Measuring success on the Web

In order to justify the creation of interoperable services at a European level, it is necessary to demonstrate the use that is made of the services, the ways that the material is being used and the impact that it has upon real users.

The issues of measuring web statistics are complex, and are well known for being unreliable and difficult to interpret (Goldberg 1995). The issues of cacheing and the widespread adoption of proxy servers make it very difficult to be able to compare web statistics in any meaningful way.

However, with these caveats in mind, it does appear possible to agree a series of measures based on the use of web statistics, collected by a range of standard packages. Web statistics is well-known for being a very inexact science. There is enormous confusion, with programmes and projects often reporting the number of 'hits'. As is well-known, this measure says more about the number of images and other components used in the design of each web page than it does about the number of users.

Benchmarking Use

It is necessary to compare the number of real users of a website, in order to demonstrate success, and as part of benchmarking exercises. In the UK, the NOF-digitise Programme has developed a basic set of measures for the use of cultural websites funded under the Programme. These basic measures were based on the following guiding principles:-

- that the measures were logical
- that they could easily be implemented
- that tools were available free, or at low cost
- that there was a low management overhead of producing the measures.

These basic measures are:-

- the number of user sessions
- the average length in minutes of user sessions
- the total number of page impressions

From these three basic measures is derived a fourth measure:-

- the average number of page impressions per user session

These measures are backed by guidance for projects on what these measures mean, and how they can be collected.

> ***User Sessions***
> *The number of distinct user sessions chalked up over the reporting period.*
>
> *User sessions are determined by grouping together all requests that come from the same IP address within a time interval of no less than 30 minutes between each request. The figure of 30 minutes is widely used and is the default in many web analysis packages.*
>
> ***Note:** This is NOT the "unique users" value. User sessions include repeat visitors to your pages.*

Note: *Due to issues with NAT (Network Address Translation, used when several machines are connected from a local network through one Internet connection), proxy servers, etc there may be times when many users are simultaneously using the site all through the same IP address. In this situation, the user session becomes invalid - all these user sessions will be counted as one huge user session. This is a limitation of the way the Web works, and all services which collect statistics are subject to the same distortion of their figures.*

Average duration of user session
By examining the time of the first and the last request made during a user session, a figure for the length of the user session can be obtained. The average duration of a user session is the average length of all user sessions found.

Note: *some good packages (notably analog amongst others) are not able to calculate the user session length, so cannot provide this information. Where this is the case, projects should answer with "n/a : " followed by details of the log analysis package in use.*

Page impressions
Total number of requests for files that are defined as pages.

Generally files that have extensions .htm, .html, .shtml, .php, .asp, .pl, .cgi and so forth. The exact set may differ amongst projects, projects will be expected to set up their analysis packages so that all page-type files are measured.

Note: *Do not include images, graphics, stylesheets, external script files or other "component" files that together comprise one page.*

Note: *Requests that can be positively identifed as emanating from non-human sources should as a matter of standard practice be excluded from the analysis. You must ensure that your reports do not include data coming from search engine spiders, network monitors, benchmark tests and other generally invalid sources.*

Note: *Some projects may be generating dynamic urls where the base url remains the same, and the page delivered is determined by the contents of the query string: ie http://www.domain.com?page=search&type=quick.*
In this case, special steps may have to be taken to convert log files to sensible page impressions values.

Dowdell, P. (2003)

These statistics, particularly the number of pages viewed per user session, demonstrate the way that the site is being used, a low number indicates that few users are exploring the site in detail, or that users are not finding the information that they are looking for. A high number indicates significant involvement with the site and its content, and could be termed an ‘Involvement factor’.

These basic measures are being collected across all 150 projects funded through the NOF-digitise programme, and initial results are extremely interesting. The measures appear to have been simple to implement, with few problems reported in their adoption.

The results so far, with approximately half a cycle of collection completed indicate the following headline figures:

- that over 5 million visitors a year are using the websites
- that the average length of a user session is approximately 3.2 minutes
- that the average number of pages viewed per user session is 4.4

However, it is important to recognise that, as yet, many of the projects have not yet launched, or have produced holding pages which will artificially reduce the average.

In the UK, this set of basic measures has been used by the 24 Hour Museum (www.24hourmuseum.org.uk) in order to benchmark the use of a small range of websites. A report has been published comparing the use of the websites, and this has produced some interesting comparisons. Particularly interesting was the ability to compare the website of a major broadcaster (Channel4.com).

Website	Page impressions	Visitor sessions	Average visit duration	Number of pages viewed per session
National Archives	77,440,747	1,512,649		51.20
Tate	32,982,581	4,799,605	6.52	6.87
National Trust	23,004,081	3,178,640	5.44	7.24
Natural History Museum	22,344,957	5790771	9.02	3.86
Science Museum	9,843,548	2,670,585	7	3.69
Imperial War Museum	7,427,122	1,688,396	8.09	4.40
National Maritime Museum	6,500,000	1,600,000	9	4.06
National Portrait Gallery	5,932,883	1,295,389	6	4.58
24 Hour Museum	4,040,131	775,457	6.49	5.21
NMGW.ac.uk	1,875,659	491,936		3.81
Nat. Museums of Scotland	1,851,201			
Access Art	1,614,964			
Ashmolean	1,400,000	200,000		7.00
Fitzwilliam Museum	1,055,152	210,603	5.18	5.01
Mary Rose	435,706		4.92	
Channel 4	436,187,975	50,439,752	7	8.65

The measure of the number of pages viewed is a useful comparison, with a number of provisos. These include:-

- will not reflect the use made of multimedia content
    - extensive use of Flash, video or VR content will not be represented in the measure
- can be skewed by page design
    - the creation of short pages or intermediate pages in the design will increase the number of pages viewed, but reduce the usability of the site

International Audience

The 24 Hour Museum also compare the number of visitors with internet domain registrations that relate directly to the UK. Again, this is a statistic open to great misunderstanding. Superficially, a figure such as 22% UK-specific users ignores the large number of users that use an ISP that does not include a country-specific domain in the URL, such as users of AOL.com or BTopenworld.com. These users, although geographically based in the UK, have international domain names, and so could appear as though they are US-based. However, as long as the caveats are understood, this is an interesting way of considering the type of use being made of a website. In a European context, this metric would measure the percentage of visitors that came from within the Member State, giving an indication of the national reach of the website.

Website	**% UK specific visitors**
Beamish	32%
Tate	29%
Fitzwilliam Museum	27.29%
National Trust	25%
Bowes Museum	22.10%
24 Hour Museum	22%
Mary Rose	21.50%
Science Museum	15.35%

To properly reflect international use of the website it would be necessary to report three percentages:-

- use by national domain addresses (eg .it, .fr)
- use by .com addresses
- use by other national domain addresses

It is possible to use a detailed analysis of web statistics to identify the proportion of .com addresses that are likely to originate from within the national domain. Whilst this is clearly desirable, this would require a detailed analysis of the statistics. Were this to be implemented as a measure, then an individual country may wish to recommend or apply a correction factor.

The table below shows how this might be applied. The ‘corrected’ figure has been obtained by identifying the .com suffixes used by UK based organisations (such as BTopenworld.com and LTScotland.com) and subtracting these from the uncorrected figure. If this idea were to be taken forward, it should be possible to identify the proportion of UK subscribers to major international ISPs such as AoL to introduce an estimated further correction. In this case a notional 25% of AOL users of this website have been estimated to be based in the UK.

Suffix	Uncorrected		Corrected	
.com	3186	68%	2661	56%
.uk	1283	28%	1808	38%

other	207	4%	207	4%

This correction factor (in this case 0.82) could be established for typical 'groups' of websites by comparing web statistics with online surveys. From this table the percentage of users of the site that derive from outside the country of origin can be derived, and can be usefully be compared with similar sites. This measure of International impact would serve to highlight the way in which small institutions can address an international audience through the use of new technologies.

Engagement Factor

In Canada, a interesting methodology has been developed to address similar issues, with a simple measure that has been called the 'Engagement Factor'.

> *The Engagement Factor is used to communicate the VMC's performance as a whole, and to report on each of the VMC's products separately. It describes users' engagement and the quality of their visits over time. It is worth noting that the Engagement Factor reflects the quality of the visit directly and does not necessarily provide specific information about the quality of the product.*
>
> *The Engagement Factor is based on three simple and basic metrics:*
>
> - *Number of visits;*
> - *Number of unique visitors; and,*
> - *Duration of visits.*
>
> *The formula for the Engagement Factor, as developed by Lyn Elliot Sherwood, is as follows:*
>
> $$\frac{\textbf{Visits}}{\textbf{Visitors}} \textbf{ X Duration}$$
>
> *This formula incorporates the average length of visits (duration) and the average number of return visits (number of visits divided by number of visitors) to determine the depth of interest visitors have in a particular product.*
>
> *Each of the three basic metrics of the Engagement Factor provides important data regarding the quality of the users relationship with the product. However, each one on its own tells only part of the story. It is for this reason that the Engagement Factor, which is based on the correlation of all three, has proven, thus far, to be effective in determining the users overall engagement with a product. An examination of each of the three metrics will clarify this point.*
>
> (Gauvin, Geber & Timpson, forthcoming)

The Engagement Factor gives a very simple approach, and produces a useful metric to that can be compared with other websites.

Market Penetration

A further aspect that could be measured is that of market penetration. In marketing, it is common to identify the size of the intended market for a product or service, and

then to measure the penetration into that market. In the development of digital services, many projects define their target audiences (market) in extremely wide terms – 'children and life-long learners' or 'general public'. Whilst undoubtedly true for websites that give general information about an institution, this is not true for elements of the site that target, for example, schoolchildren, or particular minority audiences. As a result, it is possible for some services to identify their prime target audience. In the case of a small museum developing a resource about the Roman period in a sub-region for schoolchildren studying a particular part of a National Curriculum, then it is possible to identify how many children each year will be studying that topic. By comparing this figure with web statistics, it should be possible to give an indication of the penetration of the website into the intended market.

In reality, these figures will be distorted. Using web statistics to identify the number of users is prone to error (particularly in education where there may be cacheing services in operation) and users of the service may be beyond the intended target audience (there may be a group of adult learners who are using the site, or a group of children from a neighbouring region may be using the site). However, this may be a useful measure to consider, and will identify the contribution being made by small institutions. In small institutions the numbers generated by web statistics may appear small, but the market penetration may be extremely high, indicating the success of the website in meeting the needs of the target audience.

The market penetration should be reported as a percentage of the target market, together with an explanation of how the target market has been defined. However, this measure is most appropriate for those services with a clearly identified market – such as educational resources – rather than more general informational websites or collections databases.

Recommendation

As a result of this discussion, it is recommended that services be encouraged to measure and report on the following measures:

- Number of visits
- Involvement factor
- Engagement factor
- Market penetration
- International impact

In order to support these measures, services should report on a monthly basis:-

- number of visits
- number of unique visits
- average visit duration
- number of pages viewed
- visitors with
    - .com domain suffix
    - national domain suffix
    - other national domain suffixes

Services should also report the following, and review on an annual basis

- size of target audience / market and the basis on which this was calculated
- International correction factor applied and the basis on which this was calculated

These measures should be clearly reported on each website. It is possible to consider how an XML schema for these statistics could be created, and harvesting mechanisms built in order to harvest the figures at a national level.