

WACIC Method – A Web Analytics Process to Perform Continuous Improvement in Digital Environments

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Abstract - The Web universe expands every day, providing access to multiple sources of information using different platforms and devices. Due to the increasing number of online users in the world, there are several reasons why corporations became interested in analyzing the traffic on their websites. From small to medium sized businesses, this analysis means dealing with large volumes of data, which can become a real struggle to perform without the support of Web Data Tools. In order to deal with this challenge, this paper proposes the WACIC- a Web Analytics Process to perform continuous improvement in digital environments. Beside the process definition, the paper proposes a set of artifacts to help the discussion and to register decisions.

Keywords - Web Analytics; Metrics; Method; Google Analytics.

I. INTRODUCTION

Nowadays, understanding the habits of consumers who use the Web for daily activities is a point that draws attention and concern for companies. Transformations and innovations take place constantly on the Web, which leads companies to try to understand and meet the needs of online users. Websites focused on providing services need to operate dynamically, be agile and show continuous improvement [1].

Considering the constantly increasing number of online users in the world, there are various reasons for a company to be interested in analyzing the traffic on their Website, such as knowing if the Website is attracting visitors; what are the pages gaining more interest; to measure the budget invested; the conversion rate; among others [2][3].

Digital marketing, a relatively recent field of study from 1990, has recorded an expressive growth throughout the last decades. Companies started to meet the need for digital marketing strategies, aiming at a better position in the online environment. Besides, the concepts of visitation and navigation on the Web have gone through transformation throughout the last decade [4].

Today, users create their own content, communicate through social networks, give opinions and are constantly interacting in the virtual environment [4][5].

Consequently, the data analysis coming from the Web has gained increasingly greater space in organizations due to some key aspects, such as helping in evaluating the performance of a business and allowing the entrepreneurs to better know the market they are working in.

This analysis aims to make strategic decision making more effective and less risky [5]. This way, the importance of tools that aim to collect and analyse Web data has emerged. This concept earned the name Web Analytics, and it has redefined the way in which companies are monitoring online user's behavior, and even their decision making process [1][4][5][6].

Today, enterprises are exploring Web Analytics to discover facts they did not know before. This is an important task because the recent economic recession forced deep changes into most businesses, especially those that depend on mass consumers [2][3].

The goal of this article is to describe an approach of the use of Web Analytics tools in order to help organizations to reach a competitive differential founded on the analysis of data coming from their Websites.

The lack of a structured process, the difficulties and the divergences faced by companies during the adoption of Web Analytics motivated the proposed approach. It covers the common steps that are presented by different authors, along with new steps that are suggested and are relevant in the context of Web Analytics.

The contributions of this paper are:

- A reviewed and optimized method based on continuous improvement for digital environments, combined with steps commonly used by companies during the adoption of Web Analytics process;
- Monitoring artifacts that helps to store the information tracking between all the involved roles during the process
- A method that can be used by different companies that work on the Web in different contexts.

The remaining of the paper is divided as follows: Section II describes the related work; the fundamental steps of Web Analytics are found in Section III; Section IV presents the WACIC method; finally, the conclusion is found in Section V.

II. RELATED WORK

During the development of this work, traditional and/or standardized processes to guide the use of Web Analytics were not identified. Onwubiko [7] performed a research focused on the applicability of Web Analytics tools in data gathering and analysis to enhanced cyber situational awareness for monitoring critical online Web services.

Many different intelligence sources such as Web logs, browser fingerprints and mobile fingerprints were analysed, in terms of information protection. The author brings useful information regarding technical aspects, technical challenges in the applicability of specific tools and devices that support Web Analytics, but does not present a method to structure a Web Analytics process, like the one presented in this work.

Bengel et al. [8] describe the technical aspects of a research on adopting Web Analytics by directly implementing a tracking code (tag) on the website. This tag aids in automating the tracking and identification of marketing tags for websites overall, which would be a significant effort if done manually. It is an innovative implementation, and it surely provides a competitive advantage. But the paper does not go deeply in a procedural perspective, by emphasizing a process or a method to use Web Analytics tools for different contexts. Instead of that, authors focus on the technical aspects of the tag implementation, and provide a how-to for this implementation.

