creating virtual libraries (weighted)

		Weighting							Weighted Total
		1	2	3	4	5	6	7	
Financial resources		1	4	2	3	12	30	40	**547**
	Weighted Score	***1***	***8***	***6***	***12***	***60***	***180***	***280***	
Resource sharing		1	4	6	10	20	30	23	**508**
	Weighted Score	***1***	***8***	***18***	***40***	***100***	***180***	***161***	
Human resource issues		2	7	1	9	16	27	29	**500**
	Weighted Score	***2***	***14***	***3***	***36***	***80***	***162***	***203***	
Copyright issues		2	8	3	12	19	31	18	**482**
	Weighted Score	***2***	***16***	***9***	***48***	***95***	***186***	***126***	
Strategic planning		0	4	4	9	27	27	19	**486**
	Weighted Score	***0***	***8***	***12***	***36***	***135***	***162***	***133***	
Infrastructure development		1	6	1	11	27	19	25	**484**
	Weighted Score	***1***	***12***	***3***	***44***	***135***	***114***	***175***	
Security and privacy issues		1	8	5	12	25	16	25	**476**
	Weighted Score	***1***	***16***	***15***	***48***	***125***	***96***	***175***	
Cooperative ventures		3	7	5	15	25	18	19	**458**
	Weighted Score	***3***	***14***	***15***	***60***	***125***	***108***	***133***	
Electronic publishing		2	5	7	21	16	23	17	**454**
	Weighted Score	***2***	***10***	***21***	***84***	***80***	***138***	***119***	
New organisational structure(s)		2	8	10	22	23	15	10	**411**
	Weighted Score	***2***	***16***	***30***	***88***	***115***	***90***	***70***	
New performance measures		2	6	10	25	28	14	5	**403**
	Weighted Score	***2***	***12***	***30***	***100***	***140***	***84***	***35***	
Other		0	0	0	0	0	2	2	**26**
	Weighted Score	***0***	***0***	***0***	***0***	***0***	***12***	***14***	

Figure E9: Chart Data for Figure 5.9

4. How important do you consider changes to each of the following in creating virtual libraries?

	Most Unimportant	Unimportant	Relatively Unimportant	Neither Important nor Unimportant	Relatively Important	Important	Most Important	Nil Response	Total
Client attitudes	0 0%	1 1%	2 2%	1 1%	13 13%	35 34%	42 41%	8 8%	102 100%
Organisational support	0 0%	1 1%	0 0%	3 3%	12 12%	27 26%	52 51%	7 7%	102 100%
Funding	0 0%	0 0%	0 0%	4 4%	8 8%	31 30%	52 51%	7 7%	102 100%
Trained tech staff	0 0%	0 0%	0 0%	2 2%	16 16%	41 40%	36 35%	7 7%	102 100%
Staff commitment	0 0%	0 0%	0 0%	4 4%	10 10%	42 41%	38 37%	8 8%	102 100%
Appropriate technologies	0 0%	0 0%	1 1%	1 1%	9 9%	36 35%	47 46%	8 8%	102 100%
Other	0 0%	0 0%	0 0%	0 0%	0 0%	1 1%	2 2%	99 97%	102 100%

Figure E10: Chart Data for Figure 5.10

4. How important do you consider changes to each of the following in creating virtual libraries? (weighted)

		Weighting							Weighted Total
		1	2	3	4	5	6	7	
Funding		0	0	0	4	8	31	52	**606**
	Weighted Score	***0***	***0***	***0***	***16***	***40***	***186***	***364***	
Organisational support		0	1	0	3	12	27	52	**600**
	Weighted Score	***0***	***2***	***0***	***12***	***60***	***162***	***364***	
Appropriate technologies		0	0	1	1	9	36	47	**597**
	Weighted Score	***0***	***0***	***3***	***4***	***45***	***216***	***329***	
Trained tech staff		0	0	0	2	16	41	36	**586**
	Weighted Score	***0***	***0***	***0***	***8***	***80***	***246***	***252***	
Staff commitment		0	0	0	4	10	42	38	**584**
	Weighted Score	***0***	***0***	***0***	***16***	***50***	***252***	***266***	
Client attitudes		0	1	2	1	13	35	42	**581**
	Weighted Score	***0***	***2***	***6***	***4***	***65***	***210***	***294***	
Other		0	0	0	0	0	1	2	**20**
	Weighted Score	***0***	***0***	***0***	***0***	***0***	***6***	***14***	

