



People, Networks, Books: New Strategies For University Academic Information and Service Delivery

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Abstract

An overview of the current influences affecting universities' planning and organisation of learning and research support services. Concludes that many University libraries are in danger of defining their roles too narrowly, and continuing to focus on traditional resources and services, within universities that are often poorly organised to ensure that staff and students receive the services capable of improving learning and research outcomes.

Introduction

This paper originated in late 2003, as a result of some thinking about the possible future organisation of, and services provided by, James Cook University's Academic Support Division. The Division is currently broad in its range of functionalities, which cover libraries, information technologies, academic teaching development, student learning support, student services such as careers advice and counselling, and student administration. Catalysts for reconsideration of strategies included the impending retirements both of myself and the University Librarian, and planning for the reconceptualisation of the main library building on the University's Douglas campus.

In theory, the placement of a wide range of related functions within a single Divisional responsibility allows for a more integrated approach to the organisation of service delivery. While this is so, in practice the very different professional backgrounds and socialisations of staff engaged in different service areas provide challenges to service delivery change which should not be underestimated. Reflection on these issues, from a perspective of thirty-five years of involvement with library services, lead on to a more fundamental re-examination of the objectives for university delivery of services involving a data, information or knowledge component.

Background

Over recent years, there has been an increasing volume of writings focusing one way or another on the 'future of libraries and librarians' (for three of the most thoughtful works, see Sack, 1986, Buckland, 1989 and Crowley, 2001). Apocalyptic visions regarding the library's impending demise have abounded for some decades – after all, it is now 26 years since Wilfred Lancaster's classic article 'Whither libraries? Or Wither Libraries' (Lancaster, 1978) questioned the future of libraries in the face of electronic networking developments.

Since that time, most university librarians, certainly in Australia, would claim that they have adapted well to the pressures of the electronic age, even that they have lead their universities in the change process. But as late as 2001, Scott Carlson's 'The deserted library' article in the Chronicle of Higher Education (Carlson, 2001) was still able to cause some consternation among both university administrators and librarians, in his picture of empty seats and stacks, and declining loan and entry counts, in most U.S. academic libraries. While no conclusive data is available for libraries across Australia, anecdotal evidence suggests that most university libraries have experienced a reduction of in-person use of on-campus libraries, per capita and in many cases in absolute terms. Certainly the CAUL statistics reveal a significant decline in both loans per capita, and provision of general seating per capita, over the decade 1992-2002. This is strongly indicative of a general decline in within-library use. In the very few cases where this trend has stabilised or reversed, it has been through significant investment in library workstations for student general computer access or the opening of a new building permitting improved services and access.

Do we know whether this is good or bad? Some librarians would argue, and in some cases have data to prove it, that library use is greater than ever – it is simply that it has moved from in-house use to online use from home, from work, and from computer access facilities located across campuses. At JCU, for example library server accesses have increased by over 400% from 1999 to 2004. Most Australian university libraries have moved very swiftly, both individually and in consortia, from an all-print serials collection ten years ago, to a situation in which around 85% of serials acquired are electronic (with over 95% of these acquired in aggregations). Almost certainly, this has improved the breadth and speed of staff and student access to the journal literature, particularly in smaller and regionally located universities previously unable to subscribe to a large range of print titles.

Much has been made of the supposed role of the university library as an 'information commons' since the establishment of the University of Iowa's 'Information Arcade' in 1992, and the University of Southern California's use of the term in 1994 in opening its Leavey Library for undergraduates. Yet most implementations consist simply of installation of general access workstations within cleared areas of existing library buildings, and hardly represent a conceptual breakthrough. What *is* important however, is that the concept reinforces the University's need for a 'commons', i.e. a place of open and equal access to information resources and services for all students and staff (and perhaps the local community), as much in the electronic era as with the print-based library in the past.

Information commons are now being seen as just one example of a spectrum of 'Collaborative facilities' (Collaborative, 2004) which may include functions that were once seen as separate, in purpose, and/or as organisation units, such as libraries, information technology support, multimedia production, distance education, academic development, student learning support, etc. To suggest that a 'collaborative facility' is something new is an indictment of the working relationships between many such units in the past. However, again it reinforces an important message – that the future of the academic library lies in how well it meshes with a whole range of related services. Libraries do not exist separate from their universities.

