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## **Refereed Paper**

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#### **Biography**

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## **An evaluation of the information architectural qualities of Australian library websites**

### **Abstract**

Various instruments have been employed to evaluate the effectiveness of library websites over the past decade, but more sophisticated assessment is now possible following the development of the Information Architecture (IA) profession and its guidelines, derived from a substantial body of usability research. At the heart of good IA practice are principles governing the organisation of information, with which librarians should be amply conversant. Indeed, librarians should provide leadership in this area, not least through the design and management of their own websites and digital libraries.

## Introduction

Libraries began launching websites almost as soon as the Web came into existence, and began discussing their design soon after (Garlock and Piontek, for instance, published their guide to library website design in 1996). With design enhancements, came evaluation. As library websites added more features and services, so their evaluations became more complicated, and it was not long before Library and Information Science (LIS) academics and practitioners started to discuss how library websites (and websites in general) should be evaluated. Clearly, evaluation should be based on the objectives of each particular website, and these will vary, but there is likely to be a fair amount of overlap, with many basic objectives common to most library websites.

Many libraries have long recognised that their website can be a very effective means of marketing their services. The website can also, of course, become a very important deliverer of a library's services. Nowadays, it may offer remote users many of the services offered to physical visitors, and perhaps some services that are only available to remote users. As Maquignaz and Miller (2002, p. 343) declare, 'A Library's World Wide Web presence is a significant client interface and virtual service point.' It is therefore likely that libraries will want their websites to reach out to new users and facilitate more effective use of their services by existing users. These objectives will be met partly through improved content, but also through better *information architecture* (IA). This has been demonstrated on several occasions, for

instance by Gullikson, Blades, Bragdon, and McKibbin (1999) in relation to academic websites; by Giannini (2001), in his comparison of information seeking in physical and virtual library environments where a more thorough implementation of IA principles would have significantly improved outcomes for both physical and virtual library users; and by Moyo and Nixon (2002) who also looked at information seeking on academic library websites. The information architecture of library websites, and their digital library relatives, may be supposed to be particularly important in comparison with some other types of website, given that the business of libraries is very much focused on information (as opposed to, say, entertainment). For the purposes of this paper, IA is defined broadly, as 'the structured design of shared information environments' (Information Architecture Institute, 2006).

Since these studies, other librarians have discussed the value of various information architectural principles, either explicitly or implicitly, in the design of their websites. However, this does not mean that they have always given IA principles the consideration they deserve, nor does it mean that they have necessarily utilised the advances made in the emerging field of IA. While some librarians now talk about the 'information architecture' of their websites and digital libraries, and recognise the potential synergies between IA and LIS, it is not clear whether the average library website is now designed with contemporary IA principles and guidelines firmly in view. This question has not been much investigated, although Harpel-Burke

(2005) has recently examined the IA of websites from medium-sized universities, using the criteria set out by Nielsen and Tahir (2001), and found that they fared quite well in comparison with a sample of business sites.

The literature on library website evaluation, although significant, represents only a small proportion of library websites. Of course, this does not imply that the remaining websites have not been evaluated, and one hopes that most, if not all, are 'upgraded' following systematic assessment exercises. However, even when library websites have been evaluated, this would not necessarily have been based on contemporary IA guidelines. Some evaluation instruments have IA or 'usability' as one criterion amongst many (see e.g. Chao, 2002), affording little expansion, while other instruments employed specifically for 'usability testing' where end-users provide feedback, usually after performing certain set tasks, are still not always underpinned by established IA heuristics. Although information architects strongly advocate usability testing and have contributed to its development, they also recommend a range of methods be used to evaluate websites, including usability inspections by experts. Such inspections are based on checklists, or sets of IA heuristics. These criteria provide an indication of how the information architecture of a site might be improved. (For a helpful summary of assessment methods, see Gore & Hirsh, 2003, p. 24.) Many evaluations of library websites have focused on user feedback (e.g. Maquignaz & Miller, 2002; Robins & Kelsey, 2002), especially in terms of user satisfaction, but it needs to be

recognised that users may not be aware of the potential for a better experience in the same way as are IA experts.

