

# Chapter VIII

## A Review of Methodologies for Analyzing Websites

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### ABSTRACT

*This chapter is an overview of the process of Web analytics for Websites. It outlines how basic visitor information such as number of visitors and visit duration can be collected using logfiles and page tagging. This basic information is then combined to create meaningful key performance indicators that are tailored not only to the business goals of the company running the Website, but also to the goals and content of the Website. Finally, this chapter presents several analytic tools and explains how to choose the right tool for the needs of the Website. The ultimate goal of this chapter is to provide methods for increasing revenue and customer satisfaction through careful analysis of visitor interaction with a Website.*

### INTRODUCTION

Web analytics is the measure of visitor behavior on a Website. However, what kind of information is available from Website visitors, and what can be learned from studying such information? By collecting various Web analytics metrics, such as number of visits and visitors and visit duration, one can develop key performance indicators (KPIs) – a versatile analytic model that measures

several metrics against each other to define visitor trends. KPIs use these dynamic numbers to get an in-depth picture at visitor behavior on a site. This information allows businesses to align their Websites' goals with their business goals for the purpose of identifying areas of improvement, promoting popular parts of the site, testing new site functionality, and ultimately increasing revenue. This chapter covers the most common metrics, different methods for gathering metrics,

how to utilize key performance indicators, best key practices, and choosing the right Web analytics tool.

The first section addresses metrics, information that can be collected from visitors on a Website. It covers types of metrics based on what kind of data is collected as well as specific metrics and how they can be utilized. The following section discusses the two main methods for gathering visitor information -- log files and page tagging. For each method, this section covers the advantages and disadvantages, types of supported information, and examples for data format. Following this is a section on how to choose the key performance indicators (KPIs). This includes outlining several business strategies for integrating Web analytics with the rest of an organization as well as identifying the type of Website and listing several specific KPIs for each site type. The following section provides the overall process and advice for Web analytics integration, and the final section deals with what to look for when choosing analytics tools as well as a comparison of several specific tools. Finally, the conclusion discusses the future of Web analytics.

## **METRICS**

In order to understand the benefits of Website analysis, one must first understand metrics – the different kinds of available user information. Although the metrics may seem basic, once col-

lected, they can be used to analyze Web traffic and improve a Website to better meet its traffic. According to Panalysis (<http://www.panalysis.com/>), an Australian Web analytics company, these metrics generally fall into one of four categories: site usage, referrers (or how visitors arrived at your site), site content analysis, and quality assurance. Table 1 shows examples of types of metrics that might be found in these categories.

Although the type and overall number of metrics varies with different analytics vendors, there is still a common set of basic metrics common to most. Table 2 outlines eight widespread types of information that measure who is visiting a Website and what they do during their visits, relating each of these metrics to specific categories.

Each metric is discussed below.

### **Visitor Type**

Since analyzing Website traffic first became popular in the 1990s with the Website counter, the measure of Website traffic has been one of the most closely watched metrics. This metric, however, has evolved from merely counting the number of hits a page receives into counting the number of individuals who visit the Website.

There are two types of visitors: those who have been to the site before, and those who have not. This difference is defined in terms of repeat and new visitors. In order to track visitors in such a way, a system must be able to determine individual users who access a Website; each individual visitor

*Table 1. Metrics Categories (Jacka, n.d.)*

Site Usage	Referrers	Site Content Analysis	Quality Assurance
<ul style="list-style-type: none"> <li>• Numbers of visitors and sessions</li> <li>• How many people repeatedly visit the site</li> <li>• Geographic information</li> <li>• Search Engine Activity</li> </ul>	<ul style="list-style-type: none"> <li>• Which websites are sending visitors to your site</li> <li>• The search terms people used to find your site</li> <li>• How many people place bookmarks to the site</li> </ul>	<ul style="list-style-type: none"> <li>• Top entry pages</li> <li>• Most popular pages</li> <li>• Top pages for single page view sessions</li> <li>• Top exit pages</li> <li>• Top paths through the site</li> <li>• Effectiveness of key content</li> </ul>	<ul style="list-style-type: none"> <li>• Broken pages or server errors</li> <li>• Visitor response to errors</li> </ul>

is called a unique visitor. Ideally, a unique visitor is just one visitor, but this is not always the case. It is possible that multiple users access the site from the same computer (perhaps on a shared household computer or a public library). In addition, most analytic software relies on cookies to track unique users. If a user disables cookies in their browser or if they clear their cache, the visitor will be counted as new each time he or she enters the site.

Because of this, some companies have instead begun to track unique visits, or sessions. A session begins once a user enters the site and ends when a user exits the site or after a set amount of time of inactivity (usually 30 minutes). The session data does not rely on cookies and can be measured easily. Since there is less uncertainty with visits, it is considered to be a more concrete and reliable metric than unique visitors. This approach is also more sales-oriented because it considers each visit an opportunity to convert a visitor into a customer instead of looking at overall customer behavior (Belkin, 2006).

### **Visit Length**

Also referred to as Visit Duration or Average Time on Site (ATOS), visit length is the total amount of

time a visitor spends on a site during one session. One possible area of confusion when using this metric is handling missing data. This can be caused either by an error in data collection or by a session containing only one page visit or interaction. Since the visit length is calculated by subtracting the time of the visitor's first activity on the site from the time of the visitor's final activity, what happens to the measurement when one of those pieces of data is missing? According to the Web Analytics Association, the visit length in such cases is zero (Burby & Brown, 2007).

When analyzing the visit length, the measurements are often broken down into chunks of time. StatCounter, for example, uses the following time categories:

- Less than 5 seconds
- 5 seconds to 30 seconds
- 30 seconds to 5 minutes
- 5 minutes to 20 minutes
- 20 minutes to 1 hour
- Greater than 1 hour (Jackson, 2007)

The goal of measuring the data in this way is to keep the percentage of visitors who stay on the Website for less than five seconds as low as possible. If visitors stay on a Website for such a

*Table 2. Eight common metrics of website analysis*

<b>Metric</b>	<b>Description</b>	<b>Category</b>
Visitor Type	Who is accessing the Website (returning, unique, etc.)	Site Usage
Visit Length	The total amount of time a visitor spends on the Website	Site Usage
Demographics and System Statistics	The physical location and information of the system used to access the Website	Site Usage
Internal Search Information	Information on keywords and results pages viewed using a search engine embedded in the Website	Site Usage
Visitor Path	The route a visitor uses to navigate through the Website	Site Content Analysis
Top Pages	The pages that receive the most traffic	Site Content Analysis
Referring URL and Keyword Analysis	Which sites have directed traffic to the Website and which keywords visitors are using to find the Website	Referrers
Errors	Any errors that occurred while attempting to retrieve the page	Quality Assurance

short amount of time it usually means they either arrived at the site by accident or the site did not have relevant information. By combining this information with information from referrers and keyword analysis, one can tell which sites are referring well-targeted traffic and which sites are referring poor quality traffic.

