

WHO ARE THE VIRTUAL VISITORS TO THE LIBRARY AND WHAT ARE THEY DOING?

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ABSTRACT

During the past few years, the number of visitors to the websites of many public libraries has far surpassed physical visitor numbers. Libraries are investing increasing resources in web programs and content and the presentation of their catalogues. In addition, they have begun to experiment with social media tools to enhance their web presence and develop new forms of knowledge production and consumption. However, there is limited knowledge of virtual visitor demographics, search preferences, and user content needs. This paper presents an exploratory and preliminary analysis of Hitwise data on visitors to the website of the State Library of Victoria. Different uses of the library website are investigated as well as the characteristics of the visitor, where they were on the Internet before coming to the library website and where they went afterwards. A longitudinal analysis will be presented suggesting how patterns of use can be understood in terms of external factors such as the increased uptake of broadband, and overall changes in the manner of engagement with the Internet. This analysis will have implications for libraries' management of their online presence.

BACKGROUND

In the words of its own website, the State Library of Victoria is “the major reference and research library in Victoria, responsible for collecting and preserving Victoria's documentary heritage and making it available through a range of services and programs”. While the physical space of the library has always been an important aspect of the public library (Council on Library and Information Resources 2006), in recent years, like many libraries, the State Library of Victoria also has a virtual presence. The State Library of Victoria first had a website in the mid 1990s and the current website, referred to in this paper as slv, has been online since 2004. While in 2006-07, there were just over one million visits to the buildings of the State Library of Victoria, in the same year, there were more than triple that number of visits to its website and more than 22 million visits to websites it supports. Although the library regularly conducts surveys of the physical visitors, to find out who is visiting the library, the reasons for their visits and their satisfaction with library services, little is known about the virtual visitors to the library.

The content of the slv website includes information relating to the physical library, such as opening hours, exhibitions and events. The website is also an entry point to the library catalogue and online databases, many of which include full text. In addition, the website hosts the LaTrobe journal, an online journal featuring articles that use the

library's collections as source material, and a vast amount of digital content. One third of the State Library of Victoria's collection of pictures has been digitised (more than 200,000 images) and historic plans, newspapers and the library's audio collection are also being digitized. Parts of the slv website are like a digital library, while it is also the website of a physical library.

There is an enormous amount of slv web log data that can be used to analyse the activities of online visitors; some of it is free, some of it available for a fee. Although the reporting of this data is usually tailored for market research type purposes, it has largely untapped potential for finding out more about the visitors to library websites. Recognising this, Jones et al. (2004) have outlined a program for analysing web analytics of a digital library and Fang (2007) uses Google Analytics to show movement within the site of a particular digital library. The vast quantity of data can be overwhelming and so there have been a number of attempts to develop sophisticated automated processes for analysing web log data (for example, Norguet et al. 2006). This paper differs from most studies in two ways. In order to find out more about how slv is meeting users' information needs, this paper attempts a manual classification of the long tail of upstream and downstream websites. While there has been a deal of analysis of the structure of search queries, and the amendments made (for example Hargittai 2004; Spink and Jansen 2004) there has been little analysis of their semantic content, except in cases where this is limited to very specific subject domains. This paper, however, includes an analysis of the long tail of search queries in order to understand more about the type of content people are accessing on the site.

METHODOLOGY

The data in this paper is sourced from Hitwise, WebTrends and Google Analytics but most of the analysis in this paper uses data from Hitwise (www.hitwise.com). Each different method for measuring web activity has its own particular benefits and limitations. Hitwise measures internet use using a network centric methodology and a proprietary method to match internet use with lifestyle profiles. (For more information on how these profiles are developed see <http://www.mosaicaustralia.com.au/>). Hitwise data covers more than one third of Australian internet subscriptions, including homes, businesses, schools, universities, and libraries. It is the resulting aggregate, summarized and weighted statistical information that is used in this paper. As a network centric methodology, the main strength of Hitwise lies in comparisons between different websites. However, the data is useful for this particular study as it has some demographic data attached. Also, as it is based on activity through ISP subscriptions, it excludes the web activity of 'spiders', automated computer scripts which 'crawl' the World Wide Web indexing pages.

The main disadvantage of using Hitwise data for this study is that it reports on a sample, rather than total web activity at the slv website. Although the Internet Service Providers that provide data to Hitwise include a representative cross-section of sizes, there may be some sample bias, the direction of which is impossible to detect. Because it is reporting on a sample, Hitwise data is presented in percentage terms rather than as absolute numbers.

In principle, Google Analytics could be used in a study like this as it has the advantage of reporting on total numbers of visitors. However, in order to provide accurate reports on total visitors to a website, specific Google Analytics code needs to be attached to each web page. The State Library of Victoria website is comprised of hundreds of thousands of individual webpages, and only some types of content have the Google Analytics code. Hence, Google Analytics could not be used to explore what visitors to the website are doing, or what websites they came from as it is only reporting on those accessing particular types of content.