Examples of evaluations of digital libraries and library websites which have incorporated various IA heuristics, apart from those of Moyo and Nixon (2002) and Harpel-Burke (2005) mentioned above, include those reported by McGillis and Toms (2001), Donaldson, Foo, and Nixon (2002), Raward (2003) and Snead, Bertot, Jaeger, and McClure (2005). Whereas the other three evaluations in this list are mainly based on usability testing, Raward employed a 'Usability Index Checklist' designed for a single inspection. The assessment instruments used have quite often been adapted for particular library contexts, such as that of academic libraries (e.g. McGillis & Toms, 2001; Donaldson, Foo, & Nixon, 2002; Raward, 2003).

While elements of IA have been introduced into LIS curricula (Zhang, 2002), there has been relatively little mention in the LIS literature of key IA texts, such as those by Rosenfeld and Morville (2002), Krug (2000) and Reiss (2000), and well-known IA guidelines and checklists, such as those compiled by Nielsen (1994), Keevil (1998), Lynch and Horton (2002), and IBM (n.d.). Again, this does not necessarily mean that librarians are ignoring IA principles when they design and redesign their websites, but one wonders why there has been relatively little reporting of new websites being designed according to explicit IA standards. Certainly, the general concepts have been discussed by many librarians. Along with information architecture, usability is considered key, in a way, perhaps, that user-friendliness was a decade ago,

and the primacy of user experience is now beginning to take hold. While information architects may argue as to whether usability and user experience are synonymous with IA, it is clear that they are closely related concepts. As Jennifer Vodvarka (2000, p. 8) puts it, user experience and information architecture 'go together like peanut butter and jelly.' However, discussion as to what makes for an optimal user experience according to best IA practice is much rarer. An exception is Swanson's advocacy (2001) for IA-based design where he argues that while users visit library websites for information, it is their IA that makes them successful. He redesigned his library's website according to the guidance provided by Rosenfeld and Morville (2002). Other advocates for greater use of IA standards include Donaldson et al. (2002), and Harpel-Burke (2005), whose papers are mentioned above.

While previous studies have tended to focus on the IA of academic library websites from the United States, the study described in this paper investigates how the IA of Australian libraries in general are measuring up at the present time, according to two sets of heuristics developed by information architects.

### **Methodology**

The IA of the websites of twenty Australian libraries, and, by way of comparison, the websites of ten Australian retail stores, was evaluated according to two published sets of heuristics, namely those constructed by Nielsen (1994) and the Australian

Each heuristic in both the Nielsen and AGIMO sets was assigned a rating from 1 to 5, based on an adaptation of Nielsen's severity rating system (1995) as below.

Government Information Management Office (AGIMO; 2004). These heuristics focus on the IA and usability of websites, rather than other aspects, such as graphic design, or the processes involved in website design. While AGIMO has in fact published several 'checklists' covering various aspects of IA; it was the 'website navigation' checklist that was used in this study, due to its emphasis on product rather than process.

Jakob Nielsen's set consists of ten criteria. While the AGIMO set of eleven points has been reduced to ten for the purposes of this study, as the first point was really only directly applicable to Australian government agencies. Both sets are published on the World Wide Web. There is a fair amount of overlap between the two sets, as one might expect, although Nielsen's heuristics are, in the main, a little more abstract. The AGIMO list is intended primarily for use by Australian government agencies, but is considered to be applicable to websites in general. The twenty heuristics from the two lists are included in table 3.

The heuristics formed the basis of a usability inspection, which aimed to provide an indication of the websites' overall user experience. Nielsen recommends that three or more evaluators conduct such an inspection, but only two were available for this study. Given that Nielsen estimates that three independent inspections would find 75% of usability problems, it may be supposed that two inspections would find at least half.

