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# Comparison of Web Analytics

## Hosted Solutions vs Server-side Analytics

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<p>The ratibility of websites allows the aggregation of detailed data about the behavior and characteristics of website visitors. This thesis examines the value of different web metrics based on the analytics tools used and the behavior of website visitors. The objective is to test and identify key metrics and discuss how they compare between hosted solutions and server-side analytics. The value of the web metrics is evaluated by examining the relationships of the metrics to website conversions. This thesis also shows how different web metrics were analyzed to reveal important characteristics of site visitors and how web metrics can be used to evaluate the effectiveness of the different aspects of a website.</p> <p>This thesis evaluates the performance of Google Analytics (hosted solution) and AWstats Analytics (server-side analytics). The case study examines the metkaweb.fi website by following eight different web metrics during a period of three months. The relationship analysis between the web metrics and the data provided by the two analytics tools used gives an insight into the workings of each tool and why they differ in the results produced.</p> <p>The case study described in this thesis identifies various key web metrics such as unique visits and page view. The sever-side and hosted analytics can be used together as a hybrid solution to tap into the capabilities of both technologies for more accurate reports. In general it is best practice to decide on the web metrics to be analyzed and then select a tool that is best optimized to analyze the metrics to get the most accurate results.</p>	
Keywords	Web Analytics, Web Metrics, Analytics Technologies

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## List of Abbreviations and Terms

**AWStats**      Advanced Web Statistics. A web analytics tool located or installed on a web server.

**Logfiles**      A file with records of all requests made by the browser.

**Hits**            The number of files downloaded from the server.

**WAA** also known as **DAA**

A Web Analytics Association, later renamed Digital Analytic Association is an organization involved in standardizing web analytics protocol terms utilized in web analytics.

**Parsing**      Perusing through chunk of data for information.

**ASP**            Application Service Provider. A host company that provides hosting for applications.

**AJAX**           Asynchronous JavaScript and XML. Art of exchanging files with a server without the need to reload the page.

**IP Address**   Numerical values assigned to devices to facilitate network connection and recognition.

## 1 Introduction

A few years back knowing who a visited website, why they visited, where they arrived from and what their experience was within the site was an incredible test. Web developers invented a web counter, software that peruses the logfiles in which the web server records all requests made by the browser and then tallies the numbers to get concrete details such as the number of visitors and files downloaded. On early web pages, pages comprised of text and links. Within a short period, web pages became more complex as user behaviour changed and computer technology evolved. Data analysis by means of perusing logfiles was no more precise. [1.] Web developers responded by introducing an alternate strategy for data collection/analysis by means of JavaScript codes tagged on website pages. The data gathered were then sent to remote servers for analysis. Despite the fact that this second strategy tackled the issues experienced with the first technique, it was tested by different issues. From that point forward there has been no precise method yet a variety of organizations have grown practicing on either technology and have developed fundamentally. [2.]

Currently there is a wide variety of web analytics tools far more advanced with several stakeholders. They exist in two technical ways, logfiles analysis and page tagging. Analysis of logfiles involves parsing raw logfiles while page tagging involves embedding of JavaScript codes in website pages to collect data and then by making an appeal to a diagnostic devoted server [1]. Despite the fact that both give similar services, there are discrepancies in figures given by both. Accordingly, picking which tool to utilize, or in the event that multiple tools are utilized, picking which can be an option of the other represent an overwhelming undertaking.

The dilemma as to which tool to use prompted the study discussed here in this thesis. Accordingly this study aims to analyze and present the two web analytics methodologies, page tagging and logfiles analysis, particularly hosted and server-side solutions respectively exploring them and bringing out similarities and differences. As a result, small scale and large scale e-commerce websites, website owners and web distributors can utilize the discoveries on their quest to find appropriate analytics tools for analyzing their websites. The second objective of this study is to use the findings to investigate the metkaweb.fi website (official website of the Student Union of Helsinki Metropolia University

of Applied Sciences) and come up with the best estimate of website metrics. The current condition of the site is for the most part good with an annual traffic of around 34,112 visitors according to Google Analytics report from the year 2014 while AWStats Analytics report for the same year is 82,355.

The analytics tools utilized for this study are Google Analytics and AWStats Analytics. Google Analytics uses page tagging to gather analysis data while AWStats parses log-files. They (both) represent the two technologies to be explored, hosted solutions and server-side respectively. The fact will be considered that web analytics tools are not created similar and even analytics tools with the same technology may differ in operations and data presented.

## 2 Background

### 2.1 What Is Web Analytics?

Web analytics is a generic term, there are many definitions and presumably the best of all is by Avinash Kaushik, presented in his book *Web Analytics: An Hour a Day* (Wiley). Kaushik characterizes web analytics as:

The analysis of qualitative and quantitative data from your website and the competition to drive a continual improvement of the online experience that your customers and potential customers have which translates into your desired outcomes (online and offline) [3,1-15].

From the above definition it is clear that web analytics give answers to the following central questions to any site owner.

- *Who are my visitors?*
- *What are they doing or trying to?*
- *Are they accomplishing their goal?*
- *How would I be able to get a greater amount of the visitors?*

The apparatus used to answer the above questions is web analytics software, either using the logfile analysis or page tagging methodology. By getting responses to the questions and numerous more, web executives or advertisers have the capacity to determine which pages are prominent and which pages do not get activity and accordingly can utilize the information to streamline a site to better client experience. Apart from measuring web traffic, web analytics tools can be used for market research. For example off-site analytics tools measure a website's prospective audience and commentary on what is happening on the internet regardless of the ownership of a particular website [4].

### 2.2 Web Analytics Evolution

Web analytics began by the analysis of logfiles in 1993. The logfiles stored a record of all requests made to the server such as visitors' IP addresses, pages downloaded, bandwidth utilization, operating system and browser used and many more. The initial purpose for keeping such data was for troubleshooting purposes. [1.]



Webmasters understood that if logfiles are analyzed they could give significant information. For example, counting IP addresses could provide the number of visitors to a website. This prompted development of logfile analysis software and WebTrend was the first of its kind and was commercially available in 1993. In 1995 a completely free logfile analysis program was introduced. It was better than the WebTrend in terms of how a report was presented: the reporting was more comprehensible and gave a clear documentation and better visual graphics. [1.] Figure 1 below shows a summary of web analytics evolution from 1990 to 2010.