Figure E11: Chart Data for Figure 5.11

5(a). Has or will your library change or experiment with staffing patterns or organisational structures to support access to electronic resources?

Yes	41	40%
No	54	53%
Not stated	7	7%
Total	102	100%

Figure E12: Chart Data for Figure 5.12

5(b). What changes have or will be made?

Types of Changes to Library Structures		
Movement of library within corporate structure	2	5%
Flatter structures	1	2%
Creations of new sub-sections	1	2%
Different/higher staff skills	10	24%
Reduction in staff numbers	3	7%
Increase in staff numbers	7	17%
Upgraded positions	7	17%
Changed duties and tasks	7	17%
Still to be decided	7	17%

Figure E13: Chart Data for Figure 5.13

6. If changes have or will be made to staffing patterns or organisational structures, are they:

Planned as part of overall development	24	56%
Made necessary by introduction of virtual library	9	21%
Both	10	23%
Total	43	100%

Figure E14: Chart Data for Figure 5.14

7(a). In your organisation, is your library:

Single library	50	49%
Network library	49	48%
Not stated	3	3%
Total	102	100%

Figure E15: Chart Data for Figure 5.15

7(b). Does or will the virtual library serve:

Single library	36	42%
Library network	43	50%
Other	7	8%
Total	86	100%

Figure E16: Chart Data for Figure 5.16

8. Approximately how many clients does your library serve?

1-100 clients	30	29%
101-1,000 clients	40	39%
1,000-10,000 clients	16	16%
10,001+ clients	12	12%
Not stated	4	4%
Total	102	100%

Figure E17: Chart Data for Figure 5.17

9. What are the major subject areas your library collects in?

Humanities	7	7%
Social Sciences	48	47%
Science and Technology	44	43%
Not stated	3	3%
Total	102	100%

Figure E18: Chart Data for Figure 5.18

10. How familiar is your library with Australia Online?

Familiar	21	21%
Partially familiar	39	38%
Unfamiliar	38	37%
Not stated	4	4%
Total	102	100%

Figure E19: Chart Data for Figure 6.1

Comparison: virtual library activities by development intentions

Activity	Intending to develop virtual library		Not intending to develop virtual library	
Electronic document delivery	67	81%	4	25%
Access over ownership	51	61%	5	31%
Cooperative development/purchase	49	59%	4	25%
Development of Internet/Intranet site	79	95%	11	69%
Plan for single workstation access	27	33%	0	0%
Other library holdings on OPAC	36	43%	3	19%
Gateway from OPAC	54	65%	2	13%
End-user access to online	58	70%	3	19%
Internet connection	74	89%	8	50%
Client training - Internet	73	88%	9	56%
Client training - Searching	67	81%	8	50%
Electronic journals	60	72%	4	25%
Digitisation project(s)	34	41%	5	31%
Electronic requests by clients	58	70%	6	38%
Electronic full-text	61	73%	6	38%

Figure E20: Chart Data for Figure 6.2

Comparison: level of virtual library development by development intentions

Number of Activities	Intending to develop virtual library		Not intending to develop virtual library	
1 - 5	5	6%	6	38%
6 - 10	23	28%	5	31%
11 - 16	45	54%	2	13%
Not stated	1	1%	3	19%