5 =	No usability problem at all
4 =	Cosmetic problem only: nothing very much needs fixing, but some 'touching up' could be done if extra time available
3 =	Minor usability problems: fixing these should be given low priority
2 =	Major usability problem: important to fix this, so should be given high priority
1 =	Usability catastrophe: imperative to fix this immediately

The scale was interpreted in a minimal way, that is, the lowest possible rating was assigned. If any particular problem was considered 'major,' for instance, then a '2' would be assigned, irrespective of the excellence or otherwise of a website's attributes in relation to that heuristic.

When assessing each website, both evaluators took into account the presumed context of primary and secondary user groups, and attempted to make judgements independently of content (both in terms of quality and quantity). The evaluators assessed the websites independently, though adjustment was made following discussion of the way in which the heuristics were best interpreted. In addition to rating the sites, the evaluators noted particular 'good' and 'bad' IA features. Both evaluators are academics who teach in the area of information architecture.

The websites under evaluation were intended to represent a cross-section of Australian libraries and retailers. The sampling was structured in order to achieve these criteria. Of the twenty library websites, four were from university and state libraries, five were from school and TAFE libraries, five

from public libraries (or library networks), and six from special libraries. Of the ten retail websites, four were from major chains, and six from smaller stores. The samples were derived from searches on library and business gateways, and search engines; and the websites were selected before they were examined.

The ratings were analysed in several ways. First, inter-rater agreement was examined, then aggregate ratings were compared between the two sets of heuristics. Although neither set of criteria was designed to produce an overall index of usability, and varying website contexts are likely to require different weightings attached to each heuristic, it was considered that aggregates combining the two ratings and the two inspections could provide a rough indication as to their IA success (or otherwise) and allow for some comparison across the thirty websites. In addition, ratings for each heuristic were compared in order to identify any relative strengths or weaknesses on the part of the library websites, and amongst different types of libraries.

## Results

The level of inter-rater agreement was found to be fairly good, though only following discussions between the two evaluators on the interpretation of some of the heuristics, which may also have affected the interpretation of the rating scale. The mean ratings across all sites and heuristics were extremely close: 3.40 for one evaluator and 3.39 for another. Rank correlation between the overall ratings for each site, on the part of the two evaluators, was strong (Kendall's  $\tau = 0.37$ ,  $p = 0.0049$ ). Across all ratings, the evaluators displayed a fair amount of agreement (weighted Kappa = 0.28). The overall ratings for the two sets of heuristics also showed quite a high degree of association, with rank correlation (Kendall's  $\tau$ ) coefficients of 0.66 ( $p < 0.001$ ) and 0.68 ( $p < 0.001$ ) for the two evaluators.

The mean ratings across the twenty heuristics for the thirty websites are

shown in table 1, along with their respective website's category (university/state libraries, school/TAFE libraries, public libraries, special libraries, major retailers, and minor retailers). The specific identities of the libraries and retailers have been withheld to afford them anonymity.

Table 2 sets out the mean overall ratings for each category, with the websites of university and state libraries scoring the highest, and those of special libraries, the lowest. It is worth noting that the average rating for the university and state libraries was the highest by a considerable margin. On the whole, libraries did very slightly better than did the retailers – 3.600 against 3.583.

For each heuristic, the six categories' mean rating is set out in table 3 on the next page. For most heuristics, the university and state libraries came out on top, and did not do badly under any of the criteria.

**Table 1. Mean overall ratings**

	Category
4.350	uni/state library
4.250	uni/state library
4.225	uni/state library
4.075	major retailer
4.000	minor retailer
3.950	public library
3.900	uni/state library
3.875	minor retailer
3.750	school/TAFE library
3.700	school/TAFE library
3.675	minor retailer
3.675	school/TAFE library

3.600	special library
3.550	public library
3.550	public library
3.525	major retailer
3.500	minor retailer
3.500	special library
3.475	major retailer
3.475	public library
3.400	special library
3.375	special library
3.350	special library
3.325	major retailer
3.250	special library
3.225	minor retailer
3.225	school/TAFE library
3.150	minor retailer
2.975	school/TAFE library
2.950	public library