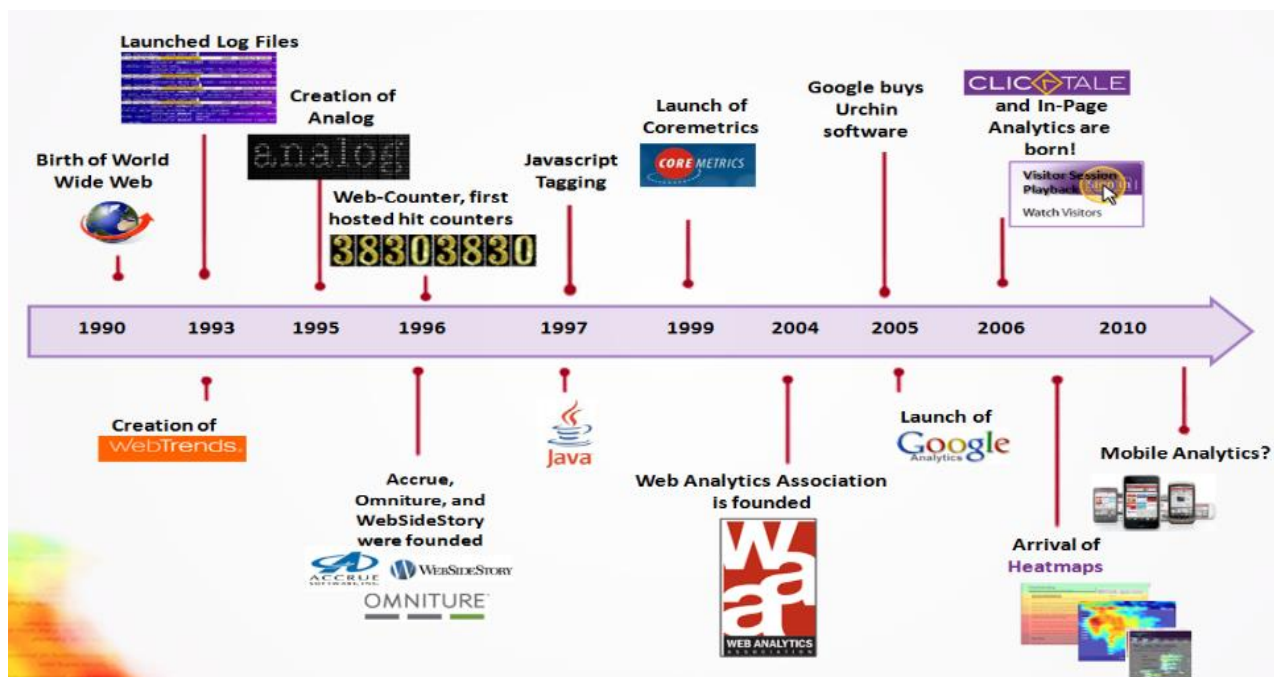


Figure 1. Web analytics evolution timeline reprinted from Clicktale blog [1].

As indicated in figure 1, Web-Counter was conceived in 1996. It was the first web analytics tool to employ the page tagging principle. Web analytics tools were chiefly used to gauge hits shown on a site's homepage. By 1997 webpages were becoming more complex. They contained components that did not exist before such as images, videos, and flash files. In this regard, the number of hits a server recorded was no more a representation of the number of pages asked for. Data collection by JavaScript tagging turned into a prominent strategy, and it is the most popular method today. [1.]

In 2004, The Web Analytics Association (WAA) was established. Its main goal was to combat issues of textures among web analytics vendors by developing a standard web analytics protocol and imperatively standardizing terms utilized in web analytics. The

obligations of WAA have since increased and now incorporate different activities outside web analytics, resulting to a name change to Digital Analytic Association (DAA), abandoning the term web analytics which could be construed to mean data collection related to websites only. [5.]

Recently more organizations with standardization agendas similar to that of DAA's have sprung up. The organizations include JICWEBS (The Joint Industry Committee for Web Standards in the UK and Ireland), ABCe (Audit Bureau of Circulations electronic, In the UK and Europe), and IAB (Interactive Advertising Bureau Europe) [6;7].

## 2.3 Web Analytics Technologies

### 2.3.1 Server-side Analytics

As the name suggests, server side analytics tools are software installed on a web server which provides site analysis by parsing logfiles. They are commonly preinstalled and preconfigured by the host company. Configuring server-side analytics is a complex task and in many cases a qualified server-side administrator may be required. [8, 59-80.]

This method of web analysis by parsing log files is as old as the start of web analytics itself. Most standard server-side web analytics are cost free and preinstalled making this technique (some way or another) readily available. Examples of server side web analytics are Webalizer, AWStats and Urchin. [8, 59-80.]

### 2.3.2 Client-side Analytics

Client-side web analytics are analytics software installed on desktop. They are also called desktop analytics tools. Just like the server-side, the client-side offers site analysis by parsing logfiles. It can be utilized to track multiple domains regardless of where they are hosted, either within the same host company or across different companies. Installing client-side analytics requires technical know-how as well as an ability or privilege to access logfiles which in some cases is not allowed by the host organization. [8, 66-79.]

Most client-side analytics worth utilizing are initially cost free. They are also cheap in the long run because there are no monthly recurrent fees. Good examples include Click Tracks, Sawmill and numerous more. [8, 59-80.]

### 2.3.3 Hosted Solutions

Hosted web analytics is more unique in relation to client-side and server-side analytics regarding the method of data collection and analysis. While the client-side and server-side analytics get analysis data from logfiles, hosted solutions collect the data from the client browser using JavaScript codes tagged in website pages. The JavaScript codes then send information to (the) Application Service Provider's (ASP) server. [8, 69-80.]

Hosted solutions were invented later than their counterpart, the client-side and the server-side solutions, but quickly gained more usage and became more popular. The first of its kind was the Web-Counter presented in 1996. It was used to show hits and visits statistics for a site. In the wake of online advertising it was used to lure online advertisers by showing them how popular a site was [8, 69-80].

Modern hosted solutions are more advanced than their predecessors. They are offered by a large portion of ASP providers in the business sector. A number of them have recurrent monthly fees. Good examples of hosted web analytics are Google Analytics and Clicky Analytics.

### 2.3.4 Other Web Analytics Technologies

Other forms of technology employing a mix of methodologies have risen up lately creating hybrid web analytics solutions which collect data using both methodologies, logfiles and page tagging. Hybrid web analytics was developed with an aim of producing more accurate statistics than either method could on its own. [9.]

Another category of web analytics is called off-site analytics which involves analysis regardless of website ownership. It is measurement of websites' potential opportunity, share of visibility and comments on the internet at large [4].

### 3 Materials Used

#### 3.1 Google Analytics

Google Analytics is a free simple and robust hosted solution. According to the W3Techonline site that provides information about the usage of various types of technologies on the web, Google Analytics is estimated to have been installed in 50% of websites with known traffic analysis tools [10].

Google Analytics was developed in 2005 by the acquisition of Urchin, a web analytics program initially developed in 1998. Since its launch it has evolved significantly. In 2007 Google overhauled the analytics reporting interface for greater customization and collaboration. In 2008 it unveiled advanced segmentation, custom reporting motion chart and management dashboard features. In 2009 it introduced more profile conversions which enabled users to set goals for the time spent on a site and page views per visit. In the same year Google introduced a feature that could alert users in case of data anomalies. [11.]

In 2011 the dashboard enabled possibilities to switch faster between profiles. The bookmarking feature was added alongside real time data encryption on all searches made from the Google account [11].

In 2012 the server-side version of Urchin was discontinued and at the same time Universal Analytics was launched. With increased mobile usage, Universal Analytic was designed to track users across multiple platforms. It did so by assigning a unique ID to all users who signed-in. It became possible to assign a unique ID to users who were signed-in and then track them through other devices they used as long as they were signed-in. Apart from that, Universal Analytics has additional features such as flexible tracking codes which can be implemented across any domain or subdomain set-up ability; configuration options called organic search sources; session and campaign timeout handling; referral exclusions; and search term exclusion. [11.]

Google Analytics is characterized by data visualization tools, segmentation for analysis of subsets such as conversions, email-based sharing and communication. Google Analytics is integrated with other Google products and other tracking software. It is quite easy to navigate through the dashboard. The basic Google Analytics menu bar is found at the top of the screen. It is used to move to and from the dashboard reporting to customization

and administration sections. Switching between different websites within the Google Analytics account can be done from the menu on the top right side of the screen. On the left sidebar there is a search box for finding specific reports and a list of links to important areas of Google Analytics. The dashboard allows customization of views of Google Analytics data using widgets. The Add Widget button allows addition of widgets. (See appendix 1 for an image of Google Analytics dashboard.)