Although the authors provide an extensive technical explanation of the experiment, it could be difficult for beginners in Web Analytics context to embrace the technique described in the paper without a process methodology that supports the adoption. A Web Analytics approach is presented by Li and Baciu [9]. According to the authors, visual analytics of large data sets has become a challenge for traditional in-memory and off-line algorithms as well as in the cognitive process of understanding features at various scales of resolution. In the paper, they attempt a new Web-based framework for the dynamic visualization of large data.

Along with the technical aspects and challenges described during the data modeling, it is interesting that the authors demonstrate the effectiveness of their Web-based framework on different types of large datasets. This type of Web Analytics research is absolutely useful and provides a step forward in Web Analytics techniques, but this research does not provide the necessary support for those who are still in need of understanding the basics of the Web Analytics adoption.

In terms of standardized Web Analytics methods, Cassidy [10] and Phillips [11] provide an explanation that goes through the common steps and helps most organizations start the adoption of Web Analytics tools. The authors provide important information regarding how organizations can integrate their own processes with adoption of Web Analytics, and how to mitigate the risks of this integration.

This information helping to integrate processes, technology, and people into all facets of analysis to generate business value is useful, but it is important to highlight that the Web Analytics steps are described without considering a specific method or framework.

Some missing steps were identified, such as the tool definition (and criteria to choose the tool that best suits the needs) and a specific step for action plans after the analysis. These complementary steps are provided by the proposed process in this work.

In the next section, we describe in more detail the Web Analytics concept and what are the fundamental steps commonly used by companies that adopt Web Analytics.

III. FUNDAMENTAL STEPS - WEB ANALYTICS

As underlined by the authors Dehkordi et al. [4], Kaushik [5], Siegel and Davenport [6], Kotler, Kartajaya and Setiawan [13], there are three methods that are most used to evaluate the performance of strategies in digital environments.

Kaushik [5], Siegel and Davenport [6] mentioned the approach based on Web metrics (or Web Analytics); another approach is supported by financial indicators, according to Dehkordi et al. [4]; and the third approach is a hybrid of Web Analytics and financial indicators, according to Kotler, Kartajaya and Setiawan [13]. For this work, the Web Analytics is the chosen one to be studied.

There are some divergences regarding the exact definition of the concept of Web Analytics. Kaushik [5] synthesized it in an objective manner: "The objective of Web Analytics is to first and foremost improve the experience of online customers. It is not a technology to produce reports; it is a virtuous cycle for Website optimization."

The mentioned cycle is commonly supported by Web Analytics tools that extract data from Websites. Regardless of whether it is applied, the cycle is understood as a process of measurement, collection, analysis and production of navigation and interaction data reports, whose purpose is to understand the behavior and needs of the users for better optimization of Internet sites and pages.

The work of Kaushik [5] is more closely related to this work, since its steps, presented in Figure 1, were used and extended. However, these steps were described and have been carried out in an ad hoc manner by the organizations.



Figure 1. Fundamental steps of the Web Analytics Cycle.

The first fundamental step in the Web Analytics process is to define the MEASUREMENT to be used. Called by some authors KPI (Key Performance Indicators) DEFINITION, it consists of defining what should be measured and what one wants to analyze in order to guide the KPIs choice [1][5][14]. It is necessary to establish a frequency to observe each KPI, identifying successes and failures in the outlined goals and allowing for comparing the results.

Therefore, from time to time, some KPIs adjustments and modifications are necessary, and they should be quickly done so that opportunities to collect information are not lost [14]. In addition, some authors recommend an amount of 3 up to 5 KPIs in order to observe each Web Analytics cycle [1][5][6].

The second step consists of data COLLECTION which is usually done by a Web Analytics tool. According to Kaushik [5] and Jerath, Ma and Park [14], it can be said that all of the Web Analytics tools available have a common point: once enabled, the data collection is done in real time, continuously.

The third step consists of the ANALYSIS of the collected data. The administrators and/or analysts responsible for manipulating the tools and metrics can use specific tools and metrics or to segment the captured data (the forms and options vary according to the tool) for carrying out the analysis[1][5][6]. For Rosenzweig [15] this step is considered crucial, emphasizing the importance of the understanding of user behavior on the Web environment.