## **Demographics and System Statistics**

The demographic metric refers to the physical location of the system used to make a page request. This information can be useful for a Website that provides region-specific services. For example, if an e-commerce site can only ship its goods to people in Spain, any traffic to the site from outside of Spain is irrelevant. In addition, region-specific Websites also want to make sure they tailor their content to the group they are targeting. Demographic information can also be combined with information on referrers to determine if a referral site is directing traffic to a site from outside a company's regions of service.

System statistics are information about the hardware and software with which visitors access a Website. This can include information such as browser type, screen resolution, and operating system. It is important that a Website be accessible to all of its customers, and by using this information, the Website can be tailored to meet visitors' technical needs.

## **Internal Search**

If a Website includes a site-specific search utility, then it is also possible to measure internal search information. This can include not only keywords but also information about which results pages visitors found useful. The Patricia Seybold Group (<http://www.psgroup.com/>) identifies the following seven uses for internal search data:

- Identify products and services for which customers are looking, but that are not yet provided by the company.

- Identify products that are offered, but which customers have a hard time finding.
- Identify customer trends.
- Improve personalized messages by using the customers' own words.
- Identify emerging customer service issues
- Determine if customers are provided with enough information to reach their goals.
- Make personalized offers. (Aldrich, 2006)

By analyzing internal search data, one can use the information to improve and personalize the visitors' experience.

## **Visitor Path**

A visitor path is the route a visitor uses to navigate through a Website. Excluding visitors who leave the site as soon as they enter, each visitor creates a path of page views and actions while perusing the site. By studying these paths, one can identify any difficulties a user has viewing a specific area of the site or completing a certain action (such as making a transaction or completing a form).

According to an article by the Web Analytics Association, there are two schools of thought regarding visitor path analysis. The first is that visitor actions are goal-driven and performed in a logical, linear fashion. For example, if a visitor wants to purchase an item, the visitor will first find the item, add it to the cart, and proceed to the checkout to complete the process. Any break in that path (i.e. not completing the order) signifies user confusion and is viewed as a problem.

The second school of thought is that visitor actions are random and illogical and that the only path that can provide accurate data on a visitor's behavior is the path from one page to the page immediately following it. In other words, the only page that influences visitor behavior on a Website is the one they are currently viewing. For example, visitors on a news site may merely peruse the articles with no particular goal in mind. This method of analysis is becoming increasingly popular

because companies find it easier to examine path data in context without having to reference the entire site in order to study the visitors' behavior (Web Analytics Association, n. d.).

## **Top Pages**

Panalysis mentions three types of top pages: top entry pages, top exit pages, and most popular pages. Top entry pages are important because the first page a visitor views makes the greatest impression about a Website. By knowing the top entry page, one can make sure that page has relevant information and provides adequate navigation to important parts of the site. Similarly, identifying popular exit pages makes it easier to pinpoint areas of confusion or missing content.

The most popular pages are the areas of a website that receive the most traffic. This metric gives insight into how visitors are utilizing the Website, and which pages are providing the most useful information. This is important because it shows whether the Website's functionality matches up with its business goals; if most of the Website's traffic is being directed away from the main pages of the site, the Website cannot function to its full potential (Jacka, n. d.).

## **Referrers and Keyword Analysis**

A referral page is the page a user visits immediately before entering to a Website, or rather, a site that has directed traffic to the Website. A search engine result page link, a blog entry mentioning the Website, and a personal bookmark are examples of referrers. This metric is important because it can be used to determine advertising effectiveness and search engine popularity. As always, it is important to look at this information in context. If a certain referrer is doing worse than expected, it could be caused by the referring link text or placement. Conversely, an unexpected spike in referrals from a certain page could be

either good or bad depending on the content of the referring page.

In the same way, keyword analysis deals specifically with referring search engines and shows which keywords have brought in the most traffic. By analyzing the keywords visitors use to find a page, one is able to determine what visitors expect to gain from the Website and use that information to better tailor the Website to their needs. It is also important to consider the quality of keywords. Keyword quality is directly proportional to revenue and can be determined by comparing keywords with visitor path and visit length (Marshall, n. d.). Good keywords will bring quality traffic and more income to your site.

## **Errors**

Errors are the final metric. Tracking errors has the obvious benefit of being able to identify and fix any errors in the Website, but it is also useful to observe how visitors react to these errors. The fewer visitors who are confused by errors on a Website, the less likely visitors are to exit the site because of an error.

## **GATHERING INFORMATION**

How does one gather these metrics? There are two major methods for collecting data for Web analysis: log files and page tagging. Most current Web analytic companies use a combination of the two methods for collecting data. Therefore, it is important to understand the strengths and weaknesses of each.

### **Log Files**

The first method of metric gathering uses log files. Every Web server keeps a log of page requests that can include (but is not limited to) visitor IP address, date and time of the request, request page, referrer, and information on the visitor's

Web browser and operating system. The same basic collected information can be displayed in a variety of ways. Although the format of the log file is ultimately the decision of the company who runs the Web server, the following four formats are a few of the most popular:

- NCSA Common Log
- NCSA Combined Log
- NCSA Separate Log
- W3C Extended Log

The NCSA Common Log format (also known as Access Log format) contains only basic information on the page request. This includes the client IP address, client identifier, visitor username, date and time, HTTP request, status code for the request, and the number of bytes transferred during the request. The Combined Log format contains the same information as the common log with the following three additional fields: the referring URL, the visitor’s Web browser and operating system information, and the cookie. The Separate Log format (or 3-Log format) contains the same information as the combined log, but it breaks it into three separate files – the access log, the referral log, and the agent log. The date and time fields in each of the three logs are the same. Table 3 shows examples of the common, combined, and separate log file formats (notice that default values are represented by a dash “-“):

Similarly, W3C provides an outline for standard formatting procedures. This format differs

from the first three in that it aims to provide for better control and manipulation of data while still producing a log file readable by most Web analytics tools. The extended format contains user defined fields and identifiers followed by the actual entries, and default values are represented by a dash “-“ (Hallam-Baker & Behlendorf, 1999). Table 4 shows an example of an extended log file.