Google Analytics was chosen for this study because it is the most popular type of the hosted analytics tools. It also combines in-depth data, powerful analysis and creative visualization, which further makes it an outstanding product. Before its introduction in 2005, the choice of analytics tools were made on the basis of inferior data of 'server stats' packages or paying several hundred dollars a month for a business solution. [1.]

### 3.2 AWStats Analytics

AWStats stands for Advanced Web Statistics. It is an open source logfile analyzer released in May 2, 2000. It was written in the Perl language and runs on different operating systems and uses a variety of log formats. It is hosted on the server and would require the user to access the server's web based control panel to access the desired data. The dashboard can also be accessed from the browser. AWStats process the logfiles to create reports, hence the term logfile analyzer. [3; 12; 14.]

The development of AWStats was started in 1997 and it is still being developed by the original designer Laurent Destailleur. There are no major developments today as it only entails the maintenance and other small new features. This software is however being maintained by other developers especially for the Linux distributors. [14; 8, 36.]

AWStats is characterized by simplicity. Its window has the left-hand and right-hand frame. The right hand frame shows the reports while the left-hand frame shows links to metrics that are listed according to their significance. The main metrics by default appear at the top of the dashboard. In addition at the top are a few controls. For example there is a dropdown menu list in which the month period or year period to be analyzed is chosen. (To see an image of the dashboard see appendix 2.)

AWStats Analytics was chosen for this study because it is the most popular server side analytic tool and mostly found readily installed by the host provider. It updates every 24

hours and instantly when the 'update now' link is clicked. Its statistics reports give details about all the fundamental web analytics metrics.

### 3.3 Metkaweb.fi Website

Metkaweb.fi is the official website of the Student Union of Helsinki Metropolia University of Applied Sciences (METKA) which represents the students of Metropolia. This website acts as an easy all round-the-clock means of communication and dissemination of services between the union, faculty and the student's body at large. Services offered from the website include membership registration and renewals, organizing students' activities like sports, information about the union officials, purpose and activity, student mentoring, and tutoring programs. [15.]

The website is built upon WordPress CMS. The front end core-structure includes a banner which contains a logo, language options button, navigation structure that includes horizontal Cascading Style Sheets (CSS) menu listing services and drop down menu. Onmouseover sub links and services are also offered. Generally the website has good structure. A well-structured website is important for Search Engine Optimization (SEO) and for great user experience. Figure 2 below describes the structure of the homepage. Other pages have similar but different structure from homepage.



Figure 2. Drawing representing the design of metkaweb.fi website home page.

The website was chosen for study to analyze the audience behaviour on the site and to show general trends in acquisition and interaction over time. Another reason for choosing this website was because it uses responsive web design practices like attention to break points, compression of site elements and contents to support many browsing devices. This helps users get better site experience on devices such as Apple iPad, Microsoft Surface, Amazon Kindle and XBOX 360, and other modern browsers on smaller or larger screens. Besides this, the website also has frameworks and libraries that support the latest versions of Internet Explorer. The website has a doctype that recognizes modern web standards such HTML5 and CSS3. This means that this webpage renders in standards mode in Internet Explorer 9 and other modern browsers. By rendering in standards mode, this webpage may get better performance in any modern browser.

## 4 Project Design

### 4.1 Analytics Tools Installation

For this study to be successful all materials explained above were analyzed. Google Analytics and AWstats were installed on the metka.fi website. The analytics tools settings were adjusted wherever possible to make them comparable.

In general Google Analytics can be installed using three methods: direct paste, functions.php, and plugins. Direct paste and functions.php require a Google account ownership prior to the installation process while the plugin method involves downloading and activation as long as the website platform supports such a process. [16;17.] For this study, Google Analytics was already installed before the conception of this research topic. The only thing to do was to confirm that it had been installed correctly on the metka.fi website.

AWStats installation process is technical and requires prior knowledge of server configuration. The first step is to download the latest version or the version preferred. Then it is necessary to follow the configuration steps provided. The steps may vary depending on the server operating system. [18;19;20.] AWStats was already installed by a host provider. Thus, on the metkaweb.fi website analysis data was available from the day this project was launched.

After confirmation that both analytic tools required were installed and working correctly, the next thing was to set them at the same level. Two key items which normally vary among vendors by default were observed. They were visits/session duration and types of files or requests that qualify as a page, and sometimes preferred time zone if not specified during installation.

According to WAA, “a visit/session is an interaction, by an individual, with a web site consisting of one or more requests for a page”. If an individual has not taken another action (typically additional page views) on the site within a specified time period the visit will terminate by timing out. [20.] By default Google Analytics time-out period for a visit is 30 minutes while for AWStats it is one hour. Therefore for consistency the Google Analytic time-out period was set to one hour.



Types of files or requests that qualify as a page were also checked in both tools. WAA defines a page as “analyst definable unit of content.” [21.] For Google Analytics and AWStats, a page constitutes of HTML, PHP or ASP files by default. Because both are similar in the definition of files that qualify as page, no changes were done.

Universal Analytics - the latest version of Google Analytics - has a feature that makes identification of unique users across multiple device possible [22]. However, for this study the feature was not enabled because the requirement policy for using the feature was not met and also for the feature to be effective enough requires a website that authenticates users either in form of account login or other. The metkaweb.fi website does not have a log-in feature for its users. Thus, the feature does not have major impact.

Finally, monthly based analysis was decided as the best comparison period to be used so as to avoid data sampling experienced in Google Analytics. The choice also matches with AWStats as it provides reports on a monthly basis.

## 4.2 Comparison Metrics

For web analytics comparisons to be effective, they must be based on common practical terms and configuration. In this study metrics from four distinct categories - counts, ratios, key performance indicators (KPIs) and dimensions - were chosen. A metric is a number. Technically a metric can be a count (a total) or a ratio (a division of one number by another). Examples of metrics that are count are visits or page views while examples of a ratio include conversion rate (a quantitative metric) or task completion rate (a qualitative metric). A key performance indicator (KPI) is a metric that helps people understand how they are doing against their objectives. Objectives are critical to something being called a KPI, hence KPIs tend to be unique to each organization. A dimension is typically an attribute of the visitor to a website. A sources from where a visitor comes to a website is a dimension in the web analytics data. This can include sources such as referring URLs, campaigns and countries. [21.]

Metrics from the three group were selected starting with most important group unique visitors, visits/sessions and page views, they were then configured as explained in chapter 4.1. For a metric to be selected it has to be of significant importance and secondly it must be available in both analytics tools used: Google Analytics and AWStats. Any metric of great importance which both tools did not have was dropped.

In the end the following list of metrics qualified:

- Unique visits
- Page view
- Visits/Sessions
- Entry page
- Exit page
- Referrer
- Visit duration/Session duration
- Page views per visit




#### 4.2.1 Unique Visitor

According to WAA, “unique visitors is the number of inferred individual people (filtered for spiders and robots) within a designated reporting time frame with activity consisting of one or more visits to a site”. Each individual is counted only once in the unique visitor measure for the reporting period. Unique visitors are authenticated in two ways, active or passive. Active identification is used in a situation where a user account is needed while the passive method applies to situations in which the user account is not needed. [21.] For the metkaweb.fi website users are not required to login. Therefore the only way to identify them is via a persistent cookie that stores and returns a unique ID value as well as a unique IP address or simply via a passive identification method.