At last, the fourth step consists of the REPORTS GENERATION. In this step, it is common to organize the information provided based on the data analysis. There are countless forms and standards of documents for generating reports of the results and they vary according to the Web Analytics tool being used [1][5][16].

This section proposes an empowered and optimized adaptation of the fundamental steps.

In order to empower the Web Analytics adoption, a Web Analytics Process to perform continuous improvement in digital environments is proposed.

IV. THE PROPOSED METHOD

The method proposed for using Web Analytics is based on the fundamental steps described in the previous section. However, some steps were added in order to bring an adherent proposal to all types of organizations interested in practices based on Web Analytics tools. Also, the proposed method aims to solve the lack of standardized methods of Web Analytics application.

A. The Method Definition - WACIC

The method proposed is named WACIC – Web Analytics Continuous Improvement Cycle. It includes the fundamental steps and added two new steps. The first one is a specific step that helps to define the Web Analytics tool that best suits and supports the chosen KPIs. Normally, this step is not performed by most of companies; they usually choose the tool before the KPIs definition [1][6]. Plus, the choice itself is commonly based only on price and popularity, instead of considering the importance of the KPIs adherence to the tool.

The second new step consists of executing action plans based on the analysis. The actions should be executed in order to reach the goals outlined in the KPIs step. Besides the inclusion of these two new steps, the DATA ANALYSIS and REPORTS GENERATION were combined into one single step. This change is due to the fact that the analysis needs to be documented or organized to be provided to all involved roles, and the reports generated by the Web Analytics tools can be used as artifacts for this step.

Two cycles compose the WACIC: the FULL CYCLE and the CONTINUOUS CYCLE. The Full Cycle presents the Method flow as a whole, since the Action Plans implemented and executed will reflect in reaching the goals defined in the KPI step. The Continuous Cycle presents a cyclical flow where the action plans executed should be analyzed and re-executed until the expected result is reached. Once the goal is reached, the full cycle should start again, in order to define new KPIs so as to reach further improvements due to the continuous process.

The adaptation of the method is based on the concept of continuous improvement, through the PDCA (Plan, Do, Check and Act) framework. In the PDCA, the main activities are planning, executing, checking and verifying [17]. As such, an uninterrupted optimization method for product and service improvement is obtained, since as the PDCA cycle repeats itself, it is possible to come closer to outlined goals and reach the expected result.

In addition, the WACIC method integrates specific artifacts that help to consolidate and track all the information obtained during each of the steps and document the decisions during the process.

Moreover, the artifacts are a suggestion, and not mandatory. In case of an organization that does not have its own artifact to support the information tracking, the WACIC can help by suggesting the artifacts that is integrated by the proposed method.

Figure 2 presents the WACIC method and Figure 3 presents the artifacts integrated to the process.

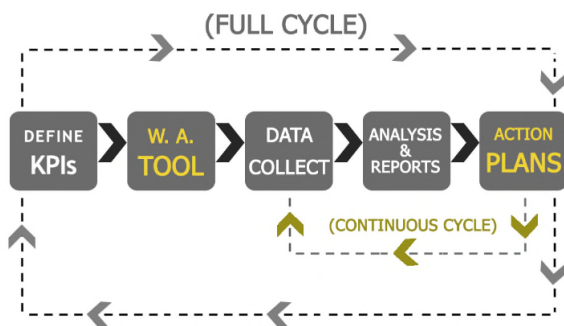


Figure 2. The WACIC method.

B. KPIS Definition

Besides the definition of measurements to be used provided by the fundamental step, three activities should be concluded during this step, aiming at addressing all the mandatory steps for KPIs definition. The activities can be carried out during one (or more, if necessary) alignment meetings. The participation of interested roles through means of communication with the data analysis team is essential and can be done either in person or through video conferences.