There are several benefits of using system log files to gather data for analysis. The first is that it does not require any changes to the Website or any extra software installation to create the log files. Web servers automatically create these logs and store them on a company’s own servers giving the company freedom to change their Web analytics tools and strategies at will. This method also does not require any extra bandwidth when loading a page, and since everything is recorded server-side, it is possible to log both page request successes and failures.

Using log files also has some disadvantages. One major disadvantage is that the collected data is limited to only transactions with the Web server. This means that they cannot log information independent from the servers such as the physical location of the visitor. Similarly, while it is possible to log cookies, the server must be specifically configured to assign cookies to visitors in order to do so. The final disadvantage is that while it is useful to have all the information stored on a company’s own servers, the log file method is only available to those who own their Web servers.

*Table 3. NCSA Log comparison (IBM, 2004)*

NCSA Common Log	125.125.125.125 - dsmith [10/Oct/1999:21:15:05 +0500] "GET /index.html HTTP/1.0" 200 1043
NCSA Combined Log	125.125.125.125 - dsmith [10/Oct/1999:21:15:05 +0500] "GET /index.html HTTP/1.0" 200 1043 "http://www.ibm.com/" "Mozilla/4.05 [en] (WinNT; I)" "USERID=CustomerA;IMPID=01234"
NCSA Separate Log	Common Log: 125.125.125.125 - dsmith [10/Oct/1999:21:15:05 +0500] "GET /index.html HTTP/1.0" 200 1043 Referral Log: [10/Oct/1999:21:15:05 +0500] "http://www.ibm.com/index.html" Agent Log: [10/Oct/1999:21:15:05 +0500] "Microsoft Internet Explorer - 5.0"



## Page Tagging

The second method for recording visitor activity is page tagging. Page tagging uses an invisible image to detect when a page has been successfully loaded and then uses JavaScript to send information about the page and the visitor back to a remote server. According to *Web Analytics Demystified* the variables used and amount of data collected in page tagging are dependent on the Web analytics vendor. Some vendors stress short, easy to use page tags while others emphasize specific tags that require little post-processing. The best thing to look for with this method, however, is flexibility – being able to use all, part, or none of the tag depending on the needs of the page (Peterson, 2004).

There are several benefits to using this method of gathering visitor data. The first is speed of reporting. Unlike a log file, the data received via page tagging is parsed as it comes in. This allows for near real-time reporting. Another benefit is flexibility of data collection. More specifically, it is easier to record additional information about the visitor that does not involve a request to the Web server. Examples of such information include information about a visitor’s screen size, the price of purchased goods, and interactions within Flash animations. This is also a useful method of gathering data for companies that do not run their own Web servers or do not have access to the raw log files for their site (such as blogs).

There are also some disadvantages of page tagging, most of which are centered on the extra code that must be added to the Website. This causes it to

use more bandwidth each time a page loads, and it also makes it harder to change analytics tools because the code embedded in the Website would have to be changed or deleted entirely. The final disadvantage is that page tagging is only capable of recording page loads, not page failures. If a page fails to load, it means that the tagging code also did not load, and there is therefore no way to retrieve information in that instance.

Although log files and page tagging are two distinct ways to collect information about the visitors to a Website, it is possible to use both together, and many analytics companies provide ways to use both methods to gather data. Even so, it is important to understand the strengths and weaknesses of both. Table 5 shows the advantages and disadvantages of log file analysis and page tagging.

## The Problems with Data

One of the most prevalent problems in Web analytics is the difficulty identifying unique users. In order to determine repeat visitors, most Web analytic tools employ cookies that store unique identification information on the visitor’s personal computer. Because of problems with users deleting or disabling cookies, however, some companies have moved towards using Macromedia Flash Local Shared Objects (LSOs). LSOs act like a cookie, but standard browsers lack the tools required to delete them, anti-spyware software does not delete them because it does not see them as a threat, and most users do not know how to delete them manually. Awareness is growing, however,

Table 4. W3C Extended Log File (Microsoft, 2005)

W3C Extended Log	<pre>#Software: Microsoft Internet Information Services 6.0 #Version: 1.0 #Date: 2002-05-24 20:18:01 #Fields: date time c-ip cs-username s-ip s-port cs-method cs-uri-stem cs-uri-query sc-status sc-bytes cs-bytes time-taken cs(User-Agent) cs(Referrer) 2002-05-24 20:18:01 172.224.24.114 - 206.73.118.24 80 GET /Default.htm - 200 7930 248 31 Mozilla/4.0+(compatible;+MSIE+5.01;+Windows+2000+Server) http://64.224.24.114/</pre>
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Table 5. Log Files vs. Page Tagging

Log Files		Page Tagging	
<i>Advantages</i>	<i>Disadvantages</i>	<i>Advantages</i>	<i>Disadvantages</i>
Does not require changes to the Website or extra hardware installation	Can only record interactions with the Web server	Near real-time reporting	Requires extra code added to the Website
Does not require extra bandwidth	Server must be configured to assign cookies to visitors	Easier to record additional information	Uses extra bandwidth each time the page loads
Freedom to change tools with a relatively small amount of hassle	Only available to companies who run their own Web servers	Able to capture visitor interactions within Flash animations	Can only record successful page loads, not failures
Logs both page request successes and failures	Cannot log physical location		Hard to switch analytic tools

and Firefox and Macromedia are working against LSOs and providing users with tools to delete them (Permadi, 2005).

Sen, Dacin, and Pattichis (2006) cite various other problems with log data from Websites including large data size and messy data. Problems with large data size are caused by massive amounts of traffic to a Website and also the amount of information stored in each record. Records with missing IP addresses and changes to Website content cause messy data. Even though the data may be hard to work with at first, once it is cleaned up, it provides an excellent tool for Web analytics.

## CHOOSING KEY PERFORMANCE INDICATORS

In order to get the most out of Web analytics, one must know how to choose effectively which metrics to analyze and combine them in meaningful ways. This means knowing the Website’s business goals and then determining which KPIs will provide the most insight.

### Knowing Your Business Goals

Every company has specific business goals. Every part of the company works together to achieve them, and the company Website is no exception.