An aspect that sets this study apart from other analyses of website visits is that this study includes the long tail in its analysis. The 'long tail' is the term brought into popular usage by Chris Anderson (2006). It is used to refer to a particular distribution of items whereby a few items account for a sizable proportion of the total, and an enormous number of items (the long tail) each contribute a tiny proportion to the rest. As an example, the top ten search terms that bring people to slv account for approximately half of all visits via search engines; thousands of terms account for the other half, with most only accounting for one or two visits each. Analysing the long tail is laborious as it requires manual coding of thousands of items; in the case of this paper, websites and search terms.

The coding of websites presented in this paper is based on Hitwise industry classifications with some recoding to make the analysis more relevant to libraries. The search terms were coded using the grounded theory technique of open coding (Strauss and Corbin 1998). The data was combed over numerous times and each search term received one or more tags which were progressively refined into a list of primary tags. The codes are more of the nature of tags than categories as they do not fit into an overall conceptual scheme. Of course, such coding inevitably involves some subjective decisions about the appropriate category in which to place a particular website or term. Although in the long tail the contribution of each site or query to the whole is small, there is a margin of imprecision to the classifications. In interpreting the data, one should focus on the overall pattern, rather than the precise size of each category.

FINDINGS

How many virtual visitors?

Figure 1 indicates monthly visits to the slv website between January 2006 and May 2008. Because the Webtrends data includes spiders, these monthly visits are shown as a shaded band with the upper boundary showing visits, including spiders. The size of the shaded band is an estimate as the number of visits from spiders can account for up to one third of visits, but varies from month to month. Hence the number of human visits is likely to be somewhere within the shaded band. Figure 1 also shows the number of those visits which were the result of clicking on search engine results. Large black circles are used to indicate the periods selected for particular analysis in this paper. It can be seen that the proportion of searches and visits has remained relatively even with the exception of the months April-May 2008. This spike in online visits is possibly due to increased spider activity or more likely is due to an extremely popular and widely

publicised exhibition at the slv in the months of April and May 2008. Intending visitors may have gone to the slv website to find out information about the exhibition.

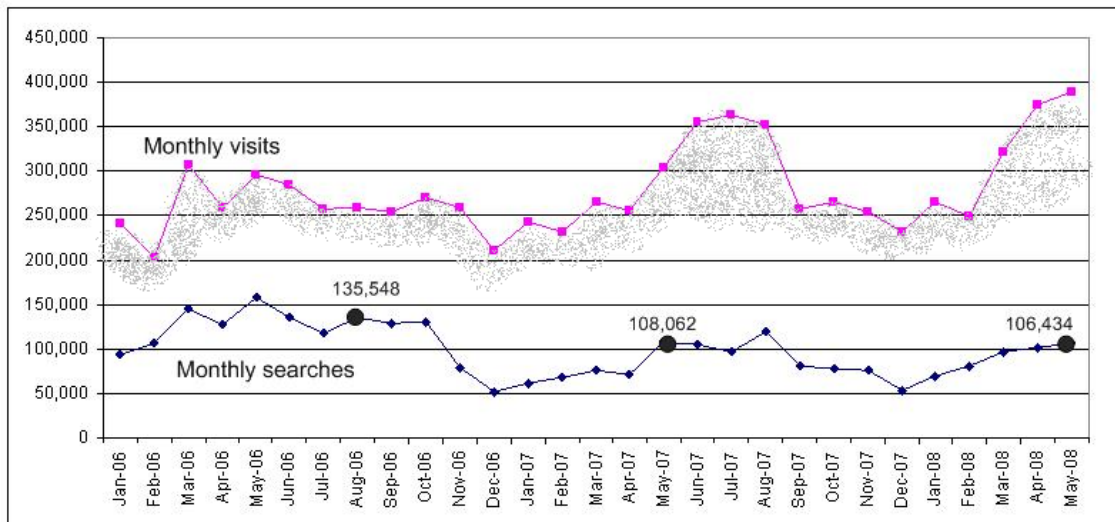


Fig. 1: Monthly visits and searches leading to the slv website (Source: Webtrends)

Data from Google Analytics indicates that the number of visits tends to be highest on Mondays to Thursdays, tapering off on Fridays. Weekends typically attract about two thirds the number of visits to the website as on a weekday.

Who are the virtual visitors?