And yet, if one walks into an Australian university library building, one is struck by how little has changed over the past 30 years. Yes, there are more computers everywhere, seemingly fully occupied by students at all times. But the buildings still have large ranges of print collection stacks, large numbers of individual student study carrels, reference desks (if under different names), and staff largely dedicated to processing of print volumes, and individual in-person service. Why is this so? Should it be so? (In passing, it is interesting to speculate why university libraries have been *allowed* by senior university managements to remain so little changed, given the clear evidence that very few academic staff now use library buildings for research or teaching support. This may be about to change, as younger academics, brought up on electronic services, move into senior management positions. But libraries also remain as tangible symbols demonstrating a university's belief in the value of learning for its own stake. This should not be under-estimated, and it has the danger of influencing libraries not to respond fast enough to the changing needs of their institutions).

In all our busyness, and in our fascination with the power of the computer and the network, are we in danger of missing the main game? Do we agree with the conclusion in the 2003 OCLC Environmental Scan (OCLC, 2004a) that

"One trend evident in this scan was that for at least ten years, ... bright people have been writing and speaking eloquently about possible futures. Yet, not much has fundamentally changed" (p104).

"At the risk of trivialising and over-simplifying decades of innovation, commitment and hard work ... what's been done has been done in a closed shop, using our own architects and consultants, with little direct assistance for our primary constituents, the information consumers. One result? Information Consumer is hanging out at the Information Mall with Google" (p 96).

In this context, is it justified that university library budgets have declined steadily over the past 30 years as a proportion of their own institutions' total expenditure? How close are university libraries to being perceived as a minor, and possibly largely irrelevant, university service? And are our current responses merely defensive moves to protect traditional ways of working for library staff, rather than real attempts to provide added value to research and learning outcomes? Are we able to demonstrate that our libraries *do* add value to those outcomes – value that is not obtained in other ways – a recent summary by the ARL Learning Outcomes Working Group gives us cause to doubt (Young, 2003).

To pursue these questions, I believe we need to look outside the library, to review the emerging research and learning needs of universities, and to disaggregate some of the functions traditionally offered by 'libraries'.

Universities

We need to be clear what universities are *for*. Like all organisations, they are aggregators of people in pursuit of common purposes. To quote Van Houweling (1994)

"Universities assemble people together in the creation of new knowledge and the transmission of previously developed knowledge".

Even if this describes a limited view of the learning process, as constructivists would contend, it does focus us on the key needs of a university for effective physical and organisational arrangements which:

- Maximise research outcomes

and

- Maximise learning outcomes, including those achieved through the facilitation of teaching approaches, as well as the facilitation of learning opportunities - as with a University library, teaching is also a means to an end, not an end in itself.

At a university level, these basic goals have changed very little over the past century, it being accepted that all universities, at least in Australia, are involved in both teaching and research.

What has changed, however, is the composition and character of both academic staff and students, and the expectations of outcomes from the Australian university experience, changes which have recently been summarised by Peacock (2004).

Staff and Students

Academic staff have taken on significantly heavier teaching loads. They spend more time in the bureaucracy of seeking research funds. They are generally older before obtaining tenure. They simply have less time for information seeking activities. At the same time, the nature of their research has been changing, with more cross-disciplinary work, and an increasing use of technology, particularly information technology.

Student bodies have become more diverse, with differing needs. Australian universities have taken on an increasing number of international students. More students have physical and learning disabilities. 'On-campus' students are located over a larger number of campuses, both on- and off-shore. 'On-campus' students have become progressively 'time-poor' as many older students combine study with work and family commitments. For

economic reasons, even 'full-time' students are increasingly working for income for many hours each week. And a slowly increasing proportion of students are studying through various forms of 'distance education', or through 'mixed-mode' delivery which combines both on- and off-campus study.

While 'lifelong learning' is still more of a goal than a reality, it is nevertheless the case that more students are commencing university studies in one institution, and finishing (with or without formal articulation arrangements) in another; and that more people are undertaking more than one university-level qualification, often in a mixture of delivery modes, as their personal circumstances and preferences change.