**Table 2. Mean ratings for each category**

Category	Mean rating
university/state libraries	4.181
major retailers	3.600
minor retailers	3.571
public libraries	3.495
school/TAFE libraries	3.465
special libraries	3.413

**Table 3. Mean ratings for each heuristic**

Heuristic	Maj retail	Min retail	Uni/stat e libs	Public libs	Sch/TA FE libs	Special libs
Visibility of system status	3.8	3.4	4.1	3.1	3.5	3.3
Match between system and the real world	4.1	3.7	3.9	3.7	3.5	3.3
User control and freedom	3.9	3.7	4.3	3.5	3.5	3.1
Consistency and standards	3.4	3.4	4.0	3.7	3.3	3.3
Error prevention	3.5	3.3	4.0	3.7	3.3	3.0
Recognition rather than recall	2.9	3.6	4.0	3.5	3.4	3.0
Flexibility and efficiency of use	3.1	2.9	3.8	3.4	3.1	2.9
Aesthetic and minimalist design	3.3	3.8	4.3	3.9	3.6	3.6
Help users recognize, diagnose, and recover from errors	3.0	3.3	3.6	3.1	3.0	3.0
Help and documentation	3.0	2.9	3.6	2.8	2.9	3.1
Ensure that users can determine what site they are on	4.3	4.2	4.6	4.1	3.7	3.8
Ensure that users can tell where they are in the website	3.5	3.2	4.4	3.0	2.9	2.9
Ensure that users can tell where to go next	3.6	3.3	4.3	3.4	3.0	2.9
Provide several options for finding information	3.4	2.9	4.3	2.7	2.7	3.0
Apply consistent navigation methods throughout the site	3.9	4.0	4.3	3.4	3.6	3.3
Use text rather than graphics for navigation elements	4.5	3.9	4.9	3.5	3.9	4.5
Describe text links effectively	3.8	3.8	4.3	3.6	3.5	4.1
Avoid pop-up windows or new browser windows	4.1	4.0	5.0	3.9	4.7	4.7
Consider the use of frames carefully	4.1	4.8	5.0	4.7	5.0	4.7
Ensure that navigational schemes and elements are accessible to people with disabilities and people from culturally and linguistically diverse backgrounds	3.0	3.4	3.3	3.2	3.2	3.0

**Table 4. Mean ratings for libraries and retailers**

Heuristic	Libraries	Retailers
Visibility of system status	3.5	3.6
Match between system and the real world	3.6	3.9
User control and freedom	3.5	3.8
Consistency and standards	3.5	3.4
Error prevention	3.5	3.4
Recognition rather than recall	3.4	3.3
Flexibility and efficiency of use	3.3	3.0
Aesthetic and minimalist design	3.8	3.6
Help users recognize, diagnose, and recover from errors	3.2	3.2
Help and documentation	3.1	3.0
Ensure that users can determine what site they are on	4.0	4.2
Ensure that users can tell where they are in the website	3.2	3.3
Ensure that users can tell where to go next	3.3	3.5
Provide several options for finding information	3.1	3.1
Apply consistent navigation methods throughout the site	3.6	4.0
Use text rather than graphics for navigation elements	4.2	4.2
Describe text links effectively	3.9	3.8
Avoid pop-up windows or new browser windows	4.6	4.1
Consider the use of frames carefully	4.8	4.5
Ensure that navigational schemes and elements are accessible to people with disabilities and people from culturally and linguistically diverse backgrounds	3.2	3.3

The public libraries scored relatively poorly for 'visibility of system,' i.e. users would not always have a good understanding of where they were. Devices such as breadcrumbs and the highlighting of current menu choices would alleviate this problem. Public libraries also displayed particular tendencies to use icons instead of textual links (and not always very recognisable icons), and to entail new browser windows or link to PDF files. Many of the library websites had links to separate catalogue interfaces. While this is not necessarily a 'bad' thing, and would often be a systems

constraint, it is important to maintain consistent labelling and design as far as possible. Public libraries showed particular strength in consistency and standards, and in aesthetic and minimalist design, though in both areas were outshone by the university libraries.