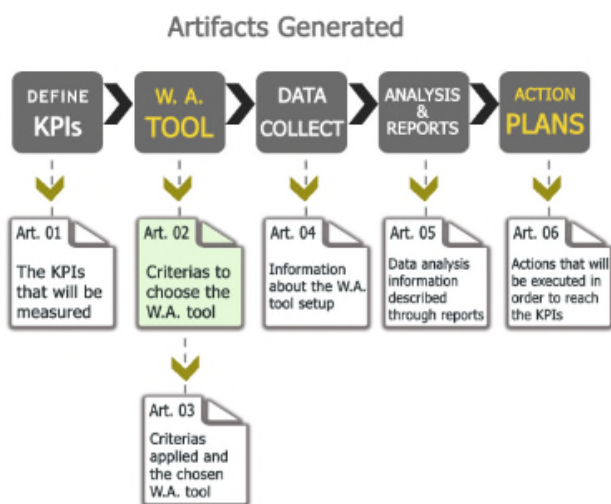


Figure 3. WACIC Artifacts.

During the first step, the activities should be carried out jointly, involving all of the relevant roles and awareness of the business goals.

Professionals tasked to conduct the Web Analytics process participate in this step, that is, Business Analysts, Project Managers, Directors and additionally, other professionals who carry out roles relevant to defining the performance indicators for the organization.

The activities in this step were defined as follows:

- *Organization Goals Definition and Understanding* - understanding of the organization's objectives provides greater assertiveness in the definition of the KPIs.
- *Motivation/Purpose for choosing the KPIs* - after understanding the organization's business objectives, it is necessary to justify the choice of the KPIs that will be defined. Which are the factors, on a technical or business level, that motivate the choice of the KPIs.
- *Definition of the KPIs* - this definition guides all of the following steps of the proposed method. Through the KPIs, it should be possible to understand if the Web environment under analysis is progressing or regressing.

TABLE I. KPIS DEFINITION

| Art. 01 - KPIs definition | |
|--|---|
| [Company's name] | |
| [Website] | |
| [Focal Points of the Company (Name, e-mail and telephone)] | |
| [Duration of this step] | |
| Date / Meeting Place | |
| [Focal Points involved in this step (Name, e-mail and telephone)] | |
| Company's goals | [to be defined] |
| What motivates to choose each of the KPIs | [to be defined] |
| KPI 01 | Description/ How it will be measured/ data collect period |
| KPI 02 | Description/ How it will be measured/ data collect period |

The following questions are examples of KPIs: "how many visitors or buyers access the organization's site daily"; "where the Website accesses come from and what is the peak number of accesses"; "what is being commented in the social networks regarding the organization"; "what are the consumer experiences of the Internet users (positive or negative reactions about the brand or product)".

A proposal of an artifact resulting from this step is presented in TABLE I, which aims to document the information relevant to the KPIs definition.

Each organization that is the focus of the analysis generates an artifact containing the information. The artifact's fields indicate the participants for each activity, date and time of the meeting(s), what the business objectives discussed were, what the purpose and justifications for the defined KPIs were, and finally, the definition of the KPIs.

C. Choosing the Web Analytics Tool

The second step in the method consists of choosing the Web Analytics tool to capture the collection of data to be analyzed. The choice of the tool needs to be based on information defined in the first step. Bearing in mind the various tools for capturing Web data available, the method proposed here presents four criteria that help in more assertively choice of the most adequate tool to be used.

The criteria are described in TABLE II. The application of the first criterion considers the most current commonly used tools, which was considered bearing in mind the tools cited in the bibliographic sources.

TABLE II. CRITERIAS TO CHOOSE THE WEB ANALYTICS TOOL

| Art. 02 - Criterias to choose the Web Analytics tool | |
|--|--|
| First | Most commonly used Web Analytics tools, nowadays. |
| Second | Logs based tools <i>versus</i> tags based tools |
| Third | Web Analytics tools that offers the features necessary to measure the KPIs defined in the first KPIs phase |
| Fourth | Costs and benefits of the tools |

The second criterion is supported by the discussion of particularities that the Web Analytics tools present. That is, based on logs or measurement by tags. These two methods are, today, often used for analyzing Internet traffic. This criterion allows for the analysis of the KPIs considered to be adherent to the operation of the chosen Web Analytics

tool. It identifies, basically, if the focus of the analysis is of a technical nature and/or focused on performance (the log method favors the collection and analysis of data through the server-side), or if the focus is the behavior/actions of the visitor (the method that uses tags favors the collection and analysis of data through the client-side).