Technology

A further key driver of change has been technological development. Its impact on information management has been dramatic. The initial impact in libraries was in improving the efficiency of processing operations, such as cataloguing and loans. But over the past decade, the growth of digital objects accessible remotely via communication networks has led to all universities being able to offer their students and staff a vastly greater store of material relevant to their learning, teaching or research. Very suddenly, we have moved, particularly in smaller and regional universities, from an information scarcity, on which most of our library policies and procedures were based, to information glut, in which the key is how to navigate effectively through the torrent – with and without assistance. Less obvious is the increase in *speed* with which people can scan a large number of digital objects to assess their relevance to the task in hand. This combination of access range and speed puts in the hands of any first-year student with the requisite skills a far greater 'library' than an academic teacher had available a generation ago.

More slowly, information technology has started to impact both on university teaching itself, and on the nature of university research.

The obvious initial impact on teaching has been to increase the reach of traditional teaching – via video-conferencing (and more recently audio/video streaming), by online-delivery of course materials, through online assessments, and individual teacher-student interactions via email, 'chat', etc.

Learning Modes

But technological options have also been combined with some more radical re-thinking of approaches to adult learning, through a series of influences. These include theoretical advances in the understanding of learning, and in particular constructivist views on the ways in which learning takes place; the pragmatic views of graduate employers, now supported by government policies, regarding the need for generic graduate skills; lifelong learning and career development requirements including new delivery modes, problem-based approaches, independent learning schedules, and group-interaction skills; and finally a range of interactive learning opportunities, simulations, virtual realities, and simply resource-rich experiences that are only beginning to impact on most teaching and learning. In most Australian universities the constraints on these developments are still strong. Very few campuses have extensive wireless coverage for access, both within and without classrooms. Few have all their classrooms fitted with the network connections and bandwidth, wall video screens and smart board/smart tablet facilities that allow teachers to bring resource richness into a 'classroom' setting. Even with recent advances in compression, universities are only beginning

to be able to deliver higher bandwidth applications to students off-campus, through audio and video-streaming. And few teaching staff yet have the skills to incorporate digital resources in 'teaching; whether in traditional synchronous or asynchronous modes. But because the implementations are at present few, we should beware of ignoring their potential impact on teaching and learning.

Much progress has been made in the understanding of how adults learn. Stimulants to learning come from interactions with ideas in texts, audio and visual forms, through repetition of tasks (i.e. by 'doing'), through interactions with other people, by observation of the everyday world, and by mental reflection. University planning must aim to optimise the opportunities for these experiences. And while much university focus used to be on 'learning' of a disciplinary area, students today are faced also with needing to acquire a range of 'generic' skills such as problem solving, group interaction, information literacy and IT use, presenting a range of issues relating to organisational responsibilities.

The trend to 'learner-centred' and 'knowledge-centred' approaches seems to me to be inevitable. It is supported by increasing opportunity, combining the increase in range of accessible materials, the speed of access and manipulation, and range of service delivery to the student.

Research Dissemination

In research, a revolution has also been going on. Initially, email merely speeded up the 'invisible college' of contacts between leading researchers in a field. Then some disciplines, such as high energy physics and economics developed repositories of 'pre-prints', 'working papers' and the like, which allowed for faster and broader dissemination of the early results of research than was possible through the formal journal literature.

The simultaneous spread of electronic metadata (in the form of databases) relating to research results, in both peer-reviewed journals and public sector 'research reports' rapidly increased the visibility of research to students (as 'neophyte researchers'), but was unable to have a significant impact on study or research methodology – until very recently when links from the metadata to the underlying digital 'full-text' made it feasible to scan a much wider range of works in a reasonable timeframe.

Even less visible to most students and researchers has been the construction of vast repositories of original research datasets, from astronomy to mining, awaiting means of convenient identification, location, access and manipulation tools. But once again, the combined power of digital data and high-speed networking has begun to spawn the standards and the tools to facilitate more general access for study and research. The emerging 'e-science' and 'e-research' developments (fuelled by tools such as the San Diego Supercomputing Center's Storage Resource Broker framework (Moore, 2004), the Globus Alliance toolkit (Globus, 2004) and the Open Grid Services Architecture (OGSA, 2004) seem likely not only to require university information intermediary focus on this area, but to result in quite new research approaches in analysing and cross-matching distributed data sets. And still invisible to many researchers and students is the vast amount of digital materials relevant to academic work becoming available through the combined efforts of universities, and the assistance of philanthropic organisations. Some of this has been in response to what is being argued as predatory pricing behaviour by major commercial journal publishers. But it is also being driven simply by the development

of affordable approaches to digitisation of texts and object representations. These repositories include for example:

- Commercial electronic Journal aggregations – such as ProQuest, ScienceDirect and Infotrac. On a consortium and generally individual library lease basis, these have led to significant increases in journal access (for example, current serial titles in Australian/New Zealand university libraries increased from 396,000 in 1992 to 1,500,000 in 2002 - of which 80% were part of electronic journal aggregations).
- Commercial and non-commercial digitisations of 'back-runs' of important journals (for example, the JStor collections, Chadwyck-Healey collections, and the US National Library of Medicine's PubMed Central).
- Repositories of (mainly) freely available, out-of-copyright books (for example through Project Gutenberg, the Million Book Project, and Blackmask).
- Institutional repositories being constructed in many universities, generally including staff e-prints, theses, still and moving images, and increasingly linked by metadata harvestable through the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and made visible through services such as OAIster.
- Discipline-based repositories such as arXiv and CogPrints
- Previously unobtainable books made available through 'On-demand' providers (for example University of Sydney Press and Lightning Source - which has already produced over 200,000 titles) - or through 'coursepack' providers such as Xanadu.
- Personal repositories being constructed by students, family historians, academics and individuals more generally – in the form of ePortfolios, Weblogs and "personal archives", and collaborative repositories such as Wikis. Some of these are becoming both important, and more visible through syndication software such as RSS and Atom.
- 'Learning object' repositories constructed with the aim that objects created for one learning purpose can be reused in a formal learning situation in another institution or at another time (for example MERLOT in the US, and CAREO in Canada).
- Image aggregators, for both still images (for example Corbis Education and Photos.com) and for moving images (such as those available through the Moving Image Collections project on behalf of the National Science Digital Library and the UK Moving Images Gateway).
- 'Resource Lists' for material brought together to support a university course, usually held in 'e-reserve' modules of library management systems, or in a course management system such as WebCT or Blackboard.
- Commercial 'e-book' suppliers – a very varied group, including Amazon's subset of about 250,000 full-text-searchable titles, NetLibrary's 40,000 titles focussing on business and IT, and Questia's 500,000 items aimed at undergraduate students in the humanities and social sciences.
- ListServ and newsgroup archives

All of these developments present some medium-term challenges of access. But we can, I think, reasonably predict that within a decade:

- A very high proportion of those texts (books and journals) considered as significant for academic work will be accessible online, and/or available as print-on-demand.

- A very large volume of images will be accessible
- A significant volume of previously invisible reports, e-prints, and visual representations will be accessible through institutional repositories
- 'Learning object' repositories will have grown, but re-use in a formal learning situation may still be limited (see differing views in Downes 2004 and Metros 2004)
- A significant volume of 'personal' information of 'early alert' value will be accessible

For the short-term, many of these 'newly digital' sources present a significant problem for university services, in that they are not easily visible through search engines, and represent part of the 'deep web' which requires specialist knowledge and indexes to retrieve. As the OCLC Scan (OCLC, 2004a) has pointed out:

"The indisputable fact is that information and content on this open Web is far easier and convenient to access than is information and content in libraries, virtual or physical".

But this may be temporary. Already we have a series of initiatives by major search engines such as Google and Yahoo to cover areas of the 'research' resources – Google's coverage of the CrossRef journals (Cross Ref, 2004), and agreements with OCLC (OCLC, 2004b) and the D-Space institutions (Young, 2004), and Yahoo's recent arrangements with the US National Science, Technology, Engineering, Mathematics and Education Library (NSDL, 2004), the Library of Congress, OAIster (Hodges, 2004) and others under their new Content Acquisition Program.

Library or University Response?

In the face of this wave of change impacting, or about to impact, on university research and teaching, how should universities respond? If we were establishing a new university, or a new campus today, would we establish a library service? Would we construct a library building? This seems most unlikely. Any building now constructed should be a 'collaborative facility' with co-location of a range of information, learning support and other student services. (The recent design intentions for the University of Sydney's proposed 'Central Building', adjacent to the present Fisher Library to contain 14 existing student services, consolidation of seven science and technology library collections, and generous 'retail space' seems likely to create a landmark development in Australia).