Table 1 below shows the unique visitors count of the metkaweb.fi website for the months of November 2014, December 2014 and January 2015.

Table 1. Screenshots of unique Visitor count taken from Google Analytics and AWStats [23; 24].

Period	Google Analytics	AWStats

January 2015	Users <b>3,949</b> 	Unique visitors <b>7,798</b>
December 2014	Users <b>2,205</b> 	Unique visitors <b>7,006</b>
November 2014	Users <b>3,238</b> 	Unique visitors <b>6,497</b>

As table 1 shows, the average difference between the two tools is about 3,500 with AWStats recording higher counts. The other months of the year 2014 were also observed and the difference still remains that AWstats provide higher counts.

AWStats uses IP addresses to identify and tag repeat visitors. In situations where a user visits from multiple locations or has a dynamic IP address they will be counted multiple times while multiple users from the same IP address are counted as a single user. The high number is also attributed to non-human visitors such as search engine crawlers, spiders, robots, and bots. AWStats keeps a database of non-human visitors but in some cases not all are identified. Thus, they end up being confused with actual human visits. [25.]


Google Analytics uses browser specific cookies to identify new and repeat visits. It can successfully track visitors from multiple locations no matter how their IP address change provided a visitor does not delete or blocks cookies or there is a cookie time-out. Google Analytics lower reporting is attributed to complete lack of data capture caused by a connection loss to a web analytics server or the use of hand held devices to browse. In case of loss of connection to a web analytics hosting server, no data is captured completely. It is estimated that 10% of data is lost due to that. [25.] Another way data might not be captured is if visitors browse with hand held devices since a large percentage of the devices do not support JavaScript. Thus, JavaScript is not executed during their visit.

#### 4.2.2 Visits/Sessions

According to WAA definition, “visits is an interaction by an individual with a website consisting of one or more requests for an analyst-definable unit of content (page view)”. If an individual has not taken other action (typically additional page views) on the site within a specified time period, the visit session will be terminated. [21.] Different tools have different time-out for a visit. To guarantee consistency in this study both analytics tools were configured to have the same time-out of one hour.

Table 2 below shows the visits count for the metkaweb.fi website for the months of November 2014, December 2014 and January 2015.

Table 2. Screenshots of visits/sessions count from Google Analytics and AWStats [23; 24].

Period	Google Analytics	AWStats
January 2015	<p>Sessions</p> <p><b>5,887</b></p> 	<p>Number of visits</p> <p><b>19,699</b></p>



December 2014	<p>Sessions</p> <p><b>2,760</b></p> 	<p>Number of visits</p> <p><b>21,667</b></p>
November 2014	<p>Sessions</p> <p><b>4,421</b></p> 	<p>Number of visits</p> <p><b>29,916</b></p>

Table 2 above shows that there is a clear variation. The difference in count for the month of January 2015 is about 13,000 visits. The other months were also observed and variation remain large. AWStats always recorded a higher number.

As explained in chapter 4.2.1, AWStats large count of visits came from non-human visitors and maybe malfunctioning script in the site that triggers error response pages. Even though AWStats keeps a database of non-human visitors the database are not exhaustive. [25;26.]




As Google Analytics rely on JavaScript codes to collect data, situations such as when clients have disabled JavaScript or impatiently click away from the page before the page fully loads can result in no visit recorded. Also the factors explained in chapter 4.2.1 contribute a lot to lower reporting. [25;26.]

#### 4.2.3 Page Views

According to WAA, “page views is defined as the number of times a page (an analyst-definable unit of content) is viewed”. The dimension of what constitute a page differs among vendors. Apart from a typical page paradigm, Flash, AJAX, media files, downloads, documents, and PDFs files may be considered as pages by some vendors with ability to specify or redefine pages during or after configuration. [21.] In this study it was made sure that the page dimensions of Google Analytics and AWStats are same.

Table 3 below shows the page views counts of the metkaweb.fi website for the months of November 2014, December 2014 and January 2015.

Table 3. Page view screenshots from Google Analytics and AWStats [23;24].

Period	Google Analytics	AWStats
January 2015	Pageviews <b>15,674</b> 	Pages <b>93,676</b>
December 2014	Pageviews <b>7,142</b> 	Pages <b>104,368</b>
November 2014	Pageviews <b>9,937</b> 	Pages <b>139,238</b>

As can be seen in table 3 above, the difference in counts is about 78,000 for the month of January 2014 alone. In the subsequent months observed the page views count difference still remains that high with AWStats reporting being higher compared to Google Analytics reporting.

AWStats and Google Analytics define pages as constitute of HTML, PHP and ASP files.

As the figure above shows, the difference in count report comes from a number of reasons. In case of AWStats it is attributed to fact that every time content is loaded from a server it is considered a page. Thus, whenever Ajax files load content to a single page AWStats counts all content loaded as a page. With the metkaweb.fi website almost all the pages are dynamic, containing Ajax files. Therefore, every time content is loaded to the pages AWStats make multiple counts. On the other hand, HTTP Status Codes returned by the web browser in situations such as successful page load (Codes 200 and 304), partial download (code 206) and requests for another page (code 301 or 302) are sometimes considered pages by AWStats. [25; 27; 28.]

Google Analytics on other hand counts only pages that have the JavaScript codes in them. This means all the pages returning HTTP Status Codes or pages that do not exist and pages that are not real web pages are not counted. Other conditions such as JavaScript failure to execute, disabled JavaScript in browser or a visitor clicking away before JavaScript load could contribute to lower page count. [25; 27.]

#### 4.2.4 Entry Page

WAA defines an entry page as “the first page in the visit regardless of how the sessions are calculated”. It is important to note that different session counting methods may give different results. The total number of pages is normally equal to visits because each visit count involves at least one page. [21.]

Table 4 below shows top entry pages as listed by Google Analytics and AWStats respectively. Note that Google Analytics refers to entry page as entrance page.

Table 4. Screenshot showing entry pages as listed by Google Analytics and AWStats [23;24].

Google Analytics				
Page ?	Pageviews ?	Unique Pageviews ?	Avg. Time on Page ?	Entrances ? ↓
	15,674 % of Total: 100.00% (15,674)	12,664 % of Total: 100.00% (12,664)	00:01:31 Avg for View: 00:01:31 (0.00%)	5,881 % of Total: 100.00% (5,881)
1. /	3,638 (23.21%)	2,941 (23.22%)	00:01:03	2,703 (45.96%)
2. /yhteystiedot/m-piste/	847 (5.40%)	745 (5.88%)	00:03:10	400 (6.80%)
3. /opiskelijakortti-kuntoon/	513 (3.27%)	309 (2.44%)	00:00:48	249 (4.23%)
4. /en/	442 (2.82%)	329 (2.60%)	00:00:52	176 (2.99%)
5. /jasenyys/	345 (2.20%)	282 (2.23%)	00:00:30	148 (2.52%)

AWStats				
Entry				
Total: 663 different pages-url	Viewed	Average size	Entry	Exit
/	13,754	47.66 KB	4,275	2,805
/wp-login.php	4,309	5.27 KB	1,557	2,109
/en/blog/page/2/	1,723	83.26 KB	608	513
/en/activities/trusteeship/participate/	1,926	56.60 KB	582	577
/en/author/tiedottaja/	1,617	82.22 KB	580	625
/en/category/news/lobbying/	2,311	92.89 KB	573	579

There is significant difference in page view count reported by the two Analytics tools. Google Analytics reports that the number of entries from the homepage for the month of January 2015 is 2,700 while AWstats recorded 2,800.