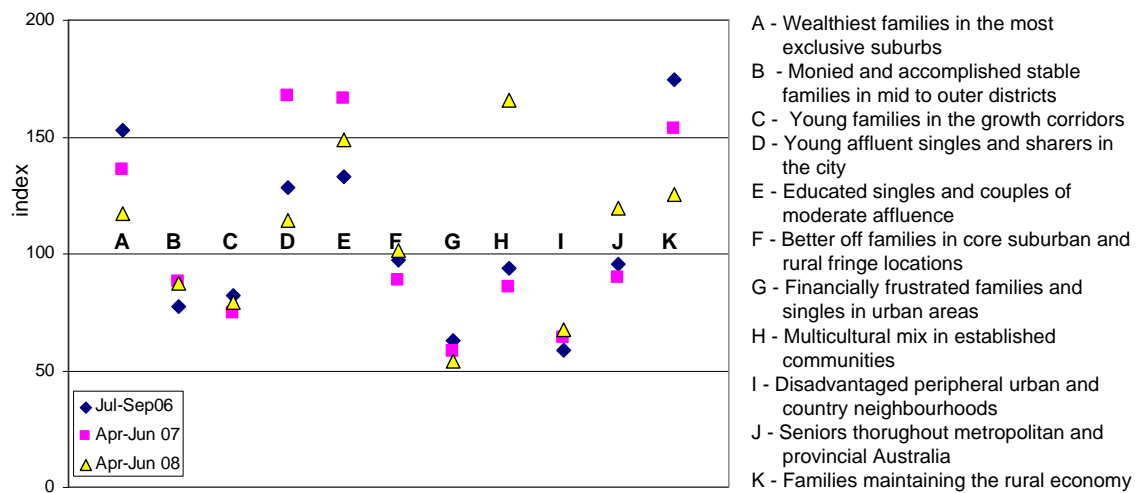


Fig. 2: Profile of visitors to slv website, representation according to lifestyle profile (Data source: Hitwise)

Figure 2 shows the lifestyle profile of visitors to the slv website for three month periods in the years 2006-2008. An index of 100 shows that the proportion of visitors to the slv website within that lifestyle profile matches the proportion of that lifestyle profile in the

online population. Any index over or under 100 shows that the website is over or under-represented within that lifestyle profile.

As one might expect, the data indicates that there is an overrepresentation of people who are well-off, who live in the city, or are educated and an under representation of people who are socially or economically disadvantaged. It is not possible to gauge from the data whether those who are more educated are more likely to be aware of the slv website and hence more likely to choose to visit it or whether it is the nature of the online activities of this group that means that they are more likely to come across the slv site. Of course, the former scenario, in particular, has implications for the library's marketing of its website. Interestingly, the proportion of seniors who visit the slv website is comparable to their representation in the Australian online population. There is also an overrepresentation of people classed as 'families maintaining the rural economy', indicating the importance of the virtual presence of the slv to people from rural areas.

Where do the virtual visitors come from?

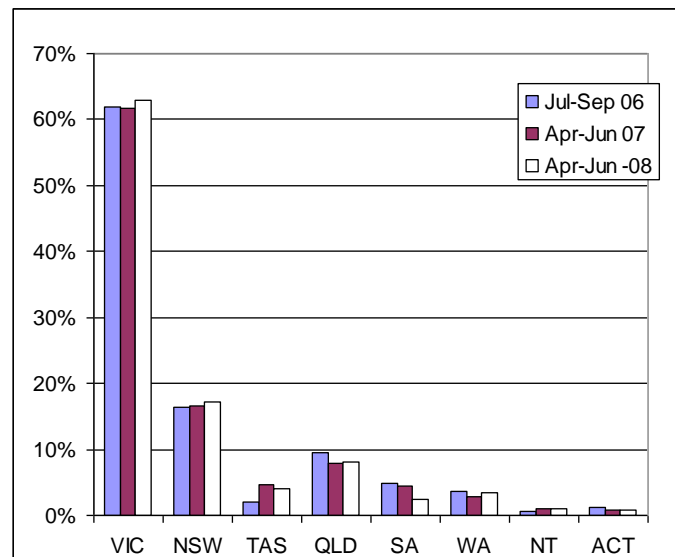


Fig. 3: Physical location of Australian visitors to slv website. (Data source: Hitwise)

Physical location

There are two aspects to the question of where the virtual visitors come from. The first is the physical location of the virtual visitor. Google Analytics can be used to identify the countries from which visitors come, whereas Hitwise can be used to find where in Australia, visitors come from. Google Analytics data indicates that more than 90% of visitors are from Australia (92% in July-September 2006, 96% in April-June 2007 and 96% in April- June 2008), with most of the others coming from other English-speaking countries. Figure 3 shows that within Australia, for each sampled three-month period (2006-2008), just under two thirds of visitors to the slv site came from Victoria, and one sixth came from New South Wales. Excluding Victoria, the distribution of online visitors from the other States is pretty close to the distribution of the population, with Tasmanians the most likely to visit the slv website.

Virtual location

One can also look at where the virtual visitor comes from in terms of their virtual location, that is, the web page visited immediately before reaching the slv website. From this upstream website, visitors could have travelled to the slv website via a hyperlink, through typing in the URL, using a bookmark or through tabbed browsing. Using the logic that the most recent site visited gives an indication of the users information need (Chi et al. 2001), the upstream websites were analysed in terms of type of provider and type of content.

