Using Analytics Tools to Understand User Behavior

Kian Rafimanesh
Abstract

Media planning and investment management are crucial in the world of advertising and marketing. This thesis presents a structured workflow for analyzing user behavior on media planning and investment management platforms using web analytics. The seven stages of the workflow are: understanding context, determining KPIs, selecting analytics tools, ethically and privacy-consciously choosing data, implementing data gathering, visualizing data, and evaluation. Ethical considerations such as respecting user privacy are important throughout the process. The GMP365™ platform, developed by GMP Systems, is used as a case study to evaluate the workflow. The workflow can be applied by other companies with similar needs for structured implementation of analytics to make better-informed decisions regarding feature development, user support, and platform optimization. To fully evaluate the affordance of analytics, long-term data gathering is recommended.
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1 Introduction

Media planning and investment management are two components in the world of advertising and marketing. Media planning involves the process of selecting the most appropriate media channels to achieve the marketing objectives, while investment management pertains to the handling of financial assets and other investments to meet specific investment goals for clients [1] [2]. Media auditing, a process of assessing the effectiveness and efficiency of media expenditures, plays a role in optimizing media investments and evaluating the success of advertising campaigns [3]. The planning, execution, and evaluation of advertising campaigns rely on these three components as foundational elements, playing a crucial role in accomplishing an organization’s marketing goals.

GMP365™ [4], a platform developed by GMP Systems, simplifies the complex processes involved in media planning and investment management. This platform is utilized by a variety of user types, all of whom are media professionals with diverse roles. These users interact with the platform according to their specific needs and responsibilities.

Web analytics is the process of gathering and analyzing data to understand user behavior [5]. This thesis provides a structured workflow for introducing analytics in media planning and investment management platforms. The workflow is implemented and evaluated on the GMP365™ platform, providing a case study for the practical application of the workflow for analyzing user behavior using web analytics. The workflow can be used by other companies in the same field and possibly other fields, leading to better-informed decisions regarding feature development, user support, and platform optimization.
2 Web Analytics

This section provides an overview of the key concepts and components related to web analytics and performance measurement.

2.1 Key Performance Indicators (KPIs)

Key Performance Indicators - KPIs, are quantitative measurements companies and organizations can use for evaluating progress towards achieving business objectives. KPIs can be used for monitoring and controlling performance, providing transparency, supporting decision-making in management, and illustrate structures and processes of a company or organization [6] [7]. A high-level KPI focuses on the overall business performance of an organization or company while a low-level KPI focuses on the products, employees, specific processes, or departments [7]. KPIs can be applied to any aspect of a business where performance can be measured and tracked. Common use cases for KPIs include: sales and marketing, finance, operation, human resources, customer service, etc. [8].

KPIs are expressed as rates, ratios, averages, percentages or other derived values that provide meaningful insights into performance trends, benchmarks, or targets[9]. To achieve an organization’s or company’s goals and objectives, relevant metrics must be chosen to identify the areas where improvement is needed. The metrics chosen for a KPI can vary among organizations since every business has different data needs [10].

2.2 Google Analytics

Google Analytics [10] is a business intelligence tool that tracks and reports website traffic and user behavior data by using cookies. Cookies [11] are small text files stored on a user’s computer or device by a website, which hold data about the user’s actions and preferences on that site. Google Analytics employs first-party cookies - cookies set by the website a user is visiting to remember a user’s preferences providing a personalized
experience and track user behavior. The tracking is possible due to first-party cookies being persistent, meaning they remain on the user’s device even after the browser is closed. By default, the persistent cookies have a lifespan of two years. First-party cookies are also used to distinguish unique users, though it is important to note that this distinction can be disrupted if cookies are cleared or if a user enters from a different device. In contrast, third-party cookies are set by a website other than the one the user is visiting. The third-party cookies are often used for advertising purposes, tracking a user’s online activities across multiple websites to build a profile of their interests.

Dimensions and metrics [12] are two components in Google Analytics that can provide meaningful insights into user behavior and performance. Dimensions are qualitative attributes that describe or categorize data points. Examples of dimensions include browser type, which classifies users by the internet browser users use (e.g. Google Chrome, Firefox), geographical location, which identifies the user’s physical location (e.g. Sweden, Stockholm), and traffic source, which specifies the origin of the user’s visit (e.g. entering the URL directly, arrival from another website, or via a search engine).

In contrast, Metrics [13] are quantitative measurements representing actual data values associated with dimensions. They are used to quantify specific aspects of user behavior and engagement. For instance, the pageview metric represents the total number of pages viewed. Similarly, the bounce rate metric measures the percentage of sessions where the user left the site from the entrance page without interacting with it. In Google Analytics, a session represents a period of continuous user activity on a website or app. A session starts when a user initiates interaction with the platform, such as visiting a webpage. By default, a session ends after 30 minutes of user inactivity. Two other examples of metrics employed in Google Analytics are Average session duration and Active users. The Average session duration calculates the mean length of user interactions with a website or app, while the Active users gives a count of unique users who interacted with a website or app during a specific period of time.

