

How Readers Navigate to Scholarly Content

Comparing the changing user behaviour between 2005 and 2008 and its impact on publisher web site design and function.

Simon Inger
Simon Inger Consulting
Abingdon, UK
simon@sic.ox14.com
www.sic.ox14.com

Tracy Gardner
Tracy Gardner Marketing
Abingdon, UK
tracy@tgm.ox14.com

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Abstract

There have been many studies using web logs that calculate where users of scholarly resources were referred from, but this approach doesn't indicate where those users started their research, merely the details of the last "hop" before hitting a content website. This research repeats an earlier study performed in 2005¹ by Scholarly Information Strategies (for whom the authors were consultants) that actually asks researchers about their preferred start points. The subtle shifts in user preferences provide a valuable insight into user navigation, the features that they find useful in publisher web sites, and the role and effectiveness of library technologies. Readers are more likely to arrive within a journal web site at the article or abstract level than ever before and this has significant implications for publisher web site design. As a consequence some of the features of publisher web sites may become harder to find and, as more functionality transitions to the reader's preferred starting point, some of the features may also become less relevant to the researcher. The most highly sought-after features of journal web sites are content alerting services, but not personalisation and not search functions. These findings shed light on how publishers should engineer their web sites to meet reader navigational behaviour.

¹ End-user web based survey conducted January 2005. Out of 12847 readers and researchers invited to take part in the survey by email, there were 481 completed surveys, a response rate of 3.74%. The population of users selected was taken from lists of users that had signed up with table of contents alerting services with a major STM publisher (with permission). This presents a natural bias towards favouring some behaviours, most notably alerting based functions. However the survey findings were consistent with the author's understanding of the popularity of alerting services obtained through dialogue with publishers.

Reader Behaviour

In designing a journal's online presence a publisher needs to gain an understanding of how readers will navigate to the journal and at what part of the journal web site they will arrive. This will help inform decisions on which partners to work with, how to distribute essential data to them, and how to design web pages within a journal web site that meet the needs of readers wherever they arrive within the site.

This research focuses on three main forms of reader behaviour with respect to e-journals; citation searching, core journal browsing, and subject searching. Given these different approaches to the literature, researchers select their most appropriate starting points on the internet (discussed below) and navigate to journal content. The combination of where readers want to perform certain functions (such as search) and on which pages within a journal web site that the reader "lands" as a consequence of their navigational behaviour sheds light on the design and feature-set of a journal's web presence. It also helps inform publishers as to which kinds of starting points it should seek to enable first for the greatest possible return in reader traffic.

For each type of behaviour this research tested, the survey asked about a number of different starting points. Starting points characteristics are explained in detail in the next section and a description is given below:

Resource	Description and Limitations
A specialist bibliographic databases such as Web of Science/Knowledge, Cambridge Scientific Abstracts, Biosis, PubMed	This should be enough to signify A&I databases, but there will be some potential overlap with web sites that are both a publisher web site, and an A&I, such as American Psychological Association. Although some of the brand names were recently changed due to mergers and acquisitions, it was decided that for reasons of language consistency that the descriptions would be the same as in the previous survey.

A web page or online catalogue listing electronic journals provided by your institution/library	This deliberately covers all types of library web sites without distinction.
A specialist web site for your subject area	Additional clarification was provided in the survey by way of a pop-up box describing portal-like sites – a site with non-journal content but with links through to key research articles or journals
A key research group web page	Additional clarification was provided in the survey by way of a pop-up box, indicating a site managed by a research group with links to key journals or papers
A departmental listing of electronic journals	Distinct from a library resource
A publisher's web site such as ScienceDirect, Blackwell Synergy, SpringerLink, HighWire or Wiley InterScience	Although some of the brand names were recently changed due to mergers and acquisitions, it was decided that for reasons of language consistency that the descriptions would be the same as in the previous survey.
Email based alerts	No distinction is made between table of contents alerting (ToC) and alerts from saved searches (or links to new articles matching previous browsing behaviour)
The journal's homepage	There will be some overlap here with the "publisher's web site", not least when referring to a single title publisher.
A journals gateway such as Ingenta, SwetsWise, EBSCO Host EJS	These are well defined, with the caveat that some gateways, e.g. Ingenta, are also journal platforms and hence also effectively the publisher's web site.
A general web search engine e.g. Google	Much research and usage statistics have shown that Google dominates this space of course. No distinction is made between Google and Google Scholar.
A scholarly society web page	Where the scholarly web site is also the primary publisher, there may be overlap here with both the "publisher's web site" and the "journal's homepage"

Citation based searching occurs when a user has citation details in hand. Figure 1, below, shows comparative results² for 2005 and 2008 and shows some important, subtle trends.

In 2005 our research into user behaviour showed that the most likely choice of starting point for users confronted with following up a citation were library web pages and OPACs, followed by specialist bibliographic databases (A&I). However, the A&I databases have eclipsed library web pages since then, and moreover both the A&Is and generalist search engines have gained in popularity since 2005 to the relative detriment of all the other potential starting points.³

What should be noted, however, which is as valid now as it was in 2005, is that all of the options attract some of the preference expressed by researchers in the survey, and a consequence publishers need to pay attention to all these different starting points.

It is interesting just how many people stated that in order to follow up a citation, they would go straight to the journal being cited, presumably because they tend to be following citations into titles that they know well enough to have bookmarked.

² See the section on Methodology for a full explanation on how the data were compared

³ It was perfectly possible for all of the peaks to have become larger. Surveyees simply stated how important each start point was to them, and didn't have to rank them or score them from a limited number of points to be allocated. Therefore it is both gratifying that the peaks are not wildly different from 2005 (it shows that the methodology is not flawed) and interesting that the increase in one behaviour is truly to the detriment of another – it didn't have to be.

When you need to find a specific online journal article and when you already have a reference or citation where do you start your search?