The homepage of any website is by default meant to be the entry page but depending on routes taken to arrive at the website, the entry page will vary and can be any page on the website. Apart from being the default entry page, the homepage of the metkaweb.fi website has dynamic content as well as a summary of the other pages and their link. Hence, it is a representation of the whole site and that is why it is the top leading entry page.



In Google Analytics dynamic web pages, for example the homepage of the metkawe.fi website are counted as single pages while in AWStats it depends on how many times the content was loaded to the page. By being dynamic in design, the homepage of metkawe.fi will have more content loaded. Hence, the top entry page listed by AWStats is also partially dependent on how much dynamic content it has. [27; 28.]

#### 4.2.5 Exit Page

According to WAA, “exit page is the last page on a site accessed during a visit, representing the end of a visit/session”. In tabbed or multi-windowed environments, the last recorded page is not definite. [21.]

Table 5 below shows exit pages as listed by Google Analytics and AWStats for January 2015.

Table 5. Screenshot of the exit pages taken from Google Analytics and AWStats [23;24].

Google Analytics							
Page ?	Pageviews ?	Unique Pageviews ?	Avg. Time on Page ?	Entrances ?	Bounce Rate ?	% Exit ?	↓
	15,674 % of Total: 100.00% (15,674)	12,664 % of Total: 100.00% (12,664)	00:01:31 Avg for View: 00:01:31 (0.00%)	5,881 % of Total: 100.00% (5,881)	47.61% Avg for View: 47.61% (0.00%)	37.52% Avg for View: 37.52% (0.00%)	
1. <a href="/?option=com_content&amp;view=article&amp;id=115&amp;Itemid=73&amp;lang=fi">/?option=com_content&amp;view=article&amp;id=115&amp;Itemid=73&amp;lang=fi</a>	1 (0.01%)	1 (0.01%)	00:00:00	1 (0.02%)	100.00%	100.00%	
2. <a href="/?option=com_content&amp;view=article&amp;id=304:kiteboarding-leijalautilu&amp;catid=35.muut-lajit&amp;Itemid=134&amp;lang=fi">/?option=com_content&amp;view=article&amp;id=304:kiteboarding-leijalautilu&amp;catid=35.muut-lajit&amp;Itemid=134&amp;lang=fi</a>	1 (0.01%)	1 (0.01%)	00:00:00	1 (0.02%)	100.00%	100.00%	
3. <a href="/?option=com_content&amp;view=article&amp;id=6&amp;Itemid=6&amp;lang=en">/?option=com_content&amp;view=article&amp;id=6&amp;Itemid=6&amp;lang=en</a>	1 (0.01%)	1 (0.01%)	00:00:00	1 (0.02%)	100.00%	100.00%	
4. <a href="/?s=avoimet+työpaikat&amp;submit=Haku&amp;lang=fi&amp;lang=fi">/?s=avoimet+työpaikat&amp;submit=Haku&amp;lang=fi&amp;lang=fi</a>	3 (0.02%)	3 (0.02%)	00:00:00	0 (0.00%)	0.00%	100.00%	
5. <a href="/?s=gaala&amp;lang=fi&amp;lang=fi">/?s=gaala&amp;lang=fi&amp;lang=fi</a>	1 (0.01%)	1 (0.01%)	00:00:00	0 (0.00%)	0.00%	100.00%	
AWStats							

Exit				
Total: 673 different pages-url	Viewed	Average size	Entry	Exit
/	13,754	47.66 KB	4,275	2,805
/wp-login.php	4,309	5.27 KB	1,557	2,109
/en/author/tiedottaja/	1,617	82.22 KB	580	625
/en/category/news/lobbying/	2,311	92.89 KB	573	579
/en/activities/trusteeship/participate/	1,926	56.60 KB	582	577

As table 5 above shows, Google Analytics reports leading exit pages as a ratio. All the pages are reported as 100% leading (top leading). Hence, it is not clear which page in specific is leading. AWstats reports exit pages as a list and the exit count. It is clearer which page is leading and by what number.




What determines exit pages should be either natural exit pages or “bouncing pages” Another factor that could make a page an exit page is if visitors find all they need within that single page.

#### 4.2.6 Visit Duration/Time Spent

According to WAA, “visit duration is the length of time in a session, normally calculated by finding the difference between the timestamp activities of the first session from the last session”. In case of a situation where only one page is visited, no visit duration is calculated or reported. This is because there is no second timestamp to subtract from. [21.] Different vendors have found a way to work out this.

Table 6 below shows average visit duration per as Google Analytics and AWStats Analytics for the months of November 2014, December 2014 and January 2015. It is important to note that Google Analytics refers to visit duration as a session duration.

Table 6. Screenshots indicated visit duration taken from google Analytics and AWStats [23;24].

Period	Google Analytics	AWStats
January 2015	<p>Avg. Session Duration</p> <p>00:02:32</p> 	Average: 388 s
December 2014	<p>Avg. Session Duration</p> <p>00:02:16</p> 	Average: 448 s
November 2014	<p>Avg. Session Duration</p> <p>00:01:54</p> 	Average: 463 s

If AWstats December 2014 readings are converted (448s) a visit duration is 00:07:28. Indeed the value is much greater compared to the reading of Google Analytics which is 00:02:16.

The large count in AWStats is probably a result of multiple visits from the same network. AWStats counts the multiple visitors from the same network as one while at the same time if a new visitor from the same network visits before previous session ends, the visit duration is counted as one. For example, if 100 individuals visit from the same network concurrently for a period of 24 hours that would be counted as a single visitor with a visit duration of 24 hours. In this case the average visit duration will be more inaccurate. On the other hand, a single visitor with a dynamic IP address can be counted as multiple users. Hence the visit duration is split. [27;28.]

For Google Analytics the low visit duration is attributed to the fact that JavaScript could sometimes delay to load. Thus the time of entry is not always precise. A visitor might engage with a site for a considerable period of time before Google Analytics recognizes it while at the same time the time spent on the last page is not always counted. All these factors will eventually contribute to lower average visit duration. [29.]

#### 4.2.7 Referrer

According to WAA, "referrer is a generic term that describes the source of traffic to a page or object". Referrer can be classified further into page referrer, session referrer or visitor referrer. However in reporting they are grouped meaningfully to facilitate analysis. [21.]

Table 7 below shows referrers of Google Analytic and AWStats respectively.

Table 7. Screenshot of referrer taken from Google Analytics and AWStats [23;24].

Google Analytics			
Default Channel Grouping	Acquisition		
	Sessions <small>?</small> ↓	% New Sessions <small>?</small>	New Users <small>?</small>
	<b>5,887</b> <small>% of Total: 100.00% (5,887)</small>	<b>55.44%</b> <small>Avg for View: 55.38% (0.12%)</small>	<b>3,264</b> <small>% of Total: 100.12% (3,260)</small>
1. <a href="#">Organic Search</a>	<b>2,924 (49.67%)</b>	50.89%	<b>1,488 (45.59%)</b>
2. <a href="#">Direct</a>	<b>1,921 (32.63%)</b>	69.50%	<b>1,335 (40.90%)</b>
3. <a href="#">Social</a>	<b>719 (12.21%)</b>	33.10%	<b>238 (7.29%)</b>
4. <a href="#">Referral</a>	<b>323 (5.49%)</b>	62.85%	<b>203 (6.22%)</b>

AWStats	
Origin	Pages
<b>Direct address / Bookmark / Link in email...</b>	45,039
<b>Links from an Internet Search Engine - Full list</b>	3,723
- <a href="#">Google</a> 3,642 / 6,006	
- <a href="#">Microsoft Bing</a> 58 / 985	
- <a href="#">Yahoo!</a> 10 / 11	
- <a href="#">Ask</a> 6 / 7	
- <a href="#">Yandex</a> 6 / 6	
- <a href="#">Baidu</a> 1 / 1	

Table 7 clearly shows that there is a difference in referrer count. This could be attributed to the fact that Google Analytics reports are free from non-human visitors while AWStats reports contain non-human visits.