But the key to collaborative facility success is not co-location, but the total re-design of service delivery within an integrated university approach.

To quote Billings (2003):

"It would be folly to imagine that the academic library will develop over the next decade as a purely natural progression from the library of today".

User Behaviour

There is a large literature on information-seeking behaviour and on customer service. It is however summed up well by Forsha (1992):

"People want what they want when they want it. They don't want something else, they don't want less than they want, and they certainly don't want it at some other time."

It is hardly surprising then that our clientele will expect support services which:

- Are known and trusted (as demonstrated in recent research by the Council of Library and Information Resources)
- Are convenient to use through the person's favoured access channel – which may be electronic, in-person, or through mobile phones.
- Are available 24x7 hours per week
- Provide contextual help at the time of need
- Are quick to respond, with minimum referral, and an appropriate sufficiency of advice or information

In his excellent book on 'Libraries in the 21st Century', Brophy (2001) has summarised the characteristics needed for quality library service as being:

- | | |
|---------------------|---------------------|
| ▪ Performance | ▪ Currency |
| ▪ Range of features | ▪ Serviceability |
| ▪ Conformance | ▪ Accountability |
| ▪ Durability | ▪ Perceived quality |

but notes, as did Orr (1973) in his classic work 'Measuring the goodness of Library Services', that none of these measures provide an assessment of the ultimate **impact** of library services on learning or research outcomes.

We can build our service design around these recognised findings. But as librarians have long known, the best services give **more** than the customer expects – through stimulation of the unexpected learning that comes through serendipity, and unplanned beneficial interactions with services, people and resources.

At a university planning level, the challenges are many; but cluster around:

- Providing effective learning experiences for students who spend relatively less time on campus, who require services remotely from the locations of both academic staff, and skilled support staff such as librarians, and who are faced with acquiring more generic skills, using a greater range of technology and an increasing variety of information resources.
- Providing effective teaching and research support for academic staff, who are under increasing time pressures, are often themselves remote from skilled support staff, often lack technological and information management skills, and are often unaware of or ineffective in accessing the greater range of relevant research and teaching materials becoming available electronically.

In both cases, we are also faced with increased user expectations about the speed and effectiveness of service delivery, given the focus on service improvement throughout the public and private sectors. These challenges are greater for existing, well-established institutions. In the words of the apocryphal Irish farmer, "If I wanted to go to there, I wouldn't start from here". A contemporary new university design for the most effective delivery of learning and research outcomes would almost certainly look quite different from any of today's Australian universities – faced as they are with retrofitting redesigned services into an existing physical and organisational infrastructure.

Principles for Redesign

But we can, I believe, draw out some general principles which might guide that re-design.

Organisation

Clearly librarians do not today have the skill sets needed to provide the whole range of pedagogic and technological support needed for learning, teaching and research. If these services are to be planned and delivered in an integrated way, then the staff involved should be located and organised so they have on-going interaction with each other. This is most easily done within a single organisational unit, but if that is not possible, then cross-unit collaborative arrangements and resource allocations need to be evolved, and use of the same social spaces encouraged for informal discussion. Web sites and directions need also to be designed collaboratively so that any gaps arising from organisational separation are minimised.

In most universities, a Pro-Vice-Chancellor or Deputy Vice-Chancellor responsibility covering at the least, teaching and learning support, library services, information technologies support, career support, and publishing/print/copying services is likely to be an advantage.

Library Responses

There have been some excellent responses to these challenges by some Australian librarians. The University of Queensland's planning of its 'Cybrary' (Schmidt, 1999) was particularly thorough in delineating the types of services and study spaces needed, and how these might best be spatially and electronically related. More recently Bundy (2004b) has summarised the facilities underlying successful service in recent Australian and New Zealand university and public libraries.

But few universities have yet created the opportunity, now available to the University of Sydney, to embark on a wider service integration approach. In a recent wide-ranging study of new U.S. higher education libraries, Bennett (2003) has argued that recent library design has not been adequately informed about changing modes of student learning and academic teaching – to which I would add, research. Bennett argues strongly for the creation of 'learning commons' as mechanisms for 'collaborative learning', as flexible spaces highly adaptive to changing student needs and preferences.