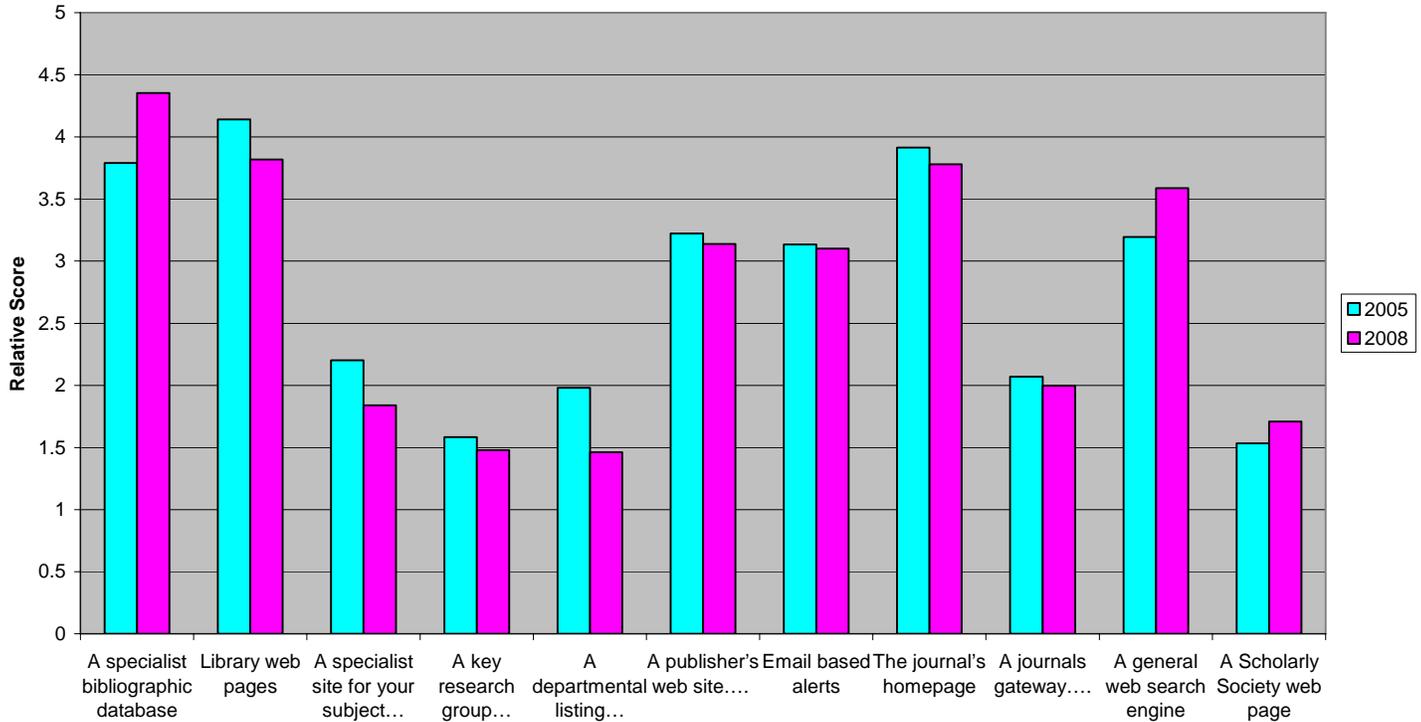


Figure 1 - Citation Searching

BROWSING

The second behaviour occurs when the user regularly reviews a few select journals that he considers worth scanning upon publication. Of course the number of journals that constitute “select” varies from discipline to discipline, but what is shown below in Figure 2, shows a cross-section of routes for all disciplines.

When you wish to view the latest issues of your core journals, how do you navigate on the web to those journals?

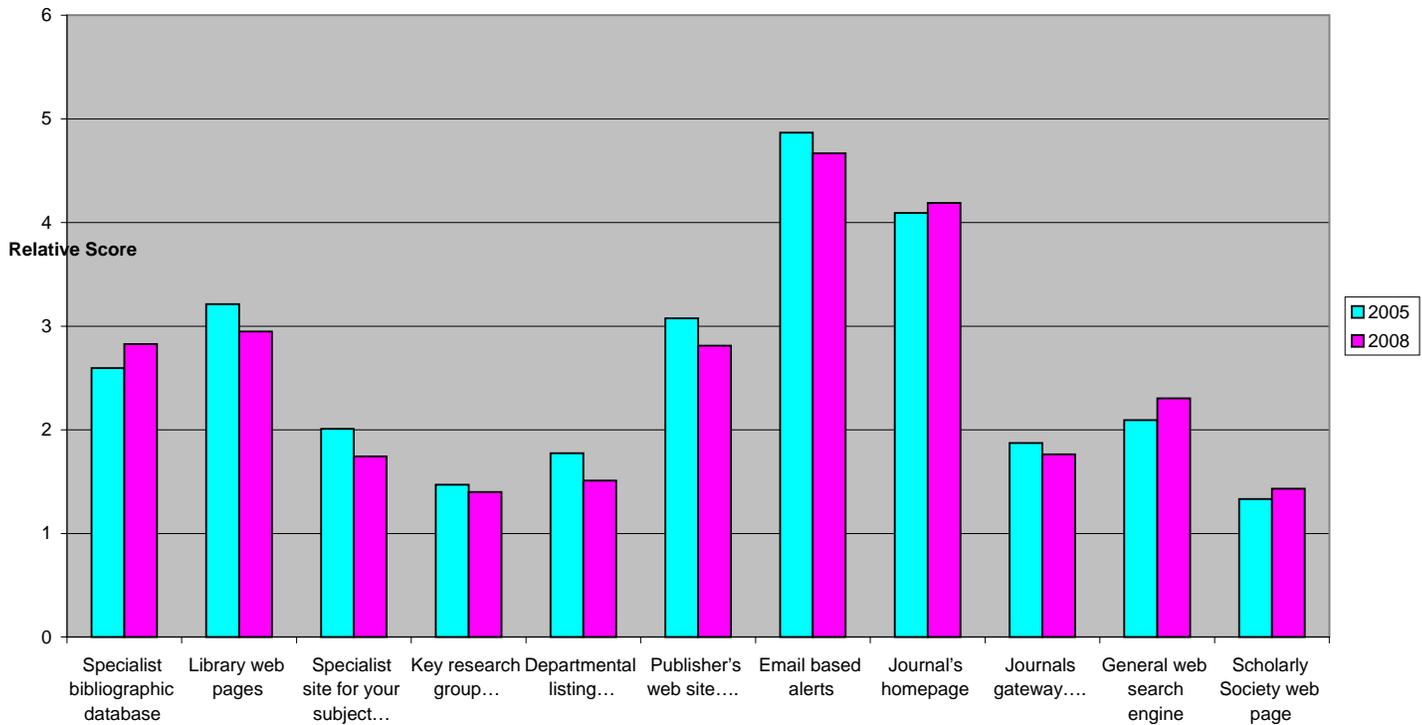


Figure 2 - Regular Reader

Users make use of email alerts and journal homepage bookmarks most frequently, with library web pages, A&Is and publisher web sites providing other routes into the content.

The trend information, however, is again subtle. There has been a relative decline in library web pages for this kind of use, and indeed of email based alerts (however, see the balance between email alerts and RSS in Figure 7 - Web Site Features), but an increase in the number of those going directly to the journal home-page, using a search engine or A&I database.

SUBJECT SEARCHING

The third form of user behaviour occurs when a user is searching for articles on a specific subject. A user is likely to undertake a comprehensive subject search prior to undertaking research in a specific field or when seeking to check, prior to publication, the precise state of the current literature.

When you need to do a search for articles on a specific subject, where on the web do you start that search?