Upstream location

Table 1 shows that in May 2008 more than one third of visitors to the slv website arrived there by clicking on search results in Google, and one in twelve (7.8%) came directly from the National Library website and Picture Australia. Both the National Library and Picture Australia sites link directly to digitised images on the slv site and so appear in the top ten upstream locations for each of the sample periods. The presence of Facebook and Gmail in the top 10 upstream locations is likely to be an artefact of tabbed browsing. The top ten upstream websites accounted for just half (51.1%) of all upstream websites in May 2008. In this same period, just within the Hitwise sample, visitors came to the slv website from 961 unique websites.

Tab.1: Top ten websites upstream of www.slv.vic.gov.au (Source: Hitwise)

Rank	May 2008	May 2007	August 2006
1	Google Australia (31.4%)	Google Australia (32.2%)	Google Australia (28.8%)
2	Google (4.5%)	Picture Australia (7.3%)	Yahoo!7 Search (7.2%)
3	National Library of Australia (4.2%)	National Library of Aust (6.8%)	Google (5.1%)
4	Picture Australia (3.5%)	Google (5.0%)	Picture Australia (4.7%)
5	Facebook (1.5%)	Google Australia Image Search (2.1%)	National Library of Australia (3.8%)
6	Windows Live Search (1.5%)	Wikipedia (1.2%)	Google Aust Image Search (3.8%)
7	Google Australia Image Search (1.3%)	Yahoo!7 Search (1.1%)	Yahoo! Search (1.6%)
8	Gmail (1.2%)	Gmail (1.0%)	Wikipedia (0.8%)
9	eBay Australia (1.2%)	The Age (0.7%)	UniMelb – Library (0.7%)
10	Wikipedia (0.9%)	UniMelb – Library (0.6%)	Ninemsn search (0.6%)
Total share – top ten	51.1%	58.0%	56.9%
Total no of unique sites	961	1070	1,224

Most analyses of upstream locations are limited to the top ten or top twenty upstream locations. In order to get a more comprehensive picture of where slv online visitors were before visiting the slv site, the long tail of upstream locations was analysed. Hitwise codes each website as belonging to one or more industry, using a coding frame

of roughly 150 industry groupings. This coding was used as a starting point in developing a coding frame that seemed more useful for this analysis. Developing this coding frame involved manually recoding each website to only one industry, and coding libraries, and educational and cultural institutions as separate categories. Of course, there were difficulties in assigning each website to only one industry and a certain amount of subjectivity was inevitably involved. For example the distinctions between archives and libraries were not clear in the case of Pandora, Australia's web archive. The Pandora Web Archive is a website of the National Library of Australia in partnership with various National archives and State libraries. The decision was made to code Pandora to 'Museums, Galleries, Archives', a subset of 'Educational and Cultural institutions'.

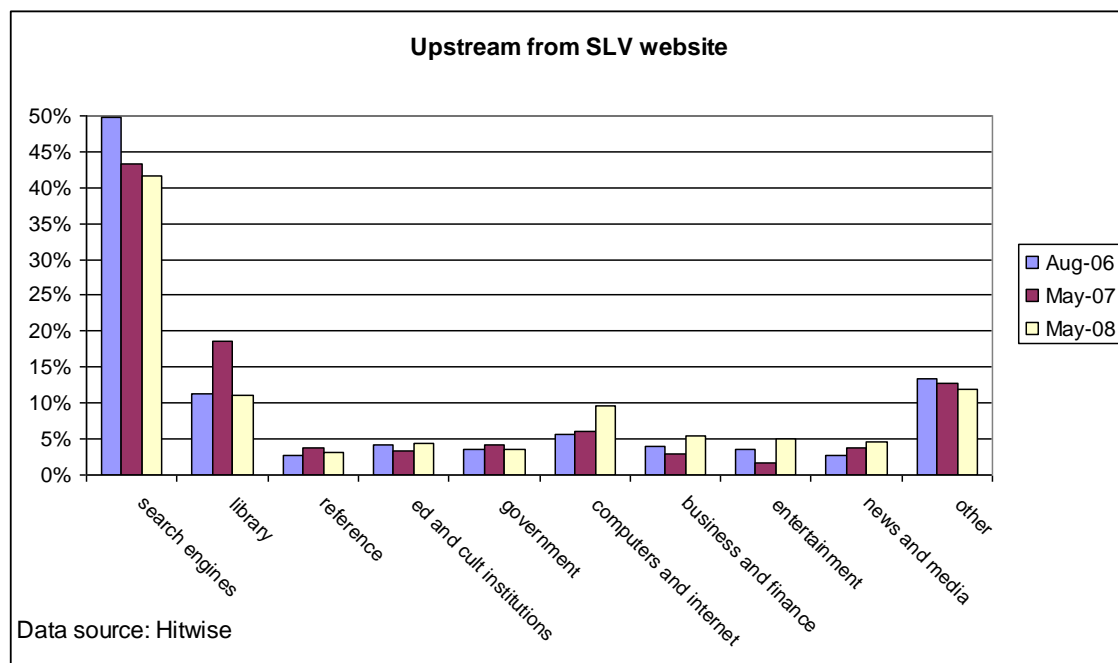


Fig. 4: Upstream location of visitors to slv website. (Data source: Hitwise)