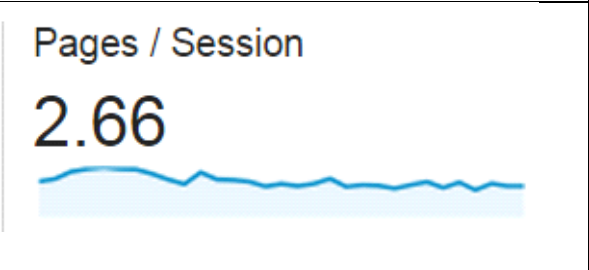
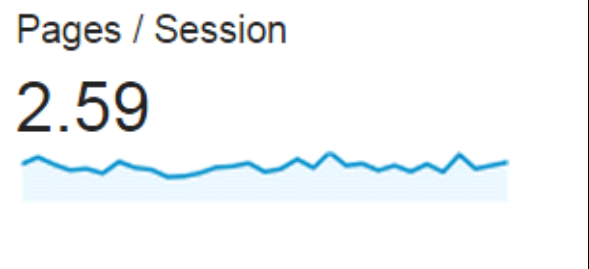
Traffic from an unknown referrer – indicted by “direct” in Google Analytic and as “Direct address / Bookmark / Link in email...” in AWStats – could be coming from direct addresses such as bookmarks, links in mail or from someone who signed in to his/her Google account before searching. [28;30.]


#### 4.2.8 Page Views per Visit

Page views per visit is defined as “the number of page views in a reporting period divided by number of visits in the same reporting period” [21].

Table 8 below shows page view as recorded by Google Analytics and AWStats respectively for the months of November 2014, December 2014 and January 2015.

Table 8. Page views per visit screenshots taken from Google Analytics and AWStats [23;24].

Period	Google Analytics	AWStats
January 2015	 <p>Pages / Session <b>2.66</b></p>	(4.75 Pages/Visit)
December 2014	 <p>Pages / Session <b>2.59</b></p>	(4.81 Pages/Visit)

November 2014	<b>Pages / Session</b> <b>2.25</b> 	<b>(4.65 Pages/Visit)</b>
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Page views per visit is calculated by taking value of page views divided by the number of visits. Therefore the difference in the reporting is solely caused by the difference in the parameters used, page views and visits. The cause of differences in the two parameters is discussed in chapter 4.2.2 and chapter 4.2.3.

## 5 Discussion

### 5.1 Other Web Metrics

As mentioned in chapter 4, metrics were selected according to their significance as well as their availability in both analytics tools used in this study. However, there are some metrics of great importance which were not considered such as bounce rate and bandwidth because they were available in one tool and not in the other. The metrics are discussed below



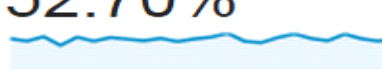
#### 5.1.1 Bounce Rate

Bounce rate is feature available in Google Analytics and in many other hosted solutions. According to WAA, bounce rate “is a single page visit divided by total number of entry pages”. In case of a specific page, it is the number of times that the page was recorded as a single page visit divided by the number of times it was an entry page. For a group of pages it is the number of times the pages in that group were recorded as a single page visit divided by the number of times they were entry pages. [21.]

This metric tells more about a visitor and the site itself. For example a high bounce rate could be a sign that something is wrong with site design, usability interface, and implementation of tracking code or the users’ behavior.

Table 9 below shows the bounce rate of the metkaweb.fi website for the months of November 2014, December 2014 and January 2015 respectively.

Table 9. Screenshot from Google Analytics indicating bounce rate values [23].

November 2014	December 2014	January 2015
<p>Bounce Rate</p> <p><b>47.61%</b></p> 	<p>Bounce Rate</p> <p><b>52.03%</b></p> 	<p>Bounce Rate</p> <p><b>52.70%</b></p> 

According to Avinash Kaushik, the average bounce rate of most websites is about 45%. In the above diagram, the metkaweb.fi website has a bounce rate ranging from 45% to 55%, indicating that it is above average. The metkaweb.fi website bounce rate can be attributed to the fact that most of the services and information offered are all partially found on the homepage. Hence a visitor does not need to visit multiple pages to access them. This also explains why the homepage was one of the leading exit pages. On the other hand higher than average bounce rate does not necessarily indicate that the website is performing poorly or that there are problems with design. The bounce rate might be very high simply because the website has only one page or the single page visited has all the information and services the visitor was looking for. Getting a bounce rate of 0% is impossible but reducing the rate is critical to increase conversions. Hence it important to determine why people are leaving and make necessary changes to keep them. [31.]

#### 5.1.2 Bandwidth

Bandwidth is the feature available in AWStats and many other server-side analytic tools. According to AWStats documentation, “bandwidth is the total number of bytes per page, images and files downloaded by web browsing”. Knowing bandwidth limit is important for the following reasons [25]:

- In case of insufficient bandwidth, visitors will not find a website.
- Lower bandwidth results in slow website loading and implementation.

Table 10 below shows a bandwidth count from AWStats, for the months of November 2014, December 2014 and January 2015



Table 10. Bandwidth screenshot taken from AWStats [24].

November 2014	December 2014	January 2015
<p style="text-align: center;"><b>Bandwidth</b></p> <p style="text-align: center;"><b>11.05 GB</b> (588.04 KB/Visit)</p>	<p style="text-align: center;"><b>Bandwidth</b></p> <p style="text-align: center;"><b>8.39 GB</b></p>	<p style="text-align: center;"><b>Bandwidth</b></p> <p style="text-align: center;"><b>10.73 GB</b> (375.91 KB/Visit)</p>

Each time someone visits a site on the internet, web pages, images and other information are sent to their computer. Bandwidth will determine how fast something loads on the site. Images, videos, and flash movies will all load quickly with the right amount of bandwidth. As the table above indicates, bandwidth decreases slightly from December to November, then increases again slightly in January. The slight decrease and increase in December and January can be attributed to decreased traffic when the students went off for holidays and the traffic picks up in January. Hence increased bandwidth because the school is back in session.

## 5.2 Results Evaluation

Based on the observations made so far, it is clear that both analytic tools have similar functions. They provide fundamental data about website performance such as the number of visitors, popular pages, session durations, and how the visitors arrived at site. It is also clear that the values reported by both analytic tools are not same. AWStats generally recorded large figures compared to Google Analytics. The difference in report figures are mainly caused by difference in their technologies. However there could have been other factors and conditions that might have affected the results in one way or another. The following are some of the factors that might have affected the accuracy of the results:

- Even though this study was carried out carefully and the tools optimized and configured in similar manner wherever possible, there were some cases in which configuration was not possible either because of differences in analytic tool design and lack of customization features in the software.