The special libraries exhibited a fairly wide range of IA qualities, as well as scale of content, as one might expect. However, most were especially weak in the areas of 'real world' terminology and conceptualisation, of user control and freedom, and error prevention. There

was a noticeable lack of attention paid to the bibliographic terminology used in the catalogues, and limited scope to navigate across different site areas and, in some cases, back to the home page. More attention also needed to be paid to the categorisation of menu choices, where semantic overlap would inevitably lead to too many false trails. One strength of the special libraries' websites was their tendency to avoid graphic links.

Both the special libraries and the school and TAFE libraries performed relatively poorly when it came to ensuring that users knew which site they were on. All pages need to include the name of the organisation set out in a consistent manner. They also performed less well in terms of offering users clear choices within the middle of the site. In some cases, dead-ends could only be exited via the browser's 'back' button. There were several other areas in which most of the libraries, outside of the university and state libraries, could improve. More considered use of headings and subheadings, as well as devices such as breadcrumbs, would assist in providing the user with the necessary navigational context. Menus and other linking systems could also have been offered more consistently across some of the sites and sub-sites. While the lack of content on some of the school and special library websites would militate against the need for affording the user more ways to find information, the public libraries' websites would have been considerably enhanced by more site search facilities, site maps and cross-links.

In general, the larger organizations, whether libraries or retailers, exhibited superior IA. This is likely, of course, to be partly a result of greater resources, including budgets for consultants and other external assistance. The professionalism of the design of the top ten or so sites shone through.

For each heuristic, the libraries' mean rating as a whole is set out against the retailers' mean rating as whole in table 4 above. We can see that libraries tended to fare well with respect to flexibility and efficiency of use, and the avoidance of new browser windows and frames. On the other hand, the retailers were ahead when it came to creating interfaces which reflected the 'real world,' user control and freedom, and applying consistent navigation methods.

Specific features that it was noted several of the libraries could work on include:

- quick-links (e.g. into catalogues and databases);
- a clearly and consistently marked 'home' link;
- consistency between link label and heading of linked page;
- explanations of links when the mouse hovers over them;
- context-sensitive help; and
- automatic respelling following catalogue search errors.

Things to avoid include:

- overlap between such menu choices as:
  - 'collections' and 'resources,'
  - 'reference' and 'information,'
  - 'databases' and 'e-library,'
  - 'search tools' and 'search engines';

- abbreviations (unless very well-known to the site's audience);
- vague terms in menu choices;
- poorly ordered menus (e.g. 'catalogue' at the end);
- duplicate menus on the same screen; and
- pages broken into several long sections without anchor links.

### Conclusion

More evaluators and a larger sample of websites would have allowed for firmer conclusions, but the results suggest that Australian libraries are generally designing websites with fairly good IA, and that their usability is comparable with that of Australian retail sites. There is, however, no room for complacency, and several areas where there is room for improvement, such as menu categorisation and consistency of navigation options. Public libraries would appear to have some 'catching up' to do with their academic and

research library colleagues, while the average special library website is not yet so usable, in IA terms.

Although IA may not necessarily be as prominent in the LIS literature as might be expected, it would appear that on the ground, library website designers are taking note of best IA practice, or at least, their work is coinciding with such practice. In some cases, it may be that the designers are not library staff and this may go some way to explaining the gaps in the LIS literature. However, in other cases, a library may have no choice but to undertake its own design and development, and in such cases, IA education for librarians becomes essential. Moreover, even if librarians do not need to do IA, there is a strong argument for them still to do it. Many of its principles mirror those on which traditional fields of librarianship, such as bibliographic organisation, are based. Librarians are thus well placed to make a greater impact in the field.

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