The third criterion to be considered in the choice of the Web Analytics tool consists of choosing a tool that has the functions that allow for the proposed measurement. The types of metrics and KPIs stipulated vary according to the search objective. Then, the choice of the tool should consider if the functions necessary to meet and support the requested measurement are provided by it.

The fourth criterion consists of the evaluation of the cost/benefit of the tools researched. There are tools available for free and tools that require a specific cost. Depending on the result of the criteria previously applied, the options for tools mapped out are countless. However, it is necessary to evaluate if the cost of a paid tool will in fact be necessary for an organization.

TABLE III. CRITERIA APPLIED TO CHOOSE THE WEB ANALYTICS TOOL

| Art. 03 - Criterias applied to choose the Web Analytics tool | |
|--|-------------------------------------|
| [Company's name] | |
| [Website] | |
| [Focal Points of the Company (Name, e-mail and telephone)] | |
| [Duration of this step] | |
| Date / Meeting Place | |
| [Focal Points involved in this step (Name, e-mail and telephone)] | |
| First Criteria | [results after the first criteria] |
| Second Criteria | [results after the second criteria] |
| Third Criteria | [results after the third criteria] |
| Fourth Criteria | [results after the fourth criteria] |
| Chosen Web Analytics tool | [to be defined] |

The application of the criterion consists of the fundamental activity in the step proposed here. This activity

should be carried out with the involvement of roles relevant to the choice.

At the end of this step, an artifact will be generated, referent to the choice of the Web Analytics tool. The artifact consists of a table for filling in information referent to the choice of the tool, as presented in TABLE III.

It is important to highlight that the Web Analytics tool do not need to be changed or replaced every time the WACIC flow restarts. Companies usually deal with costs, implementation and training of the Web Analytics tools, and those aspects should not be disregarded.

D. Data Collect

The third step of the continuous cycle consists of collecting the data. This step has some activities that need to be completed so that enabling the data capture is carried out.

The activities were divided as follows:

- *Installation of the tool* - for this activity, the manual and/or instruction steps provided by the chosen Web Analytics tools should be followed;
- *Configuration of the Website data capture* - to enable the tool, capture the data from the Website and store them for analysis;
- *Validation of the monitoring of the Website pages* - aiming to guarantee full coverage of the pages to be analyzed.

TABLE IV. DATA COLLECT

| Art. 04 - Data Collect | |
|---|-----------------|
| [Company's name] | |
| [Website] | |
| [Focal Points of the Company (Name, e-mail and telephone)] | |
| [Duration of this step] | |
| [Focal Points involved in this step (Name, e-mail and telephone)] | |
| Chosen tool | [to be defined] |
| Tool installation (OK / NOK) | [to be defined] |
| Tool configuration to capture data correctly (OK / NOK) | [to be defined] |
| Validation of pages – to make sure all of them are being tracked correctly (OK / NOK) | [to be defined] |

People involved in the data capturing activities are basically people from the technical team and/or Web Analytics professionals who carry out the activities directly through the tool, and who monitor the Website.

It is necessary a focal point, a technical role, to verify if the tool is in fact collecting the data correctly, and if all of the pages are being analyzed so that the information relevant to the future analysis of the data is not lost. For this step, an artifact that describes the activities referent to the data collection was defined. The artifact can be seen in TABLE IV.

E. Data Analysis Reports

After the data collection, the analysis step on the collected data and the interpretation of these data by the tool begins. Using the defined KPIs as a base for analysis, the interpretation of the data is performed, with the aim of evaluating and understanding the involvement of the Website visitors.

This step can be described as a study of the collected data. The formalization of the study takes place through the generation of reports containing conclusions from the analysis. The data analysis and generation of the reports should be carried out by the roles relevant to his step, that is, professionals tasked with conducting the Web Analytics process, or Business Analysts, Project Managers, Directors and, additionally, other who can help to understand user behavior and refine the objective of the research.