Furthermore, segments [14] in Google Analytics allow users to isolate and analyze subsets of data based on specific criteria, facilitating customized analysis of user behavior and engagement.

By utilizing the dimensions, metrics and segments in Google Analytics, organizations [15] can identify trends and areas for improvement and understanding their audience better, ultimately contributing to increased efficiency and cost reductions.
2.3 Papertrail

Papertrail [16] is a cloud-based service that specializes in the collection, centralization, and organization of log data from various sources such as applications, servers, and network devices. By consolidating log information into a unified view, Papertrail streamlines log management, making it more convenient for developers and IT professionals to resolve problems, detect patterns and maintain optimal system performance. Key features of Papertrail include real-time monitoring, advanced search capabilities, and customizable alerts, which collectively enhance the efficiency and effectiveness of managing large volumes of log data.

2.4 Privacy and Consent

The significance of privacy and consent in web analytics arises from collecting data via e.g. page tags and cookies. Page tags, which are brief JavaScript code fragments integrated into a web page’s HTML, serve to gather and relay user interaction data to a web analytics platform, Google Analytics being a prime example.

Regulations such as the General Data Protection Regulation (GDPR) have been established to ensure that user’s privacy are respected and the data collected are protected [15] [17]. GDPR has set guidelines for organizations that collect and process personal data from users within the European Union (EU). The websites that collect personal data must inform their users about the data collection, the purpose and how users can manage their data. Furthermore, the owners of the websites must obtain user consent before collecting personal data through page tags or setting cookies. Hence, organizations collecting personal data must establish clear and transparent privacy policies, acquire user consent prior to data collection, and safeguard users’ personal identifiable information (PII) [15] [17].

One key principle in GDPR is data minimization [18], which highlights the importance of limiting the collection of personal data to what is directly relevant and necessary for a specific purpose. By adhering to this principle, organizations can uphold privacy standards, mitigate the risks of data breaches, and showcase their commitment to protecting user privacy.
3 GMP Systems and the GMP365™ platform

GMP Systems [4] is a global provider of media plan and investment management platforms. Their platform, GMP365™, is used by global advertisers, auditors, and agencies to secure accountability in their media investments. The platform enables advertisers to manage media plans and track buying performance across markets and brands, making media investments accessible, actionable, and auditable. In this context, accessible refers to the ease of accessing and retrieving relevant information for decision making. Furthermore, actionable denotes the provision of insights that can readily be applied to improve media investments. Lastly, auditable implies the platform’s capacity for effective tracking, monitoring, and verification of media investment data to ensure accuracy and compliance with established standards.

The following information on GMP Systems and the GMP365™ platform has been gathered through direct communications with GMP Systems’ employees.

3.1 User types: Agencies, Advertisers, and Auditors

Agencies, advertisers, and auditors are the main user types of media plan and investment management platforms like GMP Systems’ GMP365™. Agencies, which can be further divided into buying and planning roles, are responsible for managing media plans, budgets, and campaigns. Advertisers, consisting of procurement and marketing professionals, are tasked with overseeing the overall media investment strategy and execution. Auditors, such as analysts and managers, are responsible for ensuring the accuracy and compliance of media investments and performance metrics within the GMP365™ platform.
3.2 GMP365™ Modules

In order to accurately interpret the user behavior data and the application of the developed workflow in this case study, a basic understanding of the GMP365™ platform’s core modules is essential. The GMP365™ platform offers several essential modules to help users manage media plans and investments. However, it is important to note that different user types have access to different modules within the platform. The modules described below are considered the most critical for understanding the GMP365™ platform and its capabilities, as illustrated in Figure 3.1.

**Dashboard:** The main interface encountered upon logging in, the Dashboard provides a high-level overview of media plans, campaigns, and performance metrics. Customizable to user preferences, it allows for efficient monitoring of ongoing media investments.

**Pitch:** A pitch is a proposal submitted by an agency to win an advertiser’s business. The Pitch module streamlines creating, managing, and evaluating agency proposals submitted through various rounds, designed to facilitate the agency selection process. The module allows advertisers to review and assess different agency proposals based on various factors such as proposed strategies, budgets, and projected outcomes. It also offers a collaborative space for communication and negotiation throughout the agency selection process.

**Campaigns:** A media campaign is a coordinated series of promotional efforts aimed at achieving specific marketing objectives. This module enables users to manage and track media campaigns from planning to execution. Tracking media campaigns within the GMP365™ platform involves monitoring various aspects such as ad placements, budgets, target audiences, and performance metrics. This ensures campaigns are executed according to plan and helps identify areas for improvement.

**Cost Guarantees:** Cost guarantees are agreements between agencies and advertisers outlining the specific pricing and performance terms for ad placements. These guarantees can include factors such as ad impressions, clicks, or conversions, as well as pricing adjustments based on media quality, audience targeting, or ad placement. The Cost Guarantees module is designed to help users manage and monitor these agreements, allowing for setting up, tracking, and comparing cost guarantees across campaigns. This
GMP Systems and the GMP365™ platform ensures that agencies deliver on their promises and advertisers receive the best value for their media investments.

**Reports:** A tool for generating and analyzing reports on various aspects of media investments. Users can create custom reports based on their specific needs, selecting from a wide range of dimensions, metrics, and filters.