This superficially attractive argument presents some real problems of practical implementation.

University Responses

We need somehow to meld the likely university and library responses to the current challenges.

At university level, the concentration is likely to be on physical client service integration, while libraries are more likely to focus on integration of access to information resources. At both levels, experience suggests that the learning requirements of students may fall through the gaps, and particularly so for students who are remote (in distance and/or time availability) from a well-provisioned campus.

A successful planning response is more likely to be achieved through concentrating on two principles, which disaggregate the university's roles as physical structure, and as service:

- Any **physical** facility is likely to be successful if it is conveniently located, and offers an attractive integrated range

of related and reliable services which save time for people.

- Any **virtual** service is likely to be successful if it is highly visible through the Web, quick and simple to use, and provides reliable and trustworthy responses.

Physical Space Considerations

Given the above background, I consider that the critical focus for University re-design is to create whole campuses that support learning, **within which** collaborative and complementary facilities which include a strong information resources role play a major part.

The 'library' building as a collaborative facility (and 'information commons' open to all in the university and its chosen wider community) would then concentrate on maximising learning opportunities through:

- A landmark design, acting as a symbol of investment in learning.
- A highly visible location convenient to access by walking, by cycling and by vehicle.
- A range of services sufficient to optimise the benefits of staff interaction through co-location, minimise unnecessary referral, and maximise the saving of time of building users.
- Facilities which provide reasons for people to visit the building other than for information resource provision (which in most cases would be better provided remotely and electronically). These may include theatres for audio and visual presentations, rooms for formal and informal gatherings, galleries for changing displays, and cafes.

Essentially this first group of facilities is designed to 'engage' and thus maximise the use of the building (or linked buildings), through attraction and service aggregation. (A key issue is whether an appropriate mix can be designed to attract academic staff, as well as students. More attention may need to be given to refining the idea of the 'Scholars Centre', as exemplified by the University of Western Australia). Once people are attracted into the building, the focus must be on maximising learning. This is likely to require:

- A highly visible and encouraging 'inquiry service interaction' zone to include a 'one-stop' service area, with multi-skilled people, with specialist expertise reasonably co-located to minimise 'referral loss'.
- A 'computer interaction' zone for access to all online services, supported by identifiable and mobile staff providing front-line IT and information search support. (This zone includes proved workstations, 'plug and play' facilities for laptops, while the whole building provides wireless access. Available software would include wordprocessing, presentation, spreadsheet, media production, etc.)
- A 'stimulation' zone through which all or most users need to pass, to contain displays, exemplars of collection objects, art works, wall TV screens etc. designed to:
 - Provide unexpected learnings
 - Promote services or resourcesWall spaces throughout the building can extend this concept.
- 'Reflection' zones, which provide quite, informal spaces within which individuals can learn through reading, or simply through thinking without disturbance.
- 'Group interaction' zones, through which students, or students/staff can work together on common problems or projects. Such areas need interactive computing support such as

wall screens, smart boards, tablets – and also access grids allowing remote individuals to interact with the group.

- Careful interpositioning of 'collection zones' of physical texts with traffic and study areas to maximise opportunities for serendipitous interaction of people with works.
- 'Teaching' zones where formal instruction can take place, fully equipped with network access and technological support. These zones need to be more numerous than in most current library buildings, given the extent of generic skills development needed by students and staff in order to interact effectively with the greater range of information resources and technologies. 'Information literacy', in the broadest sense of the term, is a key to an individual's future ability to learn.
- A 'supplies' zone, providing the range of facilities needed to support inputs to and outputs from learning – textbooks, writing implements, paper, photocopying, printing, transparencies, CDROMS/DVDs, etc.
- 'Self-service' zones aimed to minimise routine transaction times – borrowing and return of books, photocopying, printing.
- 'Informal interaction' zones, including a café, where people meet and can talk about issues informally, learning from each other in the process, as well as conveniently refuelling to sustain a state of high mental energy.

As many physical services as possible should be available at all times of the day and night, e.g. external book returns, computer interaction, and some study spaces, in order to maximise access for people mixing study and research with other priorities.