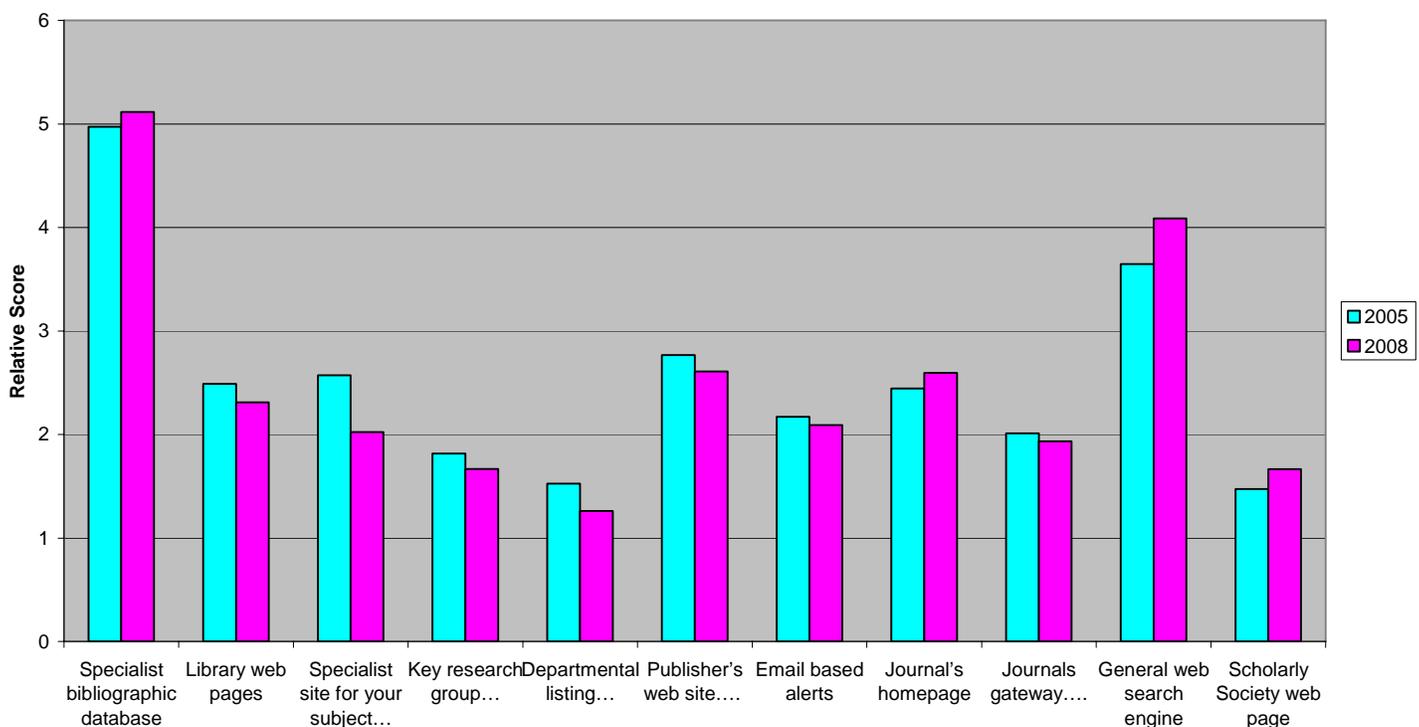


Figure 3 - Search

In such circumstances checking individual publisher sites is not overly effective because of their partial coverage. Having said that, a number of surveyees still adopt this behaviour, presumably in the largest journal publishers' collections at ScienceDirect, SpringerLink, Wiley Interscience, Informaworld and perhaps also in subject areas dominated by single publishers. Primarily, users will tend to perform searches on the principal Abstracting and Indexing (A&I) services for their subject, or use search

engines like Google. The popularity of both of these routes has increased over the past three years, but most notably for the search engines. It would appear that researchers have become more savvy in their use of resources since 2005 – smaller collections of content are, of course, inferior places to conduct a broad search, but evidently larger publisher collections are still worthy of attention. Searching within an individual journal has become slightly more popular – maybe researchers undertake multiple searches in their key journals.

Starting Point Characteristics

Of course, readers of e-journals select different starting points for different reasons, so it is worthwhile considering the characteristics of each starting point here.

ABSTRACTING AND INDEXING SERVICES (SPECIALIST BIBLIOGRAPHIC DATABASES)

The dominant subject A&Is – e.g. Biosis, PubMed, SciFinder, focus on structured access to the highest quality information within a discipline. They typically cover all the key literature but not necessarily all the literature in a discipline. Their utility flows from the one-stop-shop nature of the service that they offer and the perceived certainty and reassurance that they offer to users in providing the authoritative source of search results within a discipline. However, they cannot boast universal coverage of the literature – they provide good coverage of a defined subject niche, but reduce the serendipitous discovery of peripheral material. Also, many A&Is are sold at a premium, which in itself is a barrier to their use.

THE LIBRARY OPAC

The Library OPAC and the library's own web pages, having suffered initially from the growth of general purpose search engines are once more of growing importance as the starting point to navigation. Library controlled web space has the advantage of linking only to content that has been paid for by the library and meets library selection criteria. The library's deployment of link resolver technology has further strengthened their importance. Not only are libraries now the primary purchasers of content for their staff, researchers and students, they are also, where link resolver and associated technology has been deployed, the main determinants of how different, relevant resources are presented and offered to end users; the way in which the user navigates to a publisher site; and also what part of the site the user is delivered to. Most of the library technology layers being deployed offer "deep-linking" direct to

the article level within a journal web-site, very much affecting publisher web-site design.

A SPECIALIST WEB SITE FOR YOUR SUBJECT AREA

Specialist web sites tend to serve highly specific subject niches. They are effectively highly selective content sites and may also contain a high degree of editorial recommendations for content, providing a very useful short-cut for readers wishing to save time when reviewing the literature. Some portals have content licensed to them, which also means that in those cases portal subscribers do not have to worry about further access barriers as they navigate to the content within the portals.

A DEPARTMENTAL LISTING OF ELECTRONIC JOURNALS

A departmental listing of resources, like a library listing, usually provides a list of subscribed resources for the user, as well as a subject focused listing, making both navigation and access to the content easier for the reader.

A PUBLISHER'S WEB SITE

Publisher web sites, of course, contain only a fraction of the available literature in a given subject area, unless that publisher has almost complete dominance of the subject area under consideration. Despite this obvious limitation when searching for new content, the size of these publisher collections and the often superior interface design make these sites appealing to users, even though information specialists would advise against using them in lieu of larger search collections.

EMAIL BASED ALERTS

Email based alerts are a valuable starting point for users in several modes. The obvious advantage of them is that they are under user control, and most

likely are set up for content that the user knows he has access rights to use. By definition, the resource has already gained the user's trust.

THE JOURNAL'S HOMEPAGE

In many ways, the journal's home page is not dissimilar in characteristics to email based alerts. A user has bookmarked a journal home page presumably because he has experience of the journal, has access to it (a subscriber) and has respect and trust for it.

A JOURNALS GATEWAY

A journal's gateway has a number of key advantages over other routes to content. First, they often have a knowledge of the subscription rights of an authenticated user within the service and this allows them to present search results to the user indicating which items he has access rights too. Some gateways can even limit search to subscribed content, a clear benefit for anyone with limited resources. The coverage of gateways is also quite impressive – most of the major gateway brands have the full metadata for over 10,000 journals.

GOOGLE AND OTHER SEARCH ENGINES

The main strengths of search engines such as Google are their simplicity, broad coverage and the fact they are free to use. Some measure of quality is achieved especially with the advent of Google Scholar and the addition of citation ranking to results.