In order for a Website to be beneficial, information gathered from its visitors must not merely show what has happened in the past, but it must also be able to improve the site for future visitors. The company must have clearly defined goals for the future and use this information to support strategies that will help it achieve those goals.

For a Website, the first step in achieving this is making sure the data collected from the site is actionable. According to the Web Analytics Association (McFadden, 2005), in order for a company to collect actionable data, it must meet these three criteria: “(1) the business goals must be clear, (2) technology, analytics, and the business must be aligned, and (3) the feedback loop must be complete” (Web Channel Performance Management section, para. 3).

There are many possible methods for meeting these criteria. One is Alignment-Centric Performance Management (Becher, 2005). This approach goes beyond merely reviewing past customer trends to carefully selecting a few key KPIs based on their future business objectives. Even though a wealth of metrics is available from a Website, this does not mean that all metrics are relevant to a company’s needs. Reporting large quantities of data is overwhelming, so it is important to look at metrics in context and use them to create KPIs that focus on outcome and not activity. For example, a customer service Website



might view the number of emails responded to on the same day they were sent as a measurement of customer satisfaction. A better way to measure customer satisfaction, however, might be to survey the customers on their experience. Although this measurement is subjective, it is a better representation of customer satisfaction because even if a customer receives a response the same day they send out an email, it does not mean that the experience was a good one (Becher, 2005).

Choosing the most beneficial KPIs using this method is achieved by following “The Four M’s of Operational Management” as outlined by Becher (2005) which facilitate effective selection of KPIs:

- **Motivate:** Ensure that goals are relevant to everyone involved.
- **Manage:** Encourage collaboration and involvement for achieving these goals.
- **Monitor:** Once selected, track the KPIs and quickly deal with any problems that may arise.
- **Measure:** Identify the root causes of problems and test any assumptions associated with the strategy.

By carefully choosing a few, quality KPIs to monitor and making sure everyone is involved with the strategy, it becomes easier to align a Website’s goals with the company’s goals because the information is targeted and stakeholders are actively participating.

Another method for ensuring actionable data is Online Business Performance Management (OBPM) (Sapir, 2004). This approach integrates business tools with Web analytics to help companies make better decisions quickly in an ever-changing online environment where customer data is stored in a variety of different departments. The first step in this strategy is gathering all customer data in a central location and condensing it so that the result is all actionable data stored in the same place. Once this information is in place,

the next step is choosing relevant KPIs that are aligned with the company’s business strategy and then analyzing expected versus actual results (Sapir 2004).

In order to choose the best KPIs and measure the Website’s performance against the goals of a business, there must be effective communication between senior executives and online managers. The two groups should work together to define the relevant performance metrics, the overall goals for the Website, and the performance measurements. This method is similar to Alignment-Centric Performance Management in that it aims to aid integration of the Website with the company’s business objectives by involving major stakeholders. The ultimate goals of OBPM are increased confidence, organizational accountability, and efficiency (Sapir 2004).

### **Identifying KPIs Based on Website Type**

Unlike metrics, which are numerical representations of data collected from a Website, KPIs are tied to a business strategy and are usually measured by a ratio of two metrics. By choosing KPIs based on the Website type, a business can save both time and money. Although Websites can have more than one function, each site belongs to at least one of the four main categories – commerce, lead generation, content/media, and support/self service (McFadden, 2005). Table 6 shows common KPIs for each Website type:

We discuss each Website type and related KPIs below.

#### **Commerce**

The goal of a commerce Website is to get visitors to purchase goods or services directly from the site, with success gauged by the amount of revenue the site brings in. According to Peterson, “commerce analysis tools should provide the ‘who, what, when, where, and how’ for your

*Table 6. The four types of Websites and examples of associated KPIs (McFadden, 2005)*

Website Type	KPIs
<i>Commerce</i>	<ul style="list-style-type: none"> <li>• Conversion rates</li> <li>• Average order value</li> <li>• Average visit value</li> <li>• Customer loyalty</li> <li>• Bounce rate</li> </ul>
<i>Lead Generation</i>	<ul style="list-style-type: none"> <li>• Conversion rates</li> <li>• Cost per lead</li> <li>• Bounce rate</li> <li>• Traffic concentration</li> </ul>
<i>Content/Media</i>	<ul style="list-style-type: none"> <li>• Visit depth</li> <li>• Returning visitor ratio</li> <li>• New visitor ratio</li> <li>• Page depth</li> </ul>
<i>Support/Self service</i>	<ul style="list-style-type: none"> <li>• Page depth</li> <li>• Bounce rate</li> <li>• Customer satisfaction</li> <li>• Top internal search phrases</li> </ul>

online purchasers (2004, p. 92).” In essence, the important information for a commerce Website is who made (or failed to make) a purchase, what was purchased, when purchases were made, where customers are coming from, and how customers are making their purchases. The most valuable KPIs used to answer these questions are conversion rates, average order value, average visit value, customer loyalty, and bounce rate (McFadden, 2005). Other metrics to consider with a commerce site are which products, categories, and brands are sold on the site and internal site product search that could signal navigation confusion or a new product niche (Peterson, 2004).

A conversion rate is the number of users who perform a specified action divided by the total of a certain type of visitor (i.e. repeat visitors, unique visitors, etc.) over a given period. Types of conversion rates will vary by the needs of the businesses using them, but two common conversion rates for commerce Websites are the order conversion rate (the percent of total visitors who place an order on a Website) and the checkout conversion rate (the percent of total visitors who begin the checkout process). There are also many methods for choosing the group of visitors on

which to base your conversion rate. For example, a business may want to filter visitors by excluding visits from robots and Web crawlers (Ansari, Kohavi, Mason, & Zheng, 2001), or they may want to exclude the traffic that “bounces” from the Website or (a slightly trickier measurement) the traffic that is determined not to have intent to purchase anything from the Website (Kaushik, 2006).

It is common for commerce Websites to have conversion rates around 0.5%, but generally good conversion rates will fall in the 2% range depending on how a business structures its conversion rate (FoundPages, 2007). Again, the ultimate goal is to increase total revenue. According to eVision, for each dollar a company spends on improving this KPI, there is \$10 to \$100 return (2007). The methods a business uses to improve their conversion rate (or rates), however, are different depending on which target action that business chooses to measure.