- The majority of the metkaweb.fi website users are Metropolia University of Applied Sciences students. They visited the website throughout the year and most of the students accessed the site from school network which is available from 8:00 am to 9:00 pm. Having multiple users accessing a website from the same network during a period means that server-side analytics tool such as AWStats might have counted hundreds of users as one. At the same time most of the organization computers have cookies disabled or they are deleted regularly. Thus hosted analytics tools which solely depend on JavaScript and cookies for accuracy might have recorded erroneous data.
  
- The major objective of this study was to compare hosted and server-side analytic tools, represented by Google Analytics and AWStats Analytics respectively. However using a single tool from either side may not have given a clear representation of the two technologies because the analytics tools are not developed with equal capabilities. There can be differences even when comparing analytics tools with the same technology.

### 5.3 Metkaweb.fi Website Analysis

Taking into consideration all the factors and conditions that might have affected the accuracy of collected data, deflation in Google Analytics and inflation in AWStats, the probable correct value of unique visitors is somewhere between what the two analytics tools reported. For example the probable correct value for unique visitors for January 2015 could be between 5,000 and 6,000. This estimation is arrived at by averaging figures from both analytics tools. Interestingly the resulting number of unique visitors closely reflects the number of registered Metka members which was 5,562 according to the January report. It is fair to say that not all registered Metka members accessed the site during the reporting period. Some visits came from non-members and other factors within the software design that might have caused miscounts. These factors were all considered in calculating the probable correct value of unique visitors. Hence it might not be scientific but mere speculation. The figure also reflects that metkaweb.fi gets an optimum number of visits in relation to the actual number of registered users.

Artificial goals were created and applied to the web traffic of metkaweb.fi to determine the success or failure rate of the visitor's actions. The goals were then used for tracking the completion of the tasks of the visitors. Goals for this website were set based on the following question:

What is expected of the visitors to do once they reach the website?

What is a successful completion of a goal? For example long periods viewing the site, newsletter sign-ups, and number of total page views.

Does the site design have an influence on the visitors towards completing these goals faster/more easily?

Based on these questions and the metrics analyzed in this study, the following assumptions can be made about metkaweb.fi.

Based on the data from both analytics tools, it can be noted that all the pages within Metkaweb.fi received visits. Some pages had more visits such as the home page since it is the landing page while other pages like the newsletter also received high visit numbers because of popular content. The website also receives much of its traffic while the school was in session as reported in November and January while it slightly drops in December when the school was out of session and the students were on holiday. It is interesting to note that a larger percentage of the students also accessed the site using mobile devices. Hence it would be wise to optimize the site further for mobile devices usage and offer more content tailored for mobile users. Some of the pages had overlapping content which led to higher bounce rates while some pages were designed as exit pages such as the contact page. Hence the higher bounce rate was not a problem. The high bounce rate in the blog pages was also artificial since there was a comments section which was also an exit point. Both of these pages also represent the successful completion of a goal which is confirmed by commenting or contacting site administrators.

Average session time per visit was about 2 minutes which is enough to read through most of the content on the site. Longer content might put off visitors. Based on traffic and Google Analytics data, it is known that more often than not people are trying to accomplish a goal when they visit a website. Visitor statistics play a central role in increasing website performance and value. As an organization, the easier it is made for people to

accomplish their goals the more visitors the organization will have, and the happier these visitors will be. In other words the greater the likelihood is that they will return.

#### 5.4 Future of Web Analytics

The future of web analytics in general is great. Many companies are engaging in online businesses and are finding analytics tools to be the most effective way to analyze their online activities. Therefore demand for web analytics is growing and the web analytic standardization association is increasingly tackling the issues which could have harmed the web analytics industries [21]. It is interesting to note that existing vendors and the emerging ones are now trying to follow standards set by this association. This has resulted to continuous development of the web analytics and in the near future agreed standardized protocols will be used. Apart from that users of the analytics tools should expect the following changes as time moves on [29; 30]:

- Web analytics are likely to put more emphasis on individual users than on aggregate data. There will be more focus on the metrics like the unique visitors rather than visits and hits. Some web analytics have already focused on these areas while the others are headed to that direction.
- Metrics showing segmentation based on geographical location and age are already implemented in some tools such as Google Analytics. It is expected that in the future metrics will be improved to an extent that it will be possible to segment users based on interests and behaviors.
- Analytics tools that are capable of giving an understanding of competitors' actions are being developed. This will replace the available tools such as the off-site analytics record estimates which gives erroneous data.
- Since the range of devices used to access the web are increasing, it is expected that web analytics will find a way of tracking the users across multiple devices. Google Analytics has already done some implementations regarding this but it is still full of inaccuracies.

## 6 Conclusion

There is an increasing need across a diversity of industry sectors for specialized tools to analyze web and other digital metrics. As a result, the web analytics arena is growing. As more businesses seek to use web analytic tool to analyze their websites the fundamental question still remains, which tool to use?

There are three distinct web analytics methodologies to choose from, server-side analytics, client-side analytics and hosted solutions. All have merits and demerits over the other. The server-side offers benefits such as anywhere access, better privacy, insights into site failures, high reliability and relatively low costs while its downside is lack of portability when need to change host provider arises. The client-side offers benefits such as possibility to analyze data even without internet connection, ultimate control of data and possibility to track multiple domains while its downside is possibility of data loss in case of systems failure. Hosted solutions offer benefits such as easy installation, no maintenance, no log parsing and possibility to limit the amount of unnecessary data to sift through while its downside is its inability to detect site errors.

Generally these traffic statistics programs are not ever 100% accurate. Some people might use two analytics tools then average the numbers to get an average estimate of their traffic numbers. This might seem logical but better estimates can be realised by considering the numbers reported as approximations and focus instead on the trends from each program individually. It is very useful to have server-side analytics to check out the web traffic statistics data that can only be reported by the server and have hosted solutions to focus on the user's activity.