**Documents:** Serving as a central repository for all documents related to media investments, this module allows users to upload, organize, and manage documents while supporting collaboration among user types by enabling document sharing and review within the platform.

Figure 3.1: The GMP365™ platform modules shown for an auditor.
4 Method

This work is structured into two parts: The first involves the design of a workflow for analyzing user behavior on media planning and investment management platforms. The second part centers on the application and evaluation of this workflow in a case study involving the GMP365™ platform.

4.1 Workflow

The workflow to analyze user behavior on media planning and investment management platforms involved the following stages:

1. *Context Understanding:* Gaining an understanding of the organization, its objectives, and the distinct user types and platform modules by engaging with key stakeholders.

2. *KPI Determination:* Identifying key performance indicators (KPIs) based on the organization’s specific goals.

3. *Analytics Tool Selection:* Choosing an appropriate tool for data analytics through careful evaluation.

4. *Data Selection with User Privacy and Ethical Considerations:* Identifying what data is needed to measure the defined KPIs. Ensuring that user privacy is respected and ethical considerations are taken into account during data collection, processing, and storage.

5. *Data Gathering Implementation:* Setting up necessary mechanisms for data gathering - including implementing tracking code and other functionalities.

6. *Data Analysis and Visualization:* Creating a visual representation to display and analyze the collected data.

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7. **Evaluation:** Evaluating whether the data and insights meet the organizations objectives.

### 4.2 Case Study

The case study applies the previously defined workflow to the GMP365™ platform, taking into account the unique characteristics of the platform and its users.

The case study methodology was specifically tailored to the GMP365™ platform, taking into consideration the organization’s objectives, user types (agencies, advertisers, and auditors), and platform modules. In this Section we describe the methodology used in each step of the workflow.

**Context Understanding:** An understanding of the company and its technical platform was gathered through dialogues with various employees. The Chief Operating Officer (COO) provided insights on the company’s structure, strategic objectives, and the roles of different user types in several meetings. The Customer Success Manager explained the diverse modules of the GMP365™ platform and functions of the platform modules. Insights into technical components such as coding conventions, programming languages, utilized tools, and frameworks were obtained from discussions with the Chief Technology Officer (CTO).

**KPI Determination:** The KPIs were identified through an understanding of the company’s objectives, goals, and the desired insights concerning the user types and platform modules.

**Analytics Tool Selection:** A meeting was held with the CTO, focusing on the selection of the most appropriate tool for data collection.

**Data Selection with User Privacy and Ethical Considerations:** Discussions with the CTO focused on determining the necessary data for measuring the identified KPIs. The data collection strategy prioritized user privacy and ethical considerations. The discussions during this stage, which followed the principle of data minimization, focused on gathering only essential information for the objectives.

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Data Gathering Implementation: The practical setup for data gathering included implementing tracking code and other functionalities. This stage involved technical implementation to effectively capture the data necessary to measure the identified KPIs.

Data Analysis and Visualization: A custom dashboard was designed in the chosen analytics tool. This visual representation was leveraged to analyze and present the captured data and metrics, enabling comprehensive analysis of user behavior.

Evaluation: The evaluation process involved assessing whether the gathered data and insights met the organization’s objectives.

The steps outlined above were not followed in a linear sequence, but rather involved an iterative process. At times, it was necessary to revisit previous steps due to unclear information or to gain a better understanding of the overall context.
5 Case Study at GMP Systems

This chapter presents a case study of GMP Systems, focusing on the outcome of implementing a workflow for analyzing user behavior on their GMP365™ platform.

In addressing the needs of the organization, four key aspects of user behavior on the platform were considered:

- How much time do agencies, advertisers, and auditors spend on the GMP365™ platform in total
- How much time do agencies, advertisers, and auditors spend on different modules within the GMP365™ platform, and what are the differences in their time spent patterns across these modules?
- What is the geographical distribution of active users among agencies, advertisers, and auditors on the GMP365™ platform, and how does it differ across these user types?
- How do the time spent patterns across the different GMP365™ platform modules vary among auditors, agencies, and advertisers?

After considering the key aspects, the next step involved determining KPIs to measure user behavior on the GMP365™ platform. The KPIs determined were duration of platform usage, module-specific time spent and geographical user distribution.

Following discussions with the CTO, Google Analytics was selected as the analytics tool for this case study. The tool’s user-friendly platform, comprehensive features, and pre-existing use within the company were key factors behind this decision. The limitations of the previously used tool, Papertrail, in terms of anonymizing user data and lack of necessary tools for associating collected data with specific user types, also influenced this choice.
Respecting user privacy while addressing the key aspects of user behavior on the platform was a priority during this phase. Consequently, only key metrics such as total number of active users and average session duration were identified as essential data points to be collected, ensuring minimal collection of user details.

The data gathering stage involved the creation of custom dimensions in Google Analytics for User Type and Module Name. These were used to track the interactions of different user types with various modules on GMP365™. The built-in metrics of Average Session Duration and Active Users were utilized to measure the duration and extent of user engagement. For geographical analysis, the City dimension was