Figure 4 shows the upstream locations of visitors to the slv website for nine categories of website. In May 2008, approximately two fifths of visitors arrived at the slv website by clicking on a search engine result. The 'other category' is particularly large as it is an amalgam of lifestyle, shopping, travel, sports, community, music, health, automotive, food and beverage and gambling categories, each too small to be worth reporting on separately. So ignoring the size of the 'other category', the next biggest sources of visitors to the slv website are library sites. This is because university library sites can link directly to searches on the slv catalogue. The proportion visiting from computers and internet sites has been increasing since August 2006 and this is probably explained by the increase in use of tabbed browsers as well as the fact that this category includes social networking sites, a type of website which has grown enormously in popularity between 2006 and 2008.

Given the margin of imprecision in the categories, it seems that overall the pattern over the years has been surprisingly stable although it seems that since August 2006, the proportion of visitors arriving at the web site via search engine results is decreasing. It

is difficult to interpret the reason for this. Although it could indicate that the slv site is becoming more linked to other web sites, it could also be that the slv website is becoming less visible in search results. It is difficult to explain the May 2007 spike in the proportion of visitors who came to the slv website from other library websites.

Where does the virtual visitor go on leaving the slv website?

The previous analysis classified upstream locations in terms of the industry of the websites. The following is the results of a similar analysis of the downstream location, that is, where the user goes after visiting the slv website. Again, in principle, this can be looked at in terms of provider or content. Table 2 shows the top 10 downstream websites. Search engines figure less prominently while the national library is a popular next destination after visiting the slv website. The distribution of downstream websites is broader than upstream; the top 10 downstream websites account for less than a quarter of all websites. It is noteworthy that eBay appears in the top 10 upstream and downstream websites for May 2008. While a possible explanation for this is tabbed browsing, another explanation supported by anecdotal observation of the data by slv staff, is that some listings for collectables on eBay contain links to slv digitised images relevant to the item for sale.

Tab.2 Top ten websites downstream of www.slv.vic.gov.au (Source: Hitwise)

Rank	May 2008	May 2007	August 2006
1	Google Australia (4.7%)	National Library of Aust (6.7%)	National Library of Aust (3.4%)
2	National Library of Aust (3.6%)	Picture Australia (3.6%)	Picture Australia (3.1%)
3	Google (2.5%)	Google Australia (2.8%)	Google Australia (3.1%)
4	EBSCO's A-to-Z (2.1%)	Google (2.5%)	Google (1.7%)
5	Windows Live Mail (1.4%)	UniMelb – Library (2.1%)	White Pages Australia (1.6%)
6	Wikipedia (1.2%)	www.oldengine.org (1.9%)	Libraries Australia (1.2%)
7	Picture Australia (0.9%)	Heritage Council Victoria (1.4%)	Google Aust Image Search (1.1%)
8	Google Aust Image Search (0.9%)	Australian War Memorial (1.4%)	Wikipedia (1.0%)
9	EBay Australia (0.9%)	Dept of the Envmt, Water, Heritage and the Arts (1.2%)	Australia Post (0.9%)
10	Truelocal.com.au (0.9%)	Museum Victoria (1.1%)	Windows Live Hotmail (0.8%)
Total share – top ten	19.2%	24.7%	17.9%
Total no of unique sites	801	958	1,220

As with the upstream sites, a more comprehensive picture is gained by looking at the long tail. Figure 5 shows the downstream locations according to the categories of website used to look at upstream locations. (Again, the 'other category' is particularly large for the reasons already given.)