Average order value (AOV) is a ratio of total order revenue to number of orders over a given period. This number is important because it allows the analyzer to derive a cost for each transaction. There are several ways for a business

to use this KPI to its advantage. One way is to break down the AOV by advertising campaigns (i.e. email, keyword, banner ad etc.). This way, a business can see which campaigns are bringing in the best customers and spend more effort refining their strategies in those areas (Peterson, 2005). Overall, however, if the cost of making a transaction is greater than the amount of money customers spend for each transaction, the site is not fulfilling its goal. There are two main ways to correct this. The first is to increase the number of products customers order per transaction, and the second is to increase the overall cost of purchased products. A good technique for achieving this is through product promotions (McFadden, 2005), but many factors influence how and why customers purchase what they do on a Website. These factors are diverse and can range from displaying a certain security image on the site (MarketingSherpa, 2007) to updating the site's internal search (Young, 2007). Like many KPIs, improvement ultimately comes from ongoing research and a small amount of trial and error.

Another KPI, average visit value, measures the total number of visits to the total revenue. This is a measurement of quality traffic important to businesses. It is problematic for a commerce site when, even though it may have many visitors, each visit generates only a small amount of revenue. In that case, even if the total number of visits increased, it would not have a profound impact on overall profits. This KPI is also useful for evaluating the effectiveness of promotional campaigns. If the average visit value decreases after a specific campaign, it is likely that the advertisement is not attracting quality traffic to the site. Another less common factor in this situation could be broken links or a confusing layout in a site's "shopping cart" area. A business can improve the average visit value by using targeted advertising and employing a layout that reduces customer confusion.

Customer loyalty is the ratio of new to existing customers. Many Web analytics tools measure this

using visit frequency and transactions, but there are several important factors in this measurement including the time between visits (Mason, 2007). Customer loyalty can even be measured simply with customer satisfaction surveys (SearchCRM, 2007). Loyal customers will not only increase revenue through purchases but also through referrals, potentially limiting advertising costs (QuestionPro).

Bounce rate is a measurement of how many people arrive at a homepage and leave immediately. There are two scenarios that generally qualify as a bounce. In the first scenario, a visitor views only one page on the Website. In the second scenario, a visitor navigates to a Website but only stays on the site for five seconds or less (Avinash, 2007). This could be due to several factors, but in general, visitors who bounce from a Website are not interested in the content. Like average order value, this KPI helps show how much quality traffic a Website receives. A high bounce rate may be a reflection of unintuitive site design or misdirected advertising.

## Lead Generation

The goal for a lead generation Website is to obtain user contact information in order to inform them of a company's new products and developments and to gather data for market research; these sites primarily focus on products or services that cannot be purchased directly online. Examples of lead generation include requesting more information by mail or email, applying online, signing up for a newsletter, registering to download product information, and gathering referrals for a partner site (Burby, 2004). The most important KPIs for lead generation sites are conversion rates, cost per lead, bounce rate, and traffic concentration (McFadden, 2005).

Similar to commerce Website KPIs, a conversion rate is the ratio of total visitors to the amount of visitors who perform a specific action. In the case of lead generation Websites, the most com-

mon conversion rate is the ratio of total visitors to leads generated. The same visitor filtering techniques mentioned in the previous section can be applied to this measurement (i.e. filtering out robots and Web crawlers and excluding traffic that bounces from the site). This KPI is an essential tool in analyzing marketing strategies. Average lead generation sites have conversion rates ranging from 5-6% and 17-19% conversion rates for exceptionally good sites (Greenfield, 2006). If the conversion rate of a site increases after the implementation of a new marketing strategy, it indicates that the campaign was successful. If it decreases, it indicates that the campaign was not effective and might need to be reworked.

Cost per lead (CPL) refers to the ratio of total expenses to total number of leads, or how much it costs a company to generate a lead; a more targeted measurement of this KPI would be the ratio of total marketing expenses to total number of leads. Like the conversion rate, CPL helps a business gain insight into the effectiveness of its marketing campaigns. A good way to measure the success of this KPI is to make sure that the CPL for a specific marketing campaign is less than the overall CPL (WebSideStory, 2004). Ideally, the CPL should be low, and well-targeted advertising is usually the best way to achieve this.

Lead generation bounce rate is the same measurement as the bounce rate for commerce sites. This KPI is a measurement of visitor retention based off total number of bounces to total number of visitors; a bounce is a visit characterized by a visitor entering the site and immediately leaving. Lead generation sites differ from commerce sites in that they may not require the same level of user interaction. For example, a lead generation site could have a single page where users enter their contact information. Even though they only view one page, the visit is still successful if the Website is able to collect the user's information. In these situations, it is best to base the bounce rate solely off of time spent on the site. As with commerce sites, the best way to decrease a site's

bounce rate is to increase advertising effectiveness and decrease visitor confusion.

The final KPI is traffic concentration, or the ratio of the number of visitors to a certain area in a Website to total visitors. This KPI shows which areas of a site have the most visitor interest. For this type of Website, it is ideal to have a high traffic concentration on the page or pages where users enter their contact information.

## Content/Media

Content/media Websites focus mainly on advertising, and the main goal of these sites is to increase revenue by keeping visitors on the Website longer and also to keep visitors coming back to the site. In order for these types of sites to succeed, site content must be engaging and frequently updated. If content is only part of a company's Website, the content used in conjunction with other types of pages can be used to draw in visitors and provide a way to immerse them with the site. The main KPIs are visit depth, returning visitors, new visitor percentage, and page depth (McFadden, 2005).

Visit depth (also referred to as depth of visit or path length) is the measurement of the ratio between page views and unique visitors, or how many pages a visitor accesses each visit. As a general rule, visitors with a higher visit depth are interacting more with the Website. If visitors are only viewing a few pages per visit, it means that they are not engaged, and the effectiveness of the site is low. A way to increase a low average visit depth is by creating more targeted content that would be more interesting to the Website's target audience. Another strategy could be increasing the site's interactivity to encourage the users to become more involved with the site and keep them coming back.

Unlike the metric of simply counting the number of returning visitors on a site, the returning visitor KPI is the ratio of unique visitors to total visits. A factor in customer loyalty, this KPI measures the effectiveness of a Website to

bring visitors back. A lower ratio for this KPI is best because a lower number means more repeat visitors and more visitors who are interested in and trust the content of the Website. If this KPI is too low, however, it might signal problems in other areas such as a high bounce rate or even click fraud. Click fraud occurs when a person or script is used to generate visits to a Website without having genuine interest in the site. According to a study by Blizzard Internet Marketing, the average for returning visitors to a Website is 23.7% (White, 2006). As with many of the other KPIs for content/media Websites, the best way to improve the returning visitor rate is by having quality content and encouraging interaction with the Website.