Virtual Service Considerations

Complex though future campus physical design has become, it is the organisation of **overall service** which presents the greater present challenge. Within a very short period, we can assume that a university's clientele will be 'always connectable' via mobile data phones, PDAs and wireless-enhanced computers. Given the extra speed and convenience advantages of remote access to information resources, and to a lesser extent, to people-based services, and the increasing time pressures on students and staff, universities (and particularly their information-oriented services) need to plan as if all customers were primarily remotely located, while choosing to be 'on-campus' for services only where there are clear advantages (as, for example, for social interaction, stimulation, and perhaps, reflection in 'quiet space' away from work, friends and family).

As well as providing electronically initiated self-service facilities, university design needs to proceed from an analysis of the total life cycle of learning requirements for students, from their first consideration of study prior to enrolment, to the university's objective for them as alumni and 'lifelong learners'; and for staff, from prospective job application to potential post-retirement bequestor. There is not space here to conduct such an overall analysis, but from the perspective of a librarian, the analysis can provide some pointers:

- Given the time pressures on staff and students, service improvements are likely to come from:
 - Visible and well-described entries to 'one-stop help' services in external and internal directories, on the university web, in portals, and in appropriate external discipline and higher education web sites.
 - Contextual links to 'help' services from all appropriate web pages, where assistance may be needed. These links

may be to 'FAQ' web-based assistance, 'mini-tutorials', email and chat, and 'virtual librarian' services.

- o Organisation of university 'help' services, as far as possible, as 'one-stop' facilities, with back-up referral as necessary – accessible by phone, fax, email and on-line.
- o Carefully targeted services which 'alert' individuals to relevant new information. These are likely to include commercial services, RSS summaries, newsletters, and newsgroup feeds. They can be provided through personal channels on web portals, driven by personal profiles.
- Given the rapid change to 'information glut' for both students and academic staff, and moves towards more independent and problem-based learning for students, the information access requirements of both groups are becoming more similar. Effectively, undergraduates are becoming 'neophyte researchers'. Both groups' needs require much more attention to the design of university web interfaces which can facilitate easy navigation through the maze of electronically accessible resources.
 - o For students, a key will be how well the interfaces from each subject and course present a layered framework of links to 'required' readings, to works recommended by teachers for further exploration, and to gateways/search engines most useful to the study area concerned. There is much research on more effective linking between online learning and library functions within the concept of the Virtual Learning Environments, summarised in recent reports by McLean (2004), Markland (2003) and Hoebelheinrich (2004). As content value declines in the abundance, so does the value of context increase. As noted above, contextual 'help' will be important – to FAQs and through to librarians supported by further collaborative arrangements covering extended hours each day, backed up by 'Ask a Librarian' services.
 - o From a teaching perspective, as the 'networked classrooms' and mobile computing infrastructure comes into place, the possibilities of drawing a much richer range of 'research' resources into the teaching process expand rapidly. We need to be in a position to take advantage of current developments designed to provide effective linkages between repositories, web resources and online learning systems (Johnston, 2001, Flecker, 2004, Formadley, 2004, Yee, 2003).
 - o For researchers, a critical service will be how well the university can provide interfaces which can guide and simplify the linkages to the increasing range of accessible material. This is non-trivial, with a vast amount of current experimentation and standards development aimed at improving gateways, search engines, and metadata for later search and for harvesting (e.g. through the Open Archives Initiative Protocol for Metadata Harvesting) across distributed repositories. While we are some years from providing anything like what is needed, in the form of the Semantic Web (Anderson, 2004), a significant ongoing effort is needed both within our individual universities, and in collaborative efforts such as AARLIN, to simplify the paths through the current maze. Both 'institutional' and 'library' portals will be of major assistance (Lakos, 2000).

Absent from most Australian university libraries' current developments are efforts to improve research access to datasets. An increasing number of journal articles and reports have links to the primary data supporting the research conclusions. But the concept of Grid computing rests on

the ability of researchers to manipulate related data held in datasets distributed across many institutions. As noted above, some significant advances have been made recently in constructing dataset standards and frameworks. Because much of the research in this area has been carried out on a subject discipline basis, Australian university libraries have tended to have little involvement to date. But as Hey (2004) and Messerschmitt (2003) have pointed out, a strong future library involvement is needed. With a proposal for a national initiative now before DEST's National Research Infrastructure Taskforce (Distributed, 2004), an opportunity is here for more involvement by librarians.