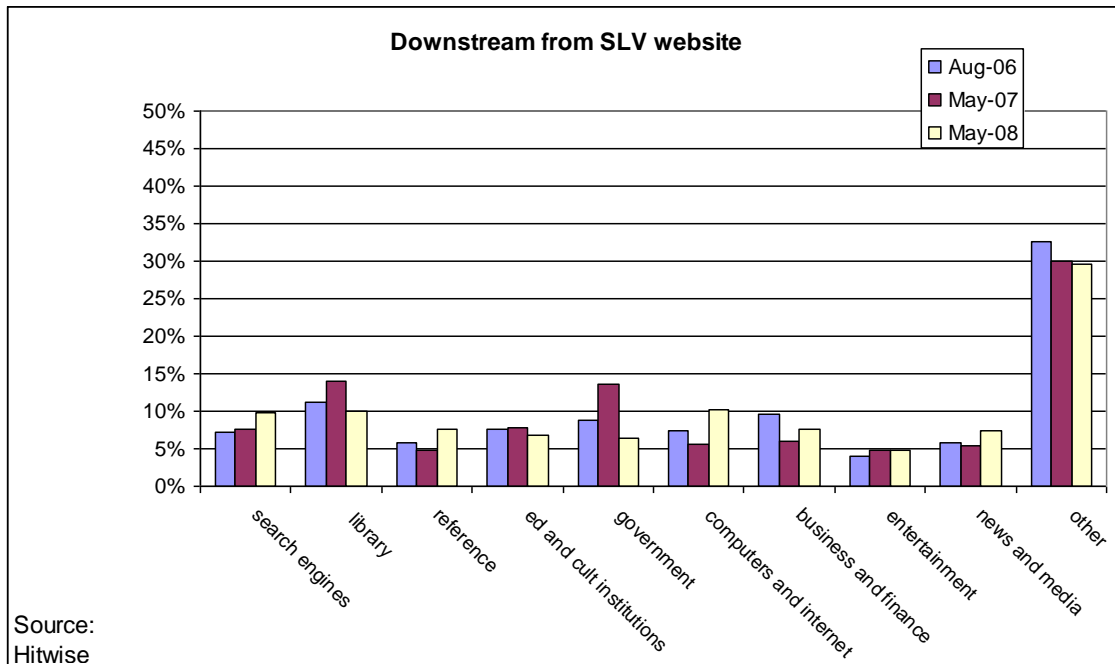


Fig. 5: Downstream location of visitors to slv website. (Data source: Hitwise)

It is difficult to discern any pattern of change over the three years presented. However, it is instructive to compare the upstream locations with the downstream locations as then some patterns become observable. For example, it can be seen that visitors to the slv website are much less likely to go to a search engine after visiting the slv website than to have come to the slv site from a search engine. One interpretation of this is that they have found what they were looking for. However, it is possible that if using tabbed browsing, they are returning to the list of search results to try another link. The fact that the 'other' category is much larger for downstream suggests that possibly they have found what they are looking for and are moving on to something else. Roughly the same proportion come to the slv site from a library website as go to a library website after the slv site. Users are slightly more likely to continue on to another type of reference site, a government site or the site of an educational or cultural institution than they are to have come from this type of site.

The preceding analysis of upstream and downstream websites has been in terms of the *industry* of the provider of the website. It is not possible to apply a similar classification in terms of the *content* of the websites as although some websites have specific content, many websites contain a huge range of diverse content. However, one can get some purchase on the content of interest to the visitor by looking at the search terms that brought visitors to the slv site from search engines.

What brought them to the slv website?

For those two in five visitors in May 2008 who come to the slv site via a search engine, we can attempt to impute intention from the meaning of the search term. Of course, the search terms only reflect the fact that someone clicked on a slv site in the search engine results, so they are a reflection of the content of the slv website. In a way they indicate what is being found, or how the slv website was found, rather than what is being

searched for. Figure 6 illustrates this point. In May 2008, unique search terms that resulted in traffic to the slv website accounted for approximately 0.01% of all search terms (Source: Hitwise), a figure comparable to other Australian cultural institutions.

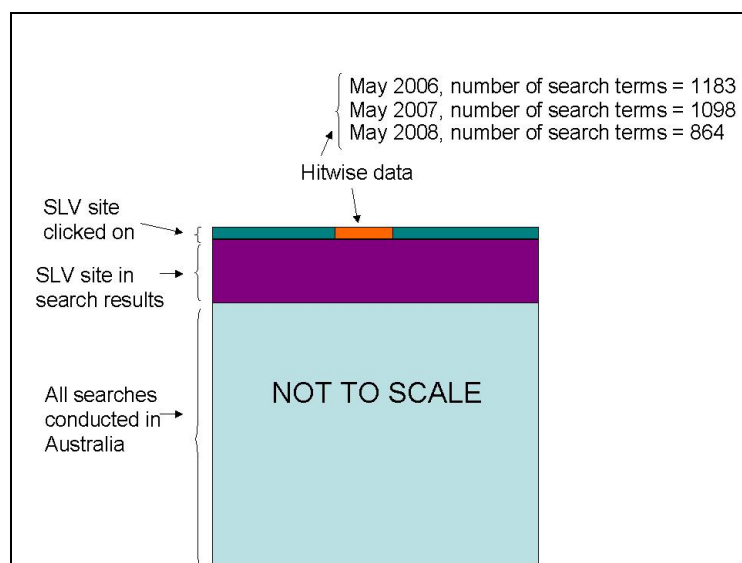


Fig. 6: Hitwise data on search terms that led to the slv website

The nine most commonly entered search terms that led to the slv website in May 2008 were all permutations of “State Library of Victoria, Melbourne”. These nine terms accounted for 23% of all search terms that were typed in. In order to get an idea of what else brought people to the slv, the long tail of search terms was analysed and each term was assigned to a primary category. This analysis gives more nuanced information on how the slv website is meeting user’s information needs. (Note that the data did not allow taking into account how many times each search term was used. Hence the analysis is of search terms, not of the frequency of search terms.)