A SCHOLARLY SOCIETY WEB PAGE

Society web pages have much the same appeal a journal homepage. Society members usually have access privileges to the society journals through the site.

The Role of the Librarian

Over the past ten years, libraries have been expending more time and money in the management of e-resources, and much of these efforts have been focussed on the development and implementation of library web pages, journal A to Z listings, improvements to library catalogues, library link-servers and federated search. These web site tools are available from library technology vendors – often the same organisations responsible for the earliest library automation projects of 30-40 years ago, while others are more recent innovators in the area.⁴ .

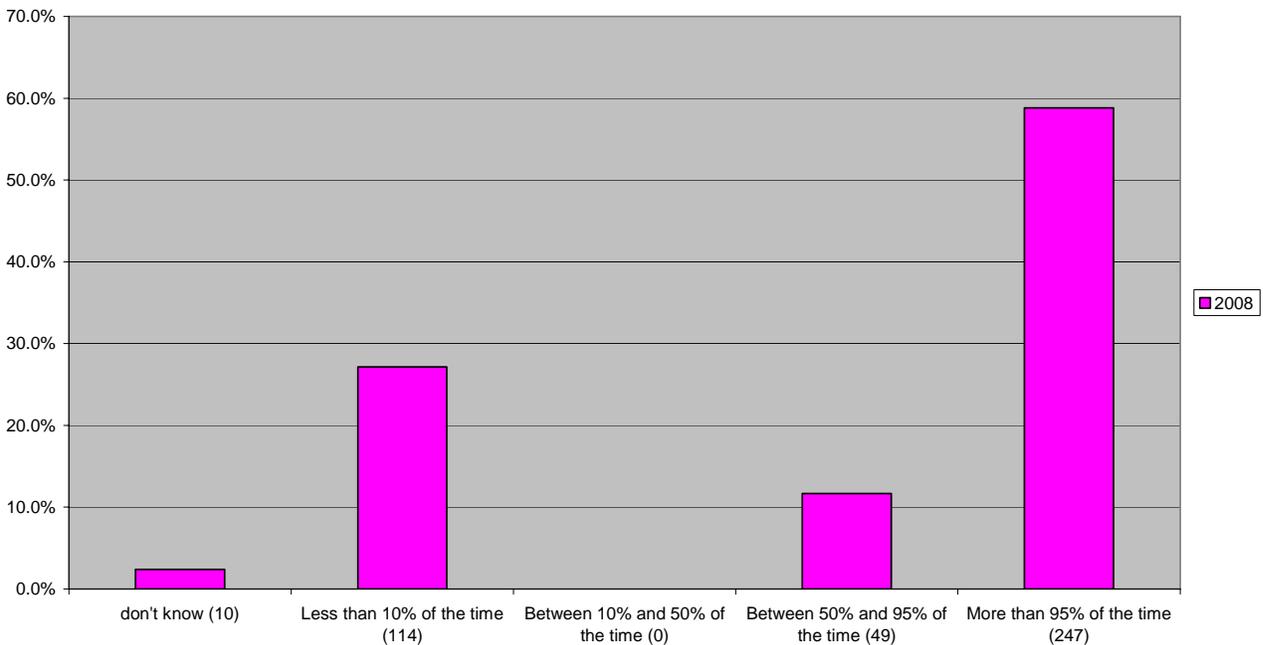
Anecdotally the authors are aware that publishers generally have little appreciation for these technologies and yet combined they have a significant effect on user navigation. Of the library technologies noted, all bar one only effect the user if he chooses the library web site as his starting point for research (as noted above), but the library link resolver has an impact on user navigation regardless of their chosen starting point.

Libraries are making significant investments in order get library patrons to use their carefully selected resources rather than simply using whatever Google searches retrieve. However, until relatively recently, even with all these specially developed library infrastructure products, the librarian could exert little control over the organisation and presentation of resources, once the user had left the library web space. There was no easy way for the library to control where users navigated to, and specifically to ensure that the user was preferentially presented with the version of the content to which the user had

subscription rights. This is the purpose of the library link server (or link resolver) – a technology layer that assists in user navigation by showing the user their options for obtaining their target content – whether from the primary publisher’s web site, an aggregated collection of content or other options such as print holdings, inter-library loan or document delivery.

As part of the survey, we asked users about the influence of library technology and the findings are shown in Figure 4, below.

How often do you think that technology deployed by your institution's library affects how you navigate to e-journals?



⁴ Ex-Libris and Serials Solutions are two examples of well-known library technology vendors

Figure 4 - Intermediation of Library Technology

This is an amazing result for library technology. Nearly 60% of surveyees recognised that library technology (most likely, therefore, link servers) intermediated their navigational route to e-journals more than 95% of the time. A further 10% felt it was over half of the time. Presumably, therefore, at least 70% of the survey respondents were in institutions with highly effective technology implementations.⁵

As a consequence, publishers need to ensure that their e-content site is enabled as an OpenURL aware target, so that link servers can point to it. In a library-intermediated world, this should have a fairly radical effect on the number of users who successfully navigate to a web site – links from A&Is, gateways and other content hosts should all end up at the version of a publisher's content appropriate (i.e. accessible) to them.

Secondly, but less critically, publishers could enable their e-content sites as link sources, so that readers clicking on reference links in the publisher site are taken to the librarian's preferred version of the reference, i.e. one that a user has rights to see rather than one that leads the user up a cul-de-sac.

⁵ There are no comparative data for 2005 for this question. This question was introduced to the survey for the first time in 2008.

Article Linking

In the survey, researchers scored the relative importance of additional routes to content through various forms of article linking. The results show that RSS is still in its infancy (and maybe of greatest utility to libraries or other gateway builders), but perhaps most interestingly the category of “from links in emails from colleagues and peers” was also quite important. When combined with the result for reference linking this underlines the importance that publisher web sites are capable of being bookmarked and linked to at the article level.

How often do you follow links to a publisher’s electronic journal web site from these starting points?