Figure E21: Chart Data for Figure 6.3

Comparison: virtual library activities by type of library

Virtual library activities	Single Library		Library Network	
Electronic document delivery	35	70%	36	73%
Access over ownership	28	56%	30	61%
Cooperative development/purchase	17	34%	37	76%
Development of Internet/Intranet site	46	92%	45	92%
Plan for single workstation access	14	28%	14	29%
Other library holdings on OPAC	18	36%	21	43%
Gateway from OPAC	26	52%	30	61%
End-user access to online	26	52%	36	73%
Internet connection	39	78%	43	88%
Client training - Internet	38	76%	43	88%
Client training - Searching	26	52%	36	73%
Electronic journals	26	52%	36	73%
Digitisation project(s)	22	44%	15	31%
Electronic requests by clients	26	52%	36	73%
Electronic full-text	28	56%	38	78%

Figure E22: Chart Data for Figure 6.4

Comparison: level of virtual library development by type of library

Number of activities	Single Library		Network Library	
1 - 5	8	16%	3	6%
6 - 10	27	54%	10	20%
11 - 16	14	28%	33	67%
Not stated	1	2%	3	6%

Figure E23: Chart Data for Figure 6.5

Comparison: virtual library activities by subject specialisation

Activities	Humanities		Social Sciences		Sciences and Technology	
Electronic document delivery	3	43%	36	75%	33	75%
Access over ownership	3	43%	28	58%	27	61%
Cooperative development/purchase	0	0%	24	50%	29	66%
Development of Internet/Intranet site	6	86%	46	96%	40	91%
Plan for single workstation access	3	43%	15	31%	9	20%
Other library holdings on OPAC	2	29%	15	31%	22	50%
Gateway from OPAC	4	57%	23	48%	28	64%
End-user access to online	2	29%	30	63%	29	66%
Internet connection	5	71%	41	85%	37	84%
Client training - Internet	3	43%	42	88%	37	84%
Client training - Searching	1	14%	39	81%	36	82%
Electronic journals	3	43%	26	54%	34	77%
Digitisation project(s)	2	29%	23	48%	12	27%
Electronic requests by clients	2	29%	28	58%	32	73%
Electronic full-text	3	43%	32	67%	32	73%

Figure E24: Chart Data for Figure 6.6

Comparison: level of virtual library development by size of client base

Number of activities	1-100 clients		101-1,000 clients		1,001-10,000 clients		10,001+ clients	
1 - 5	3	10%	4	10%	3	19%	1	8%
6 - 10	13	43%	14	35%	5	31%	7	58%
11 - 16	12	40%	22	55%	8	50%	4	33%
Not stated	2	7%	0	0%	0	0%	0	0%

Figure E25: Chart Data for Figure 6.7

Comparison: virtual library activities by subject specialisation

Activities	Humanities		Social Sciences		Sciences and Technology	
Electronic document delivery	3	43%	36	75%	33	75%
Access over ownership	3	43%	28	58%	27	61%
Cooperative development/purchase	0	0%	24	50%	29	66%
Development of Internet/Intranet site	6	86%	46	96%	40	91%
Plan for single workstation access	3	43%	15	31%	9	20%
Other library holdings on OPAC	2	29%	15	31%	22	50%
Gateway from OPAC	4	57%	23	48%	28	64%
End-user access to online	2	29%	30	63%	29	66%
Internet connection	5	71%	41	85%	37	84%
Client training - Internet	3	43%	42	88%	37	84%
Client training - Searching	1	14%	39	81%	36	82%
Electronic journals	3	43%	26	54%	34	77%
Digitisation project(s)	2	29%	23	48%	12	27%
Electronic requests by clients	2	29%	28	58%	32	73%
Electronic full-text	3	43%	32	67%	32	73%

Figure E26: Chart Data for Figure 6.8

Comparison: level of virtual library development by subject specialisation

Number of activities	Humanities		Social Sciences		Science and Technology	
1 - 5	1	14%	6	13%	4	9%
6 - 10	4	57%	21	44%	14	32%
11 - 16	1	14%	21	44%	24	55%
Not stated	1	14%	0	0%	2	5%