New visitor ratio is the measurement of new visitors to unique visitors and is used to determine if a site is attracting new people. When measuring this KPI, the age of the Website plays a role – newer sites will want to attract new people. Similarly, another factor to consider is if the Website is concerned more about customer retention or gaining new customers. As a rule, however, the new visitor ratio should decrease over time as the returning visitor ratio increases. New visitors can be brought to the Website in a variety of different ways, so a good way to increase this KPI is to try different marketing strategies and figure out which campaigns bring the most (and the best) traffic to the site.

The final KPI for content/media sites is page depth. This is the ratio of page views for a specific page and the number of unique visitors to that page. This KPI is similar to visit depth, but its measurements focus more on page popularity. Average page depth can be used to measure interest in specific areas of a Website over time and to make sure that the interests of the visitors match the goals of the Website. If one particular page on a Website has a high page depth, it is an indication that that page is of particular interest to visitors. An example of a page in a Website expected to have a higher page depth would

be a news page. Information on a news page is constantly updated so that, while the page is still always in the same location, the content of that page is constantly changing. If a Website has high page depth in a relatively unimportant part of the site, it may signal visitor confusion with navigation in the site or an incorrectly targeted advertising campaign.

## Support/Self Service

Websites offering support or self-service are interested in helping users find specialized answers for specific problems. The goals for this type of Website are increasing customer satisfaction and decreasing call center costs; it is more cost-effective for a company to have visitors find information through its Website than it is to operate a call center. The KPIs of interest are visit length, content depth, and bounce rate. In addition, other areas to examine are customer satisfaction metrics and top internal search phrases (McFadden, 2005).

Page depth for support/self service sites is the same measurement as page depth content/media sites – the ratio of page views to unique visitors. With support/self service sites, however, high page depth is not always a good sign. For example, a visitor viewing the same page multiple times may show that the visitor is having trouble finding helpful information on the Website or even that the information the visitor is looking for does not exist on the site. The goal of these types of sites is to help customers find what they need as quickly as possible and with the least amount of navigation through the site (CCMedia, 2007). The best way to keep page depth low is to keep visitor confusion low.

As with the bounce rate of other Website types, the bounce rate for support/self service sites reflects ease of use, advertising effectiveness, and visitor interest. A low bounce rate means that quality traffic is coming to the Website and deciding that the site's information is potentially useful.



Poor advertisement campaigns and poor Website layout will increase a site’s bounce rate.

Customer satisfaction deals with how the users rate their experience on a site and is usually collected directly from the visitors (not from log files), either through online surveys or through satisfaction ratings. Although it is not a KPI in the traditional sense, gathering data directly from visitors to a Website is a valuable tool for figuring out exactly what visitors want. Customer satisfaction measurements can deal with customer ratings, concern reports, corrective actions, response time, and product delivery. Using these numbers, one can compare the online experience of the Website’s customers to the industry average and make improvements according to visitors’ expressed needs.

Similarly, top internal search phrases applies only to sites with internal search, but it can be used to measure what information customers are most interested in which can lead to improvement in site navigation. This information can be used to direct support resources to the areas generating the most user interest, as well as identify which parts of the Website users may have trouble accessing. In addition, if many visitors are searching for a product not supported on the Website, it could be a sign of ineffective marketing.

Regardless of Website type, the KPIs listed above are not the only KPIs that can prove useful in analyzing a site’s traffic, but they provide a good starting point. The main thing to remember is that no matter what KPIs a company chooses, they must be aligned with its business goals, and more KPIs do not necessarily mean better analysis – quality is more important than quantity.

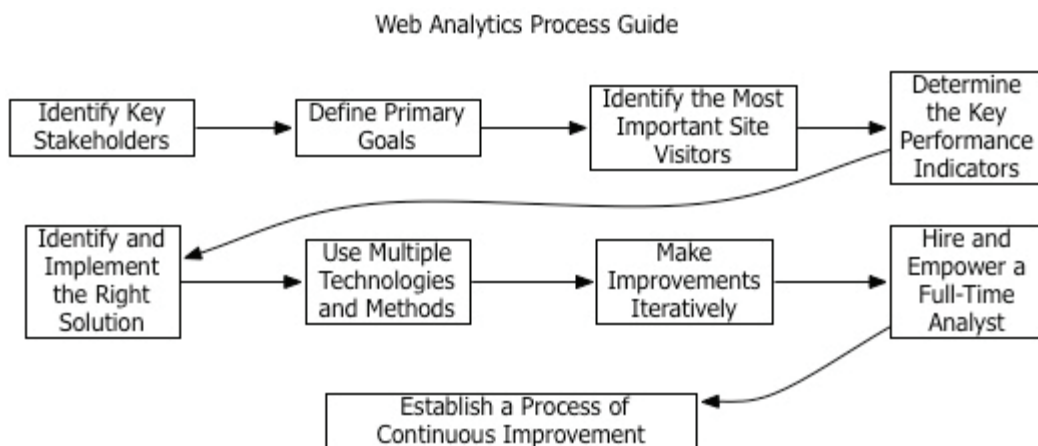
**KEY BEST PRACTICES**

In this chapter, we have addressed which metrics can be gathered from a Website, how to gather them, and how to determine which information is important. But how can this help improve a business? To answer this, the Web Analytics Association provides nine key best practices to follow when analyzing a Website (McFadden, 2005). Figure 1 outlines this process.

**Identify Key Stakeholders**

A stakeholder is anyone who holds an interest in a Website. This includes management, site developers, visitors, and anyone else who creates, maintains, uses, or is affected by the site. In order for the Website to be truly beneficial, it

*Figure 1. The best key practices of Web analytics*





must integrate input from all major stakeholders. Involving people from different parts of the company also makes it more likely that they will embrace the Website as a valuable tool.

### **Define Primary Goals for Your Website**

To know the primary goals of a Website, one must first understand the primary goals of its key stakeholders. This could include such goals as increasing revenue, cutting expenses, and increasing customer loyalty (McFadden, 2005). Once those goals have been defined, discuss each goal and prioritize them in terms of how the Website can most benefit the company. As always, beware of political conflict between stakeholders and their individual goals as well as assumptions they may have made while determining their goals that may not necessarily be true. By going through this process, a company can make sure that goals do not conflict and that stakeholders are kept happy.