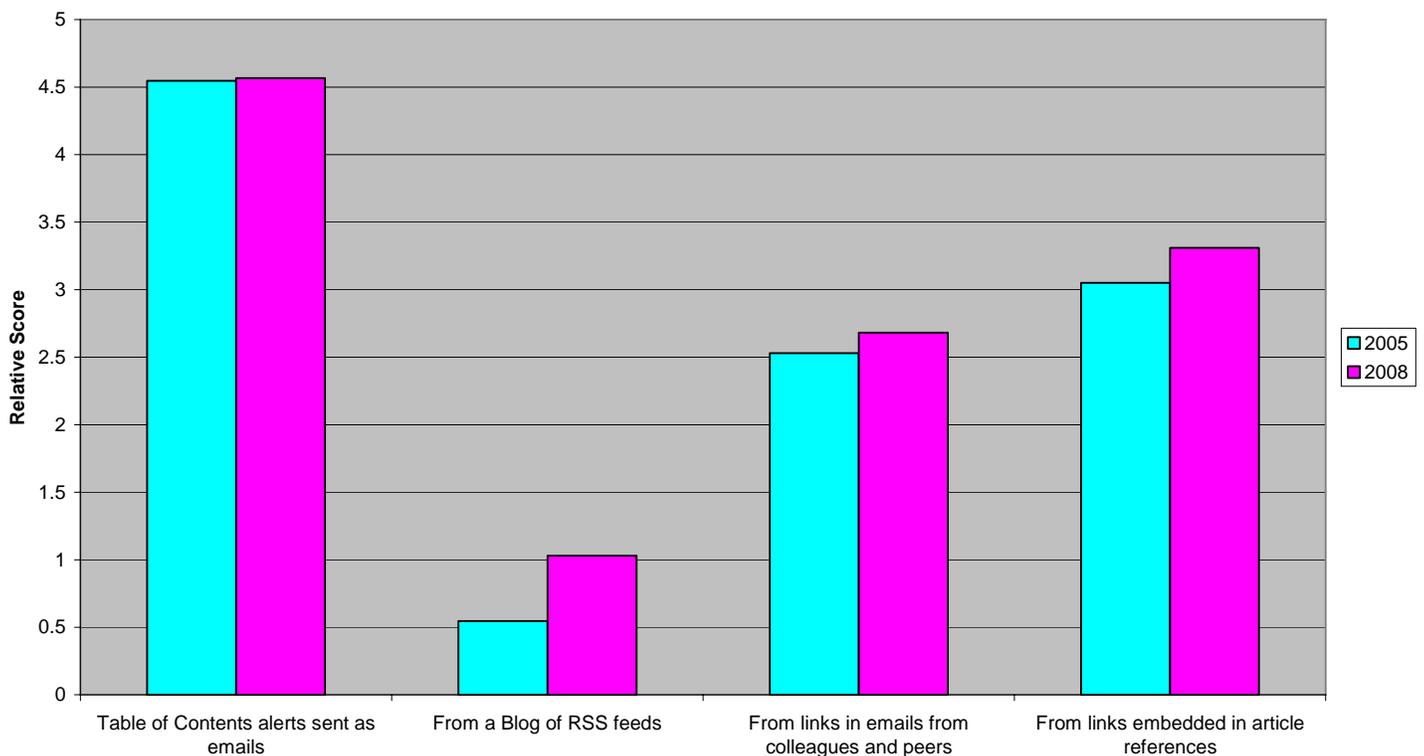


Figure 5 - Linking

Routes to Content and Hosting Options

Reader behaviour, the characteristics of different starting points, and the deployment of library technology are all relevant to a publisher seeking to decide how to deploy content and specifically where to host.

What has become abundantly clear over the past few years is that having content visible through as many channels as possible is optimal, whereas having it physically hosted on more than one journal platform is detrimental:

No-one can police or predict where users will choose to start their research; their choices reflect a complex array of their perceptions of the starting point characteristics, brand awareness, budgetary considerations and which sites they trust. As a consequence a publisher must actively back all of the navigational options for its readers and not try to pre-judge any of them. To achieve this publishers should collaborate with Google so that it optimally indexes the publisher's content; publish XML catalogues containing the meta-data of its articles for library technology companies to harvest; support "deep-linking", OpenURL linking and have a predictable URL syntax for its articles; promote its content to the key A&Is and campaign for inclusion in their databases; and provide RSS feeds of recent content for other sites, such as portals, to pick up. All of these activities promote the publishers content, and some of them are of near critical importance, since the absence of a publisher's content from a library technology vendor's knowledge base can have a catastrophic effect on discoverability.

If a publisher chooses to make its content physically available on more than one platform, there can be significant confusion for librarians as they must choose the appropriate incarnation to link to for their patrons. These multiple incarnations may additionally have varying prices: library technology will certainly highlight alternative, cheaper resources. Multiple platforms can be deployed effectively if aimed at different market sectors; this has been in the deployment of some medical journals on platforms

that either target libraries and their patrons or, quite separately, individuals.

The Reader on the Publisher's Site

The objective of the publisher when the user arrives at its site should be to present the user with the required content as quickly and painlessly as possible. This is not always achieved, however, but there are some ground rules that may be worth considering specifically for scholarly content. First among these is getting the user to the content they want with as few clicks as possible, ideally none. This is, of course, in part, a function of where they arrive on the site in the first place.

When you arrive at a publisher's electronic journal web site by following a link from another website or a bookmark, how often do you arrive at each of the following points in the web site?

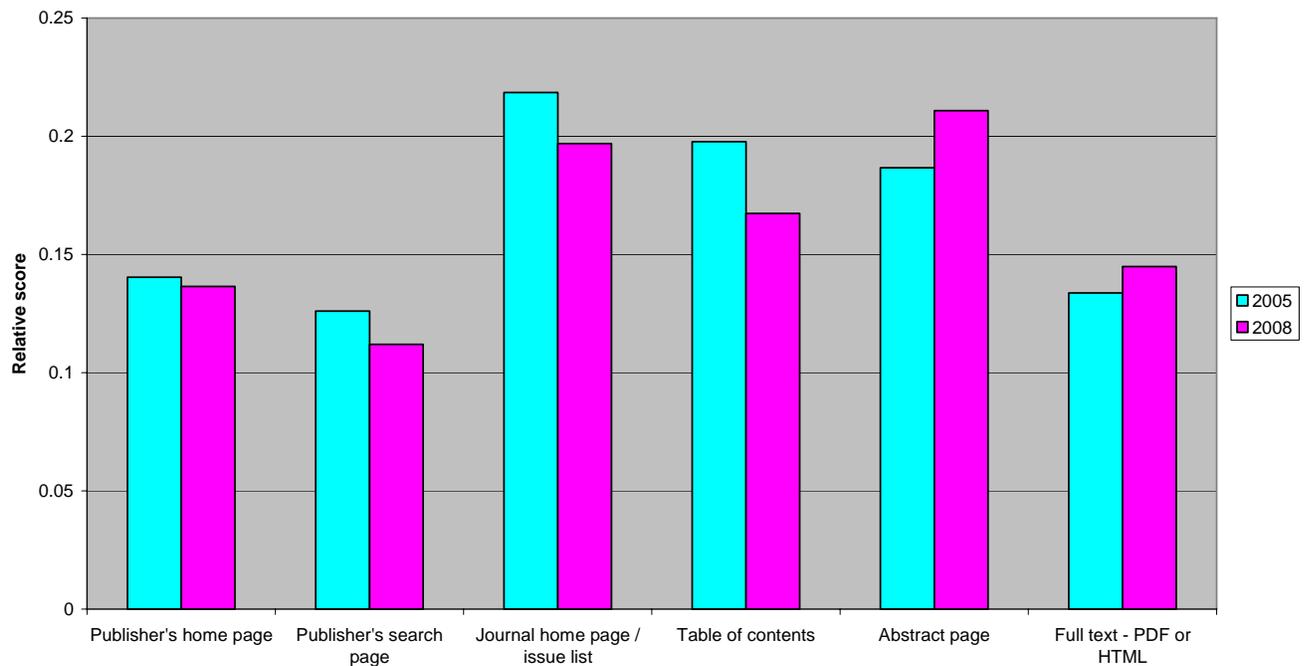


Figure 6 - Landing Page

Figure 6, above shows that over the last three years, researchers find themselves arriving more deeply into the publisher's web site than they did before.