Tab.3 Number of unique search terms relating to slv as a proportion of all search terms that led to the slv website (Data source: Hitwise)

Search term	Aug 2006	May 2007	May 2008
‘State library Victoria ‘or similar	3.4%	5.3%	9.4%
Relates to exhibition at slv	-	-	3.4%
Relates to other specific aspect of slv	2.2%	4.4%	4.3%
Total	5.6%	9.7%	17.0%

As Table 3 shows, there was a particularly large proportion of search queries relating to slv in May 2008. This is likely due to the incredibly popular exhibition on during this time. Hence, Figure 7, which classifies the content of the search query, excludes specifically slv-related queries.

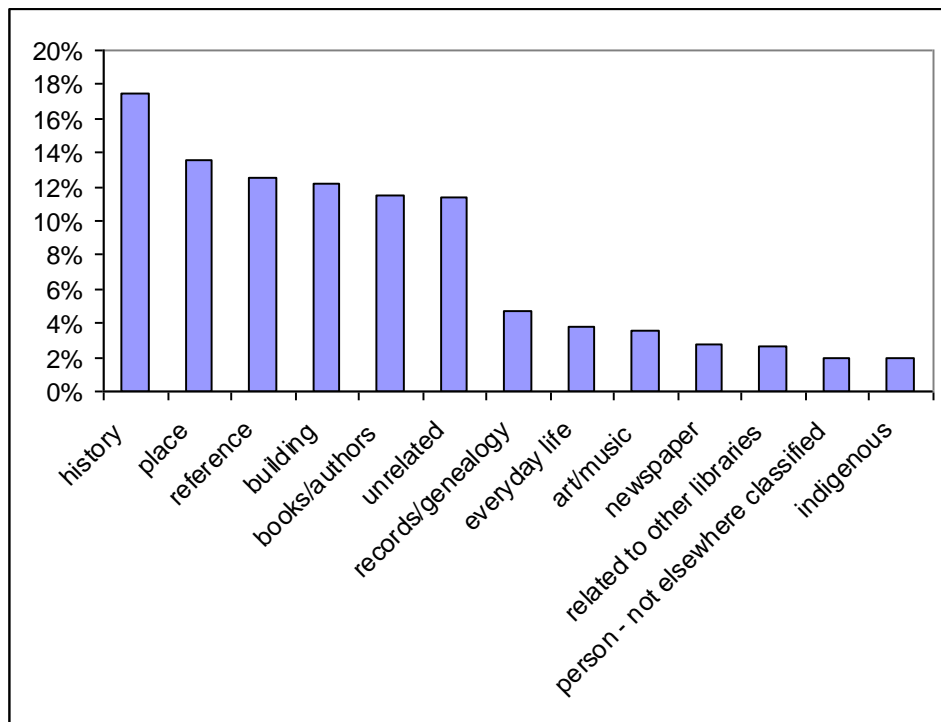


Fig 7 Subject of unique search terms that led to the slv website - excluding slv related terms (Data source: Hitwise)

Queries on places or particular buildings (for example “Chewton post office”) were almost exclusively related to Victorian places or buildings, and most history queries related specifically to Victoria. This, of course, reflects the content of the slv website. These three categories of query accounted for 43% of all non-slv-related queries. The category records/genealogy contains queries that were explicit about this records or genealogy although obviously many of the searches for places, buildings and history may also have been for the purposes of genealogy. One in six queries (16%) appeared to be a general reference query (for example ‘how to clean mouldy wall’), that matched slv web content. More than one in ten (12%) queries related to a book or an author. The 11% of queries coded as ‘unrelated’ were those that seemed unlikely to have resulted in a link to the slv website; it is possible that after lodging the query the user had tabbed to another browser page and there clicked through to slv.

Did they find what they were looking for?

One of the things that is very difficult to gauge from the data is whether the user obtained material of interest from the slv site. Following is a rough attempt to gauge this. Given that the slv website contains several hundred digitised images, an attempt was made to work out what proportion of visitors were looking for images. This was done by separately aggregating upstream and downstream sites that contained the word ‘Flickr’, ‘foto’, ‘image’, ‘picture’, or ‘photo’ either in their description or in their URL. As Figure 8 shows, the number of downstream sites relating to images is less than half the number of upstream sites relating to images. This could be interpreted as indicating that most people found what they were looking for. Moreover, the aggregate of

upstream sites is an underestimate of upstream sites relating to images, as analysis of the search terms indicate that many people were looking for images via search engines. If these had been added in, the gap would be even greater, adding more strength to the hypothesis that most people who were looking for images found what they were looking for at the slv site.