Figure E27: Chart Data for Figure 6.9

Comparison: Virtual Library Activities by Level of Familiarity with Australia Online

Activities	Familiar		Partially Familiar		Unfamiliar	
Electronic document delivery	17	81%	27	71%	27	77%
Access over ownership	16	76%	16	42%	24	69%
Cooperative development/purchase	13	62%	21	55%	18	51%
Development of Internet/Intranet site	21	100%	37	97%	32	91%
Plan for single workstation access	11	52%	7	18%	8	23%
Other library holdings on OPAC	6	29%	17	45%	14	40%
Gateway from OPAC	9	43%	22	58%	22	63%
End-user access to online	15	71%	23	61%	22	63%
Internet connection	20	95%	33	87%	29	83%
Client training - Internet	18	86%	33	87%	30	86%
Client training - Searching	17	81%	29	76%	28	80%
Electronic journals	13	62%	26	68%	23	66%
Digitisation project(s)	7	33%	13	34%	15	43%
Electronic requests by clients	12	57%	28	74%	21	60%
Electronic full-text	16	76%	25	66%	24	69%

Figure E28: Chart Data for Figure 6.10

Comparison: Level of Virtual Library Development by Level of Familiarity with Australia Online

Number of activities	Familiar		Partially Familiar		Unfamiliar	
1 - 5	2	10%	5	13%	4	11%
6 - 10	6	29%	17	44%	15	39%
11 - 16	13	62%	16	41%	16	42%
Not stated	0	0%	1	3%	3	8%

Figure E29: Chart Data for Figure 7.1

Comparison of ARL, CAUL and Current Study Results

Virtual Library Activities	ARL Study (1992) *n=74*		CAUL Study (1993) *n=28*		Current Study (1998) *n=98*		Chi-square *p=*
Use of or development of electronic document delivery services	***63***	(85%)	***23***	(82%)	74	(76%)	
Policies, services or reallocation which emphasise access over ownership	***59***	(80%)	25	(89%)	59	(60%)	.002
Participation in cooperative development or purchase of electronic files	***54***	(73%)	23	(82%)	54	(55%)	.007
Participation in the development of a campus-wide information system [1]	***62***	(84%)	22	(79%)	98	(100%)	_
A written plan that states as its goal access to information from a single workstation	***26***	(35%)	9	(32%)	23	(23%)	
Enhancement of the online public access catalogue (OPAC) to include the holdings of other libraries	***60***	(81%)	13	(46%)	39	(40%)	.000
Providing a gateway from the OPAC to other databases or networks, such as the Internet	***53***	(72%)	11	(39%)	57	(58%)	.009
End-user access to online files from on or off campus [1]	***65***	(88%)	23	(82%)	63	(64%)	.001
Connection with the Internet	***69***	(93%)	25	(89%)	84	(86%)	
Training faculty and students: [2]	***64***	(86%)	22	(79%)	-	-	_
in the use of Internet	***44***	(59%)	22	(79%)	84	(86%)	.000
in end-user searching	***55***	(74%)	19	(68%)	77	(79%)	
Subscribing to electronic journals	***36***	(49%)	11	(39%)	64	(65%)	.017
Digitizing of text for electronic storage, retrieval, and/or dissemination	***31***	(42%)	8	(29%)	39	(40%)	
An email front-end that allows users to initiate interlibrary loan and document delivery requests, suggest purchases, or ask reference questions from within the OPAC [3]	***32***	(43%)	9	(32%)	64	(65%)	–
Access to electronic full-text	***49***	(66%)	17	(61%)	69	(70%)	

1 Questions altered for FLIN Survey (1988), as terminology used in academic environment is different from that used in non-academic **sector.**

2 Question omitted from FLIN Survey (1998).

3 Question altered for FLIN Survey (1998) to accommodate advances in technology, and to make it easier for respondents to understand.