This distribution of landing points is determined by where on the web they started from, how link resolvers are set up, and how many libraries have them. The impact of this on publishers is that the navigational aids and

journal or publisher branding that are required to assist and inform the user, need to be available on those pages that users first arrive at. Any information that might reasonably be expected – and ideally has been validated through market research – to be of interest to the end user such as perhaps, membership information, subscription information or submissions procedures, needs to be made available via links from the most popular landing pages.

In addition, if more users are arriving at a point deeper in the publisher web site than ever before, it follows that much of the functionality that they seek must now be provided elsewhere in their navigation, within a search engine, a gateway, or even within a library link resolver, rather than within the publisher site itself.

In the survey, respondents were invited to indicate which features, of a selected list of features of publisher web sites, they found useful and the results are presented in Figure 7 - Web Site Features.

The shifts in importance of the features shown over the past three years are in some cases quite stark. Table of contents alerting remains the most popular feature, whilst other forms of alerting (citation alerts, saved search alerts) were also seen as very useful. It is in those areas dealing in “trust” – where users follow up information suggested to them by their peers and the journal’s editors, such as “news” and “editor’s choice” where the greatest gains have occurred. These used to be much underutilised areas but one presumes that publishers have become better attuned to their reader’s needs and readers themselves have grown to value the information being presented and have started to trust the information being presented as being worthy of further reading.

Similarly, RSS feeds, although still a relatively small impact, has grown enormously in popularity.

What features do you find useful in publishers' electronic journal web sites?

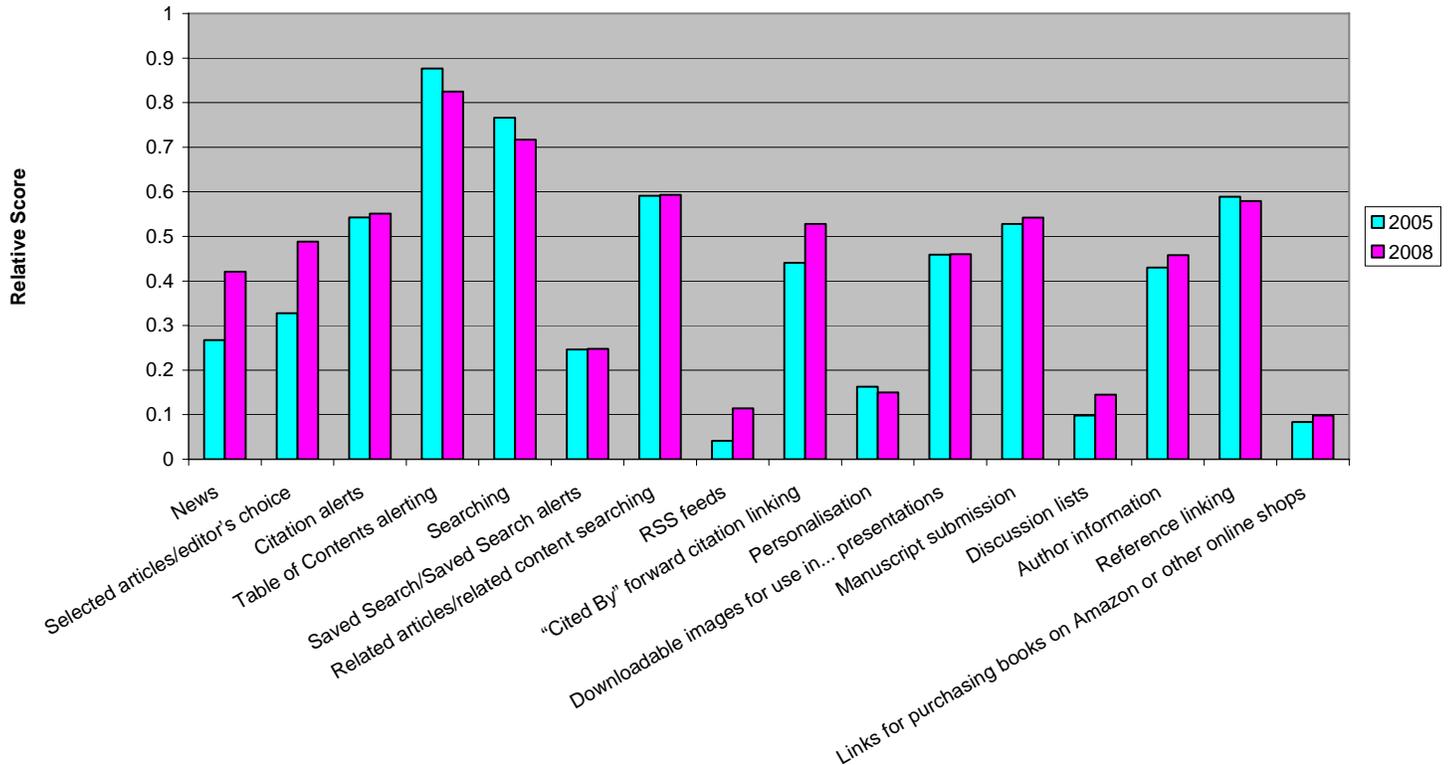


Figure 7 - Web Site Features

Figure 8 - Alerting Services, below, shows how users are also increasing the number of web-sites within which they will set up alerting services. These are not limited to those journals that the reader considers as core, but are evidently set up more widely. The majority of people still state that they use these services only on their core journals' sites, but an increasing number disagree with this strategy.

Figure 9 - Personalisation, below, shows a different trend; fewer people are setting up personalisation services on web sites than before. This is not surprising, since, anecdotally at least, the authors are aware of low usage of such features reported by publishers and, with the advent of Web 2.0 technologies, there are other ways of providing some of the features of personalisation without having to track the individual.

I only use alerting services, saved searches and citation alerts on those publisher sites that contain the few journals that are absolutely core to my reading needs.

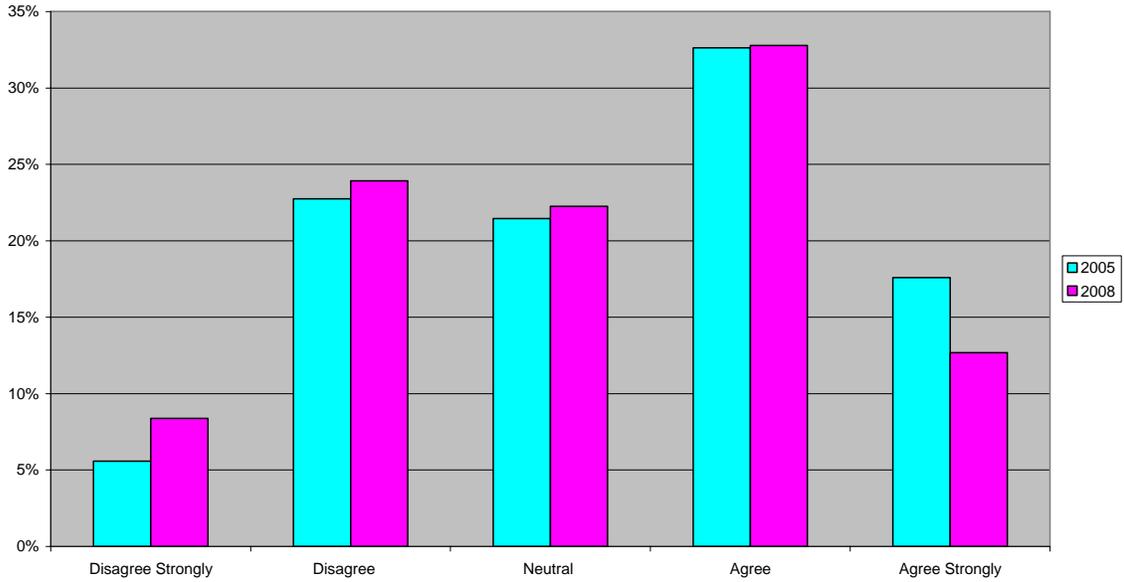


Figure 8 - Alerting Services

I use personalisation features on many publisher web sites

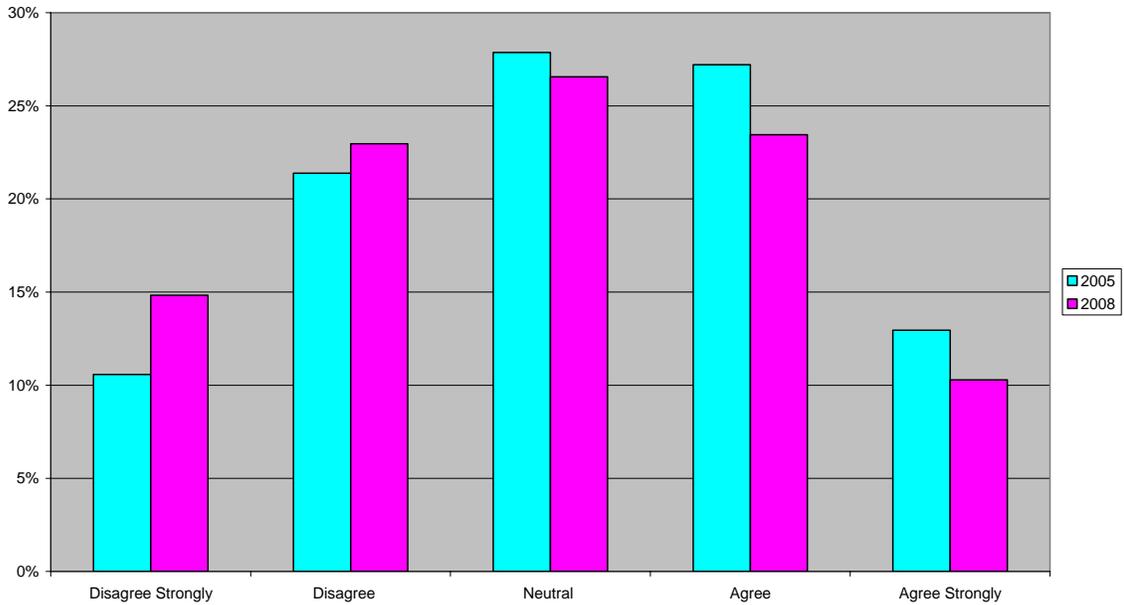


Figure 9 - Personalisation

Publishers remain under pressure, however, from editorial boards and society members to create a high level of functionality and the publisher has to

manage a careful balancing act to satisfy all of its constituencies. While some features are clearly little used and little respected by researchers, it is often the case, especially for a commercial publisher, that these features have to be developed to support a political position with respect to societies and powerful editorial board members.

Society Web Sites

Of course many leading learned societies are also publishers of journals. These journals may often be subject to publishing agreements with commercial publishers and as a consequence these titles are hosted on the publisher's journal platform. However, even in these cases, it is not uncommon for societies to build links from their own web sites to their journals on a publisher's web site, thus making the society web site a gateway to the journal content. Other societies manage their own publishing program and manage the journal hosting platform themselves. In these cases there is often a seamless transition from the society web site to the journal web site.

In either case, the society web site can be an important starting point for a researcher, not least because of brand familiarity and the trust afforded through membership.

The survey studied the importance of the society web site in a number of ways, firstly as a starting point as already noted in Figure 1 through Figure 3. In addition, however, specific questions about the importance of the society web site were included in the survey, but these show a declining importance.

How often do you use society web pages when you need to find a specific online journal article or reference work?

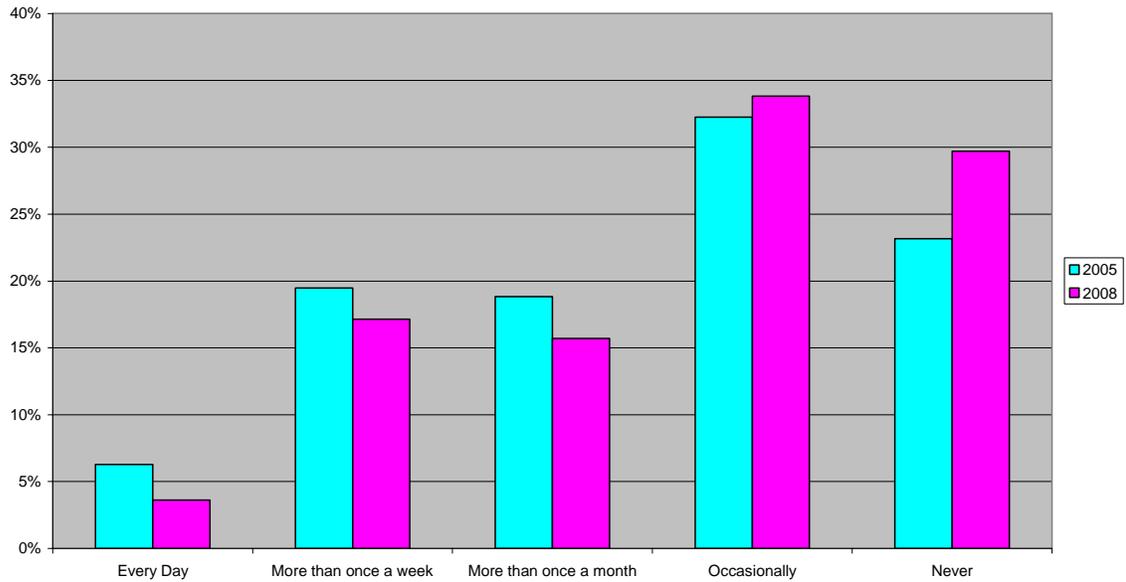


Figure 10 - Society Web Pages and Journal Articles

How often do you use society web pages when you wish to view the latest issues of your core journal list?

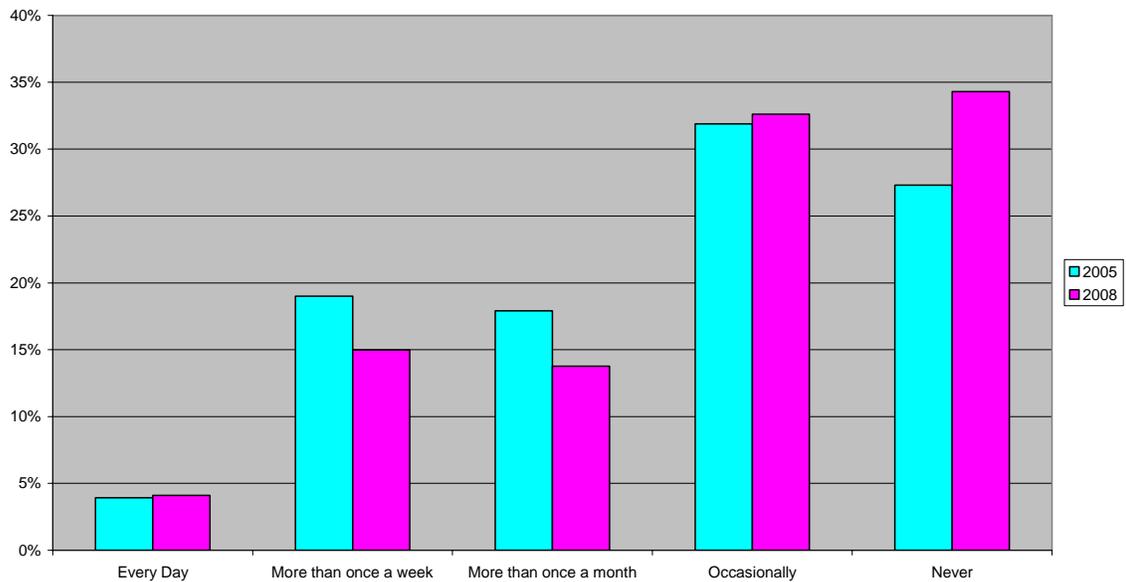


Figure 11 - Society Web Pages and Core Journal List

In both Figure 10 and Figure 11 we see a decline in the frequency that researchers report using society web pages for the two behaviours under

study. However there may be other, community-based roles for society web sites that the authors will seek to uncover in future survey research.

Methodology

The survey, as conducted in 2008, was formed as similarly as possible to the original survey conducted in 2005. An invitation to take the survey was emailed to a large selection of readers of Annual Reviews, Nature and PNAS.

Since the research set out to look at trends in respondents' views over a three year period, it was imperative that the survey used language and terms as similar as possible to the original research, that the medium of collection was the same (online survey) and the temptation to add greatly to the survey was resisted. Some clarification of terms was deployed by means of pop-up dialogues in this version that were not present in the original survey and some example web sites used to clarify terms have since changed their names through mergers and brand realignment.

The original survey was emailed to the recipients of ToC alerts from EBSCO's MetaPress with permission of the two major publishers who had collected the email addresses of many thousands of individuals. These publishers covered STM, Social Sciences and Humanities, but no analysis (or sampling) was done of those being emailed as to which subjects they studied, which would have offered a better cross-section of the community. To incentivise participation, the survey included an optional prize draw. The original survey received 481 responses.

This repeat survey was emailed to ToC alert subscribers from Annual Reviews Inc, a sample of ToC alert subscribers to Nature publications and as a short invitation as part of regular ToC alerts from PNAS (using a placeholder normally reserved for advertising). To incentivise participation, the survey included an optional prize draw. The repeat survey received 782 responses. Perhaps unsurprisingly the resultant responses came from a higher proportion of Life Scientists in North America than had the original survey.

It was important, therefore, to test what effects on the overall results these shifts in demographics had and to correct for them, so that a true comparison or trend could be seen from the data.

The main shift in regional demographic was an increase in the proportion of responses from North America at the expense of Europe, with an unsurprising rise in the responses from Asia. The data was re-sampled to the levels of responses from each region in the original study and a selection of the results were plotted and compared with the non-adjusted set. There was found to be no significant shift in the responses indicating that there is no need to adjust the results for the regional demographic shift.

However, when the same approach was taken with the subject demographic of the respondents, it was discovered that Life Scientists in particular had significantly different behaviours to other subject disciplines (which typically include greater use – and presumably paid access to – professional abstracting and indexing databases). As a consequence, for the purpose of plotting the comparisons shown in this white paper, the responses were down-sampled to the same levels of respondents in each of the subject demographics as responded in 2005. So, while we cannot pretend that the data shown represents some “average” behaviour across all disciplines, it is valid to look at the trend over time with respect to each behavioural aspect and feature preferences.

Conclusions

A key measure of publisher success is the usage of its e-journals, which can be maximised by influencing and enabling all the routes to its content. Library technology plays a key role in user navigation, as well as the more apparent starting points such as Google or major subject A&I databases.

Publishers need to support all conceivable routes to their content through the web. This can best be achieved through the open distribution of XML metadata catalogues, through RSS feeds, collaboration with CrossRef, library technology vendors and through working with major gateways, A&Is and search engines.

Just as was stated in 2005, as metadata distribution is maximised and users are able to choose more freely their preferred routes to content, many of the advanced features that users require are likely to migrate to their chosen gateways (or portals) leaving the publisher site ever more as a content silo, without the need for many of the advanced features that are currently present there.

At the same time it remains true that publishers are under pressure from editorial boards, society members and perversely even from librarians, to create a high level of functionality and the publisher has to manage a careful balancing act to satisfy all of its constituencies.

About the Authors

Simon Inger has been working in the journals industry for over twenty years. In this time he has worked for B.H.Blackwell, CatchWord, Ingenta and, since 2002, as an independent consultant. Simon was co-founder and Managing Director of CatchWord Ltd, the world's largest e-journal hosting organization, from its inception in 1995 to its sale to Ingenta in February 2001.

Simon has worked extensively in journal sales, marketing & pricing; e-journal delivery & platform selection; fulfilment & editorial systems selection; management; financial planning; product development; market research; content development; and library technology. In addition he runs training courses for librarians in the UK and Ireland on e-journal technology and management under the banner of UKSG, as well as courses for publishers focussed on content delivery through gateways, search engines and library portals.

Simon is often invited to speak at library and publishing conferences on subjects from global e-journal delivery to library portals, OpenURL and linking and their impacts on purchasing and consumption.

Tracy Gardner has more than thirteen years experience in marketing and communications, 10 of which have been served within the learned publishing industry.

She has a very broad view of the industry having worked for publishing technology companies (CatchWord and Ingenta), a not-for-profit publisher (CABI Publishing) and a consultancy company (Scholarly Information Strategies) where she worked on key marketing and market research projects for publishers, intermediaries and libraries. Tracy has been a co-trainer on UKSG's E-Journal Technical Update course for the past 2 years and now works for herself delivering marketing consultancy and training services to those involved in the scholarly publishing industry.