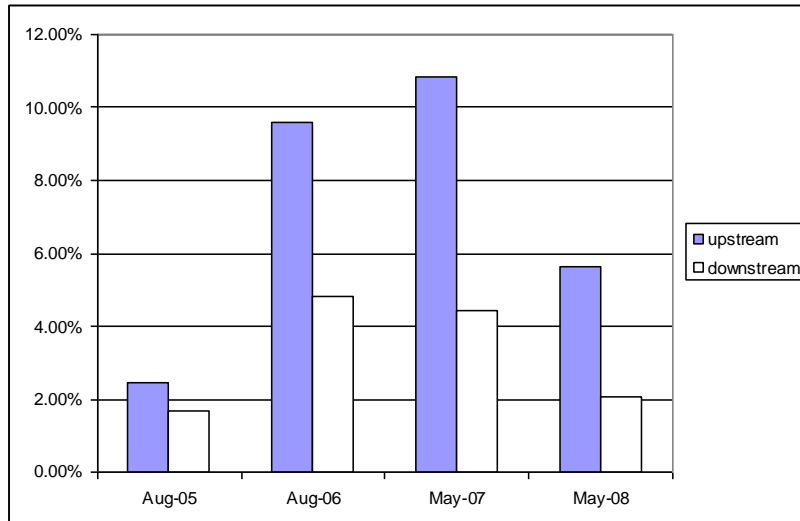


Fig. 8: Looking for pictures before and after visiting slv website (Data source: Hitwise)

What has changed?

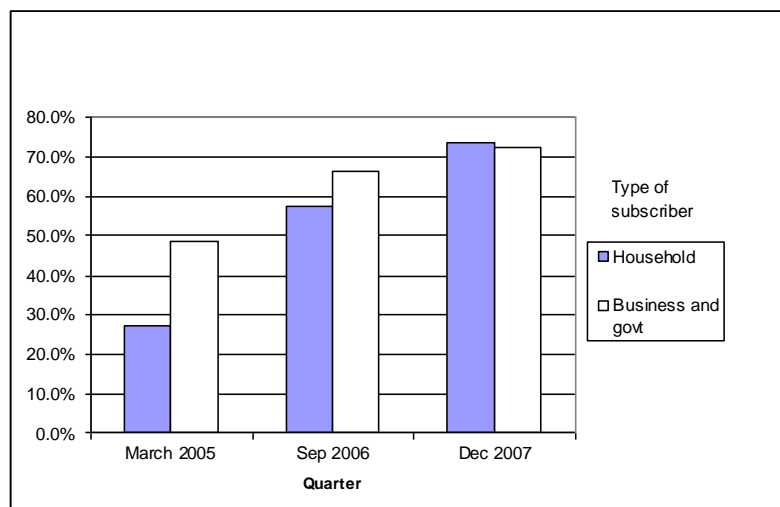


Fig. 9: Proportion of internet subscriptions which are 'broadband' (Source: ABS 2007)

Online visitors to the slv are a subset of the Australian population who use the Internet. According to unpublished data from the World Internet Project, this was about three quarters of Australians in 2007. In 2006-2007, 64% of Australian households had home Internet access. The households least likely to have home Internet access were those with lower household incomes or located in ex-metropolitan or remote areas, or with no children under 15 years (Australian Bureau of Statistics 2007). Most of the analyses presented in this paper have shown little difference over the years 2006-2008. However,

the increase in the proportion of pictures being accessed, as shown in Figure 8, coincides with an increase in broadband access (see Figure 9).

CONCLUSIONS

This paper has provided some examples of how analysing web activity around a library website can be used to increase understanding of how the website is meeting users information needs. In particular, it has shown the additional information obtained through classifying the long tails of the upstream websites, the downstream websites and the search terms that bring a visitor to a site.

The analysis affirms the importance of the slv website as a repository of digital content as well as a website for the physical library. The queries relating to the library and particular aspects of the library, indicate the ongoing importance of the physical library to many virtual visitors and the need to make information about the physical library easy to navigate to. Ideally, in further research, one would compare the search terms that bring people to the slv site with the search terms typed into the slv site and the search terms typed into the slv catalogue. In addition, one would match the type of content being accessed with an inventory of website content to identify what areas were not being used or accessed. One would also include analysis of how visitors move about within the slv website.

As Spink (2007) points out, the advantages of using web logs are that data can be collected inexpensively and unobtrusively from large numbers of users. The disadvantages include the lack of data on the user and their intentions. These things can only be imputed. To really find out if people found material of interest, one would need to ask them.

In addition the data does not allow distinction to be made between visitors who are 'searchers' and visitors who are 'browsers', visiting the slv site just incidentally. 'Searchers' are those who arrive at the slv site because they are looking for particular information. In contrast, an example of a 'browser' is someone who, out of interest, clicks on a thumbnail image on their favourite website; a click which takes them to the original digitised image on the slv site.

It is important to take advantage of web log data to find out more about online activity but some of the questions such analysis raises may only be adequately answered by detailed qualitative investigations of information seeking and web use.

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BRIEF BIOGRAPHY OF PRESENTER

Dr Vivienne Waller is a Research Fellow at the Institute for Social Research, Swinburne University of Technology and is currently working on the ARC-funded project 'The Searchers'. This research is in partnership with the State Library of Victoria and investigates the strategic challenges for major public libraries presented by the online information environment. Viv's research interests are in the social and political aspects of the use of new technologies, as well as social theory more generally.