TABLE V. DATA AND ANALYSIS REPORTS

| Art. 05 - Data and analysis reports | |
|--|--------------------|
| [Company's name] | |
| [Website] | |
| [Focal Points of the Company (Name, e-mail and telephone)] | |
| [Duration of this step] | |
| [Focal Points involved in this step (Name, e-mail and telephone)] | |
| Date and Meeting place | |
| KPIs/ Period of data collect | Report Information |
| [to be defined] | [to be defined] |

The activities in this step can be carried out, preferably, during one (or more, if necessary) meeting in person, since

the analyzed KPIs should be discussed. At the end of the data analysis phase, the reports generated by the tool will be used as artifacts from this step.

In addition to the generated reports, the TABLE V will present a summary of the content from the reports, facilitating its identification and interpretation.

F. Action Plans (definition and execution)

The fifth step consists of applying action plans that help to reach the objectives described in the first step of this cycle. Within an organization, an action plan may involve various departments and areas.

For each plan, three items should be defined, i.e., defining who will be responsible for carrying it out, the duration, and how the plan will be executed.

The action plan is derived from the analysis performed in the Analysis and Report Generation step, and consists of a practical way to reach the strategic objectives previously established in the first step of the method.

Professionals conducting the Web Analytics process and those designated to carry out the action plan must participate in this step, preferably in an in-person meeting.

The activities in this step consist of the execution of the action plans and vary according to the defined KPI and should be described and monitored through the artifact presented in TABLE VI. Each action plan details must be registered.

TABLE VI. ACTION PLANS

| Art. 06 – Action Plans | | | | |
|--|---------------------|-----------------------|--|---|
| [Company's name] | | | | |
| [Website] | | | | |
| [Focal Points of the Company (Name, e-mail and telephone)] | | | | |
| [Duration of this step] | | | | |
| [Focal Points involved in this step (Name, e-mail and telephone)] | | | | |
| Date and Meeting place | | | | |
| [KPI DESCRIPTION] | [REPORT OF THE KPI] | [ACTION PLAN DEFINED] | DURATION OF ACTION PLAN - and its deadline | RESPONSIBLE TO EXECUTE ACTION PLAN (Name, telephone and e-mail) |

It is important to highlight that in this step the cyclic flow of the method started. If one of the action plans executed does not present the expected result during a new

data analysis, the continuous cycle is repeated with the aim of continuous improvement, until the KPI is achieved.

After the KPIs have been observed and reached, the complete cycle repeats itself. For this, it has a method where it will be possible to constantly collect, measure, analyze and implement improvements that are reflected in a better quality of the information made available to Website users.

V. CONCLUSION AND FUTURE WORK

This paper presented WACIC Method that has as a goal to standardize the use of Web Analytics and to integrated artifacts that guide and document decisions.

The validation of WACIC is being applied (still in progress) using two case studies from distinct Web environments, i.e., a corporate and an academic ones. The validation takes a long time because it needs to collect data for a significant period, analyze and understand the problems to define the action plan. Then, it is necessary to implement the plan and collect data again and compare the improvement towards the KPIs that were defined.

Based on previous works, there are companies that still have difficulties to create or follow a process that helps them to deal with Web data. Many of companies are still starting to use Web Analytics tools, and during this transition it is common to emerge doubts regarding how to use Web Analytics tool, what exactly should be measured or how should the process be executed in order to extract the maximum strength from Web Analytics tools.

One of the alleged reasons for the failure and/or lack of continuity of the investment in Web Analytics is related to the difficulty in structuring an adequate process or method. What is often seen are organizations that end up mixing concepts and guidance from various sources when applying Web Analytics, facing even more doubts and difficulties when they try to extract useful information.

This paper can help these companies to adopt the WACIC process and its artifacts, documenting decisions and achieving their goals more assertively through the Web Analytics.

Future work will present the challenges faced and the complete results of the method applicability and conclusions about its efficacy. Also will the action plans implemented and its impact to the products/services offered by the Websites analyzed will be described. It is expected to provide a map between the identified problems and solutions that efficiently improved the focused Web sites.

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