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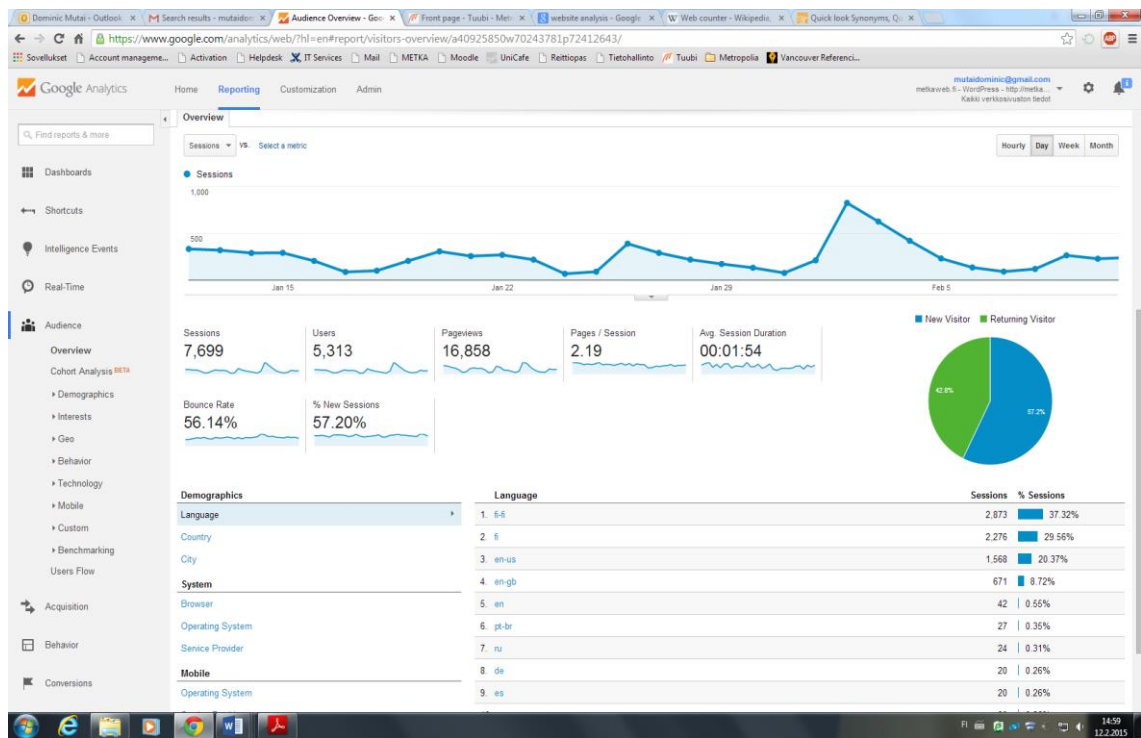
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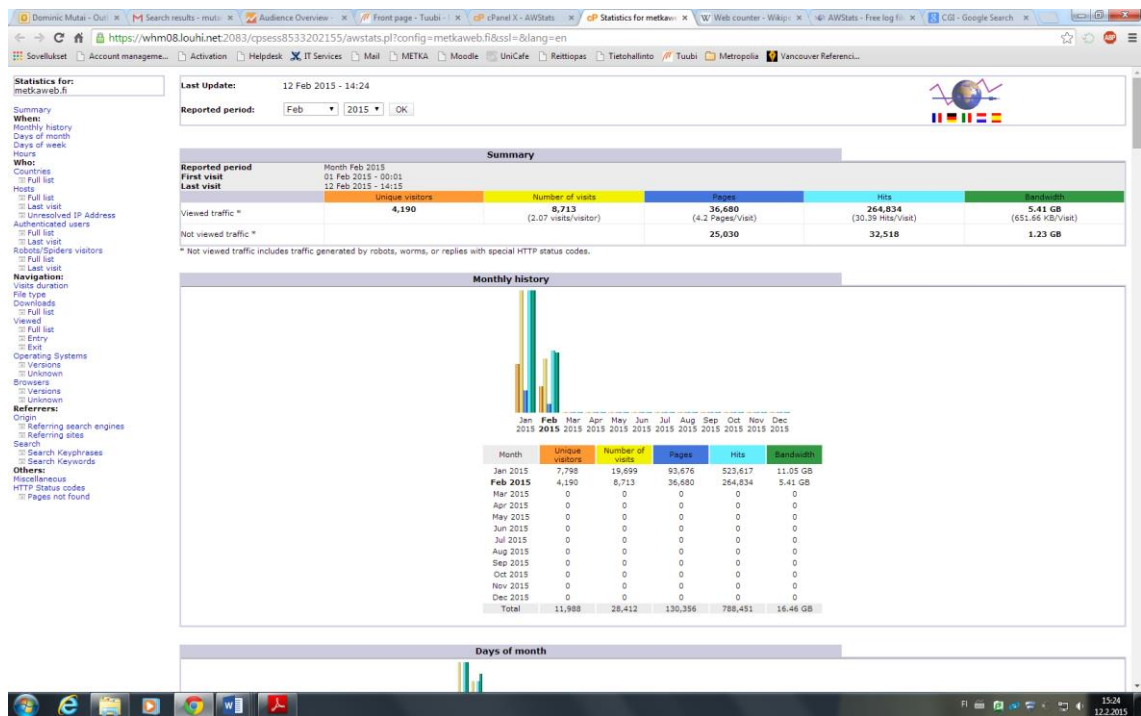
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## AWStats Analytics dashboard [24].



## Metkaweb.fi Website Homepage [15].

metkaweb.fi

English Suomi

Etusivu Jäsenyys Toinnita Opiskelijat Tutustu Blogi Yhteystiedot Haku

# HAE TUTORIKSI NYT!

**Aikataulu**

M-pöytä  
tulevarä 31

Opiskelijakoffi- ja jäsenpalvelusali

Puhelin: 044 745 4952

M-pöytien aukioloajat 1.-28.2.

Ma	12.00 – 16.00
Ti	12.00 – 18.00
Ke	9.00 – 11.00 ja 12.00 – 16.00
To	9.00 – 11.00 ja 12.00 – 16.00
Pe	8.30 – 12.00

Lisätiedot aukioloajoista

**Uutiset**

04/02/2015

**Hae markkinoinnin harjoittelijaksi METKALLE!**

Metropia Ammattikorkeakoulun opiskelijajunta METKA hakee joukkoonsa MARKKINOINNIN HARJOITTELIJAA ajalle 16.3.–14.6.2015 tai sopimuksen mukaan. Harjoittelajan palkanmaksu on 37.5hviikko ja työ tehdään...

Lue lisää »

03/02/2015

**METKA hakee liikuntasuunnittelijan sijaisista!**

Metropia Ammattikorkeakoulun opiskelijajunta METKA hakee LIKUNTASUUNNITTELIJAN SIAISTA määräaikaan työsuhteeseen 37.5 tuntia viikossa vuoden 2015 loppuun saakka. Rekrytoim on...

**Viestilä**

Illegaalit numerot? Miltäköön opetuksen taakka? Eivät palautteita isone parilla? Kärrä se viestikäsä!

**OPPI**

Tule kysymään meiltäsi pamaavat asiat Metropian henkilöstöltä ja palvelimien METKOvi kassat!

**METKA Liikunta**

METKAn valtiomestari Hoytät Luokki tyrmässä iijaja viikossa. Tulemko kappaleita ja laule liikuntatapa!

Metropia Ammattikorkeakoulu (METKA)

4 403 people like Metropia Ammattikorkeakoulu (METKA)

Yhteystiedot

Jyry

12.2.2015

## Metkaweb.fi website Blog Page [15].

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Etusivu Jäsenyys Tiedote Opiskelijat Tuleminen Blogi Yhteistyöt

Blogi


01/30/2015

### Esittelyssä METKÄN työntekijät

Viemäsi blogissa esitellään METKÄN vuoden 2015 hallitus. Hallituksen tukena METKÄllä toimii myös liian työntekijöitä, jotka ovat oman alansa asiantuntijoita ja tuovat jatkuvuutta opiskelijajärjestönsä toimintaan.

Esitellyn työntekijöiden lisäksi METKÄssä toimii tutoroinnin ja ohjauksen asiantuntija ja toinen nähtävyyshenkilöäni kateena Iirota, joka oli esitellyä kirjoitteessa opintopöytäkirja.

Sara Miettunen, pääsihteeri



- 1. Kaika olet?**  
Olen Sara Miettunen, 29-vuotias alkuvuoteen tulleva ennen opiskelijajärjestöä.
- 2. Mikä on vastuullisesti METKÄssä?**  
Toimin METKÄN pääsihteerinä, eli olen METKÄN henkilöstön esimies ja toimiston päällikkö. Vastaan myös METKÄN taloudesta sekä ensisistä muista sääntömääräisistä tehtävistä.
- 3. Minkä haluat saada METKÄssä aikaa?**  
Haluan saada aikaa sen, että opiskelija ahdasta haluisa olla METKÄN jäsen, sillä sillä saa palkitsemattomat edut, se myös muodostaa eräänlaisen tukiverkoston tai viiterhman opiskelujalle. Opiskelu

Kirjoita seuraavat merkit kenttään / Write the following characters to the field

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Yhteistyössä

Jyty

ALOITA

16:31  
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