Too few libraries have given attention to the full range of services needed for research support. A university needs not only to provide access to the equipment and information resources from which new insights can be developed, but also to support the necessary corollaries to discovery – organisation, promotion and dissemination of research findings. Given the extent of publication changes outlined above, every university needs to provide publishing support facilities. All require flexible bibliographic capture and management functions. For 'coursework' students this is likely to be in the form of electronic-portfolio support, which provides evidence of assessed student work for career and employment purposes, and the availability of word processing, presentation and simple bibliographic software supporting classroom presentations and essay/report writing. For postgraduate research and staff, the requirements are more complex, and include local (or possibly collaborative) e-print, e-thesis, and e-press repository/access/archive capabilities, together with the advisory services needed by researchers for choosing and using the most appropriate publishing channels, and dealing with intellectual property issues.

Very few libraries seem to have adjusted to the changes in availability of **books**, both in the form of freely-available electronic formats, and as print and electronic formats easily and quickly (but not necessarily cheaply!) available from commercial suppliers. Library resources are still concentrated on acquisition and cataloguing of **owned** material, rather than providing the full range of options for book access. It is for potential users to determine appropriate balance of costs against delay for their particular requirements.

Finally, libraries have generally ignored the key role that **people** play as information resources. Directory services in most universities are underdeveloped, local subject gateways rarely highlight people-finding facilities, and there are several emerging web services providing better access to individuals of both research and teaching relevance – for example, Community of Science, Friend of a Friend, Faculty Finder and MERLOT Virtual Speaker.

James Cook University Responses

In response to this agenda, James Cook University has been trying to make progress in addressing the need to reconceptualise the main buildings from which library services have traditionally been offered; and to put in place the infrastructure which would gradually enable staff and students to interact easily with the increasing range of 'research' (or 'learning')

resources becoming relevant and available for research, teaching and learning.

Many other universities are ahead of us. Our solutions are particular to our own organisation, physical and resource constraints, and scale of operation. But they may be useful pointers for other institutions.

- We have a single Division with organisational responsibilities covering IT, library and information services, teaching development, learning support, careers support, counselling, and student administration.
- For the library building, we have been proceeding and/or are planning to:
 - o Co-locate library, IT user support, student learning support, academic staff development, and student administration.
 - o Increase workstations, wireless access and 'plug and play' areas for mobile computing
 - o Remove a high proportion of the existing print collection to storage or discard
 - o Continue the addition and substitution of electronic access for collected print current journals
 - o Move to collaborative 'help' services across the whole range of information, IT and student support enquiries
- For integrated access to resources for learning, teaching and research, we have:
 - o Established an Academic Information Resources Access working group
 - o Developed an Information Access Framework for academic resources
 - o Templated and prioritised all projects within the Framework e.g. Course materials, e-theses, e-prints, images, library management system, AARLIN etc.
 - o Plans and funding submissions for institutional repository facilities, within a broader JCU research promotion and access structure.

Conclusions

The array of challenges for universities, their libraries, and the whole array of staff engaged in providing learning and research support, is daunting. Over the next decade, library managers and their staff are going to have to adapt significantly. They need to extend the boundaries of the concept of the library, work in more effective collaboration with a wider range of other university staff and organisational units, take difficult decisions about service priorities, and most importantly, as Bundy (2004a) has recently argued cogently and convincingly, see themselves in educational rather than informational terms.

It is tempting to believe that for historical reasons, universities will always have organisations recognisable as libraries. That assumption is about to be tested. In the words of Roy Tennant (1999):

"The game has changed. We face an array of possibilities and challenges that will leave no library untouched. We are, whether we want to or not, about to become much more than we are now – or much less."

Libraries remain trusted institutions. Their librarians have many of the skills needed to provide the 'glue' for the new learning and research management systems to become rich resources for staff and students. They **must** lead their institutions in the collaborative

efforts needed to achieve this goal, as active designers, not as passive receivers of information queries.

Key Words universities, services, integration, learning, research.

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