### **Identify the Most Important Site Visitors**

According to Sterne, corporate executives categorize their visitors differently in terms of importance. Most companies classify their most important visitors as ones who either visit the site regularly, stay the longest on the site, view the most pages, purchase the most goods or services, purchase goods most frequently, or spend the most money (Sterne, n. d.). There are three types of customers – (1) customers a company wants to keep who have a high current value and high future potential, (2) customers a company wants to grow who can either have a high current value and low future potential or low current value and high future potential, and (3) customers a company wants to eliminate who have a low current value and low future potential. The most important visitor to a Website, however, is the one who ultimately

brings in the most revenue. Defining the different levels of customers will allow one to consider the goals of these visitors. What improvements can be made to the Website in order to improve their browsing experiences?

### **Determine the Key Performance Indicators**

The next step is picking the metrics that will be most beneficial in improving the site and eliminating the ones that will provide little or no insight into its goals. One can then use these metrics to determine which KPI you wish to monitor. As mentioned in the previous section, the Website type – commerce, lead generation, media/content, or support/self service – plays a key role in which KPIs are most effective for analyzing site traffic.

### **Identify and Implement the Right Solution**

This step deals with finding the right Web analytics technology to meet the business's specific needs. After the KPIs have been defined, this step should be easy. The most important things to consider are the budget, software flexibility and ease of use, and how well the technology will work with the needed metrics. McFadden suggests that it is also a good idea to run a pilot test of the top two vendor choices (McFadden, 2005). We will expand on this topic further in the next section.

### **Use Multiple Technologies and Methods**

Web analytics is not the only method available for improving a Website. To achieve a more holistic view of a site's visitors, one can also use tools such as focus groups, online surveys, usability studies, and customer services contact analysis (McFadden, 2005).

## **Make Improvements Iteratively**

When analyzing a Website's data, it is helpful to add gradual improvements to the Website instead of updating too many facets of the Website at once. By doing this one can monitor if a singular change is an improvement or if it is actually hurting the site.

## **Hire and Empower a Full-Time Analyst**

It is important to put a person in charge of the data once it is collected. According to the Web Analytics Association, a good analyst understands business needs (which means communicating well with the stakeholders), has knowledge of technology and marketing, has respect, credibility, and authority, and is already a company employee. Although it may seem like hiring a full-time analyst is expensive, many experts agree that the return on revenue should be more than enough compensation (McFadden, 2005).

## **Establish a Process of Continuous Improvement**

Once the Web analysis process is decided upon, continuous evaluation is paramount. This means reviewing the goals and metrics and monitoring new changes and features which are added to the Website. It is important that the improvements are adding value to the site and meeting expectations.

## **SPECIFIC TOOLS**

### **Choosing a Tool**

Once the company decides what it wants out of the Web analysis, it is time to find the right tool. Kaushik outlines ten important questions to ask Web analytics vendors (2007):

1. *What is the difference between your tool and free Web analytics tools?* Since the company who owns the Website will be paying money for a service, it is important to know why that service is better than free services (for example, Google Analytics). Look for an answer that outlines the features and functionality of the vendor. Do not look for answers about increased costs because of privacy threats or poor support offered by free analytics tools.
2. *Do you offer a software version of your tool?* Generally, a business will want to look for a tool that is software based and can run on their own servers. If a tool does not have a software version but plans to make one in the future, it shows insight into how prepared they are to offer future products if there is interest.
3. *What methods do you use to capture data?* If you remember from the first section, there are two main ways to capture visitor data from a Website – log files and page tagging. Ideally, one should look for a vendor that offers both, but what they have used in the past is also important. Because technology is constantly changing, look for a company that has kept up with these changes in the past by providing creative solutions.
4. *Can you help me calculate the total cost of ownership for your tool?* The total cost of ownership for a Web analytics tool depends on the specific company, the systems they have in place, and the pricing of the prospective Web analytics tool. In order to make this calculation, one must consider the following:
  - a. Cost per page view.
  - b. Incremental costs (i.e. charges for overuse or advanced features).
  - c. Annual support costs after the first year.
  - d. Cost of professional services (i.e. installation, troubleshooting, or customization).

- e. Cost of additional hardware you may need.
  - f. Administration costs (which includes the cost of an analyst and any additional employees you may need to hire).
5. *What kind of support do you offer?* Many vendors advertise free support, but it is important to be aware of any limits that could incur additional costs. It is also important to note how extensive their support is and how willing they are to help.
  6. *What features do you provide that will allow me to segment my data?* Segmentation allows companies to manipulate their data. Look for the vendor's ability to segment your data after it is recorded. Many vendors use JavaScript tags on each page to segment the data as it is captured, meaning that the company has to know exactly what it wants from the data before having the data itself; this approach is less flexible.
  7. *What options do I have to export data into our system?* It is important to know who ultimately owns and stores the data and whether it is possible to obtain both raw and processed data. Most vendors will not provide companies with the data exactly as they need it, but it is a good idea to realize what kind of data is available before a final decision is made.
  8. *Which features do you provide for integrating data from other sources into your tool?* This question deals with the previous section's Key Best Practice #6: Use Multiple Technologies and Methods. If a company has other data it wants to bring to the tool (such as survey data or data from your ad agency), bring them up to the potential analytics vendor and see if it is possible to integrate this information into their tool.
  9. *What new features are you developing that would keep you ahead of your competition?* Not only will the answer to this question tell how much the vendor has thought about

future functionality, it will also show how much they know about their competitors.

10. *Why did you lose your last two clients? Who are they using now?* The benefits of this question are obvious -- by knowing how they lost prior business, the business can be confident that it has made the right choice.

Some examples of free and commercially available analytics tools are discussed below.

### **Free Tools**

One of the most popular free analytics tools on the Web now is Google Analytics (previously Urchin). Google Analytics (<http://www.google.com/analytics/>) uses page tagging to collect information from visitors to a site. In addition to expanding on the already highly regarded Urchin analytics tool, it also provides support for integrating other analytic information (for example, WordPress and AdWords). Google Analytics reports many of the KPIs discussed in the previous sections including depth of visit, returning visitors, and page depth.

There is, however, concern about privacy issues regarding Google Analytics because Google uses their default privacy policy for their analytics tools, but the company assures its Google Analytics users that only account owners and people to whom the owners give permission will have access to the data (Dadoo, 2006). Microsoft also provides a free Web analytic software called Gateau (Thomas, 2007).

### **Paid Tools**

InfoWorld provides an in-depth analysis comparing the top four Web analytic companies – Coremetrics, WebTrends, Omniture, and WebSideStory HBX (Heck, 2005). They created a scoring chart and measured each vendor on reporting, administration, performance, ease-of-use, support, and value. Coremetrics received a score of

8.3 with its highest ratings in administration and support. It is a hosted service that offers special configurations for financial, retail, and travel services. WebTrends also earned a score of 8.3 with its highest rating in reporting. This tool is expensive, but it offers a wide range of performance statistics and both client and server hosting. Omniture is next in line with a score of 8.4 with its highest ratings in reporting and support. It is an ASP reporting application that excels in providing relevant reports. WebSideStory had the highest score of 8.7 with its highest ratings in reporting, administration, ease-of-use, and support. This tool is easy to use and is appropriate for many different types of businesses.

## CONCLUSION

The first step in analyzing your Website and Website visitors is understanding and analyzing your business goals and then using that information to carefully choose your metrics. In order to take full advantage of the information gathered from your site's visitors, you must consider alternative methods such as focus groups and online surveys, make site improvements gradually, hire a full-time analyst, and realize that your site's improvement is a process and not a one-time activity. Using these key best practices and choosing the right analytics vendor to fit your business will save your company money and ultimately increase revenue.

As Web analytics continues to mature, the methods vendors use to collect information are becoming more refined. One article speculates that companies will find concrete answers to the problems with cookies and unique visitors (Eisenberg, 2005). The Web analytics industry as a whole is also expanding. According to Eisenberg (2005), a recent Jupiter report predicts an increase in the Web analytics industry – 20 percent annually, reaching \$931 million in 2009. More and more businesses are realizing the benefits of critically analyzing their Website traffic and are

taking measures to improve their profits based off these numbers. Regardless of business size and objective, an effective Web analytics strategy is becoming increasingly essential.

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## KEY TERMS

**Abandonment Rate:** KPI that measures the percentage of visitors who got to that point on the site but decided not to perform the target action.

**Alignment-Centric Performance Management:** Method of defining a site's business goals by choosing only a few key performance indicators.

**Average Order Value:** KPI that measures the total revenue to the total number of orders.

**Average Time on Site (ATOS):** See *visit length*.

**Checkout Conversion Rate:** KPI that measures the percent of total visitors who begin the checkout process.

**Commerce Website:** A type of Website where the goal is to get visitors to purchase goods or services directly from the site.



**Committed Visitor Index:** KPI that measures the percentage of visitors that view more than one page or spend more than 1 minute on a site (these measurements should be adjusted according to site type).

**Content/Media Website:** A type of Website focused on advertising.

**Conversion Rate:** KPI that measures the percentage of total visitors to a Website that perform a specific action.

**Cost Per Lead (CPL):** KPI that measures the ratio of marketing expenses to total leads and shows how much it costs a company to generate a lead.

**Customer Satisfaction Metrics:** KPI that measures how the users rate their experience on a site.

**Customer Loyalty:** KPI that measures the ratio of new to existing customers.

**Demographics and System Statistics:** A metric that measures the physical location and information of the system used to access the Website.

**Depth of Visit:** KPI that measures the ratio between page views and visitors.

**Internal Search:** A metric that measures information on keywords and results pages viewed using a search engine embedded in the Website.

**Key Performance Indicator (KPI):** A combination of metrics tied to a business strategy.

**Lead Generation Website:** A type of Website that is used to obtain user contact information in order to inform them of a company's new products and developments, and to gather data for market research.

**Log File:** Log kept by a Web server of information about requests made to the Website including (but not limited to) visitor IP address, date and

time of the request, request page, referrer, and information on the visitor's Web browser and operating system.

**Log File Analysis:** Method of gathering metrics that uses information gathered from a log file to gather Website statistics.

**Metrics:** Statistical data collected from a Website such as number of unique visitors, most popular pages, etc.

**New Visitor:** A user who is accessing a Website for the first time.

**New Visitor Percentage:** KPI that measures the ratio of new visitors to unique visitors.

**Online Business Performance Management (OBPM):** Method of defining a site's business goals that emphasizes the integration of business tools and Web analytics to make better decisions quickly in an ever-changing online environment.

**Order Conversion Rate:** KPI that measures the percent of total visitors who place an order on a Website.

**Page Depth:** KPI that measures the ratio of page views for a specific page and the number of unique visitors to that page.

**Page Tagging:** Method of gathering metrics that uses an invisible image to detect when a page has been successfully loaded and then uses JavaScript to send information about the page and the visitor back to a remote server.

**Prospect Rate:** KPI that measures the percentage of visitors who get to the point in a site where they can perform the target action (even if they do not actually complete it).

**Referrers and Keyword Analysis:** A metric that measures which sites have directed traffic to the Website and which keywords visitors are using to find the Website.

**Repeat Visitor:** A user who has been to a Website before and is now returning.

**Returning Visitor:** KPI that measures the ratio of unique visitors to total visits.

**Search Engine Referrals:** KPI that measures the ratio of referrals to a site from specific search engines compared to the industry average.

**Single Access Ratio:** KPI that measures the ratio of total single access pages (or pages where the visitor enters the site and exits immediately from the same page) to total entry pages.

**Stickiness:** KPI that measures how many people arrive at a homepage and proceed to traverse the rest of the site.

**Support/Self Service Website:** A type of Website that focuses on helping users find specialized answers for their particular problems.

**Top Pages:** A metric that measures the pages in a Website that receive the most traffic.

**Total Bounce Rate:** KPI that measures the percentage of visitors who scan the site and then leave.

**Traffic Concentration:** KPI that measures the ratio of number of visitors to a certain area in a Website to total visitors.

**Unique Visit:** One visit to a Website (regardless of if the user has previously visited the site); an alternative to unique visitors.

**Unique Visitor:** A specific user who accesses a Website.

**Visit Length:** A metric that measures total amount of time a visitor spends on the Website.

**Visit Value:** KPI that measures the total number of visits to total revenue.

**Visitor Path:** A metric that measures the route a visitor uses to navigate through the Website.

**Visitor Type:** A metric that measures users who access a Website. Each user who visits the Website is a unique user. If it is a user's first time to the Website, that visitor is a new visitor, and if it is not the user's first time, that visitor is a repeat visitor.

**Web Analytics:** The measurement of visitor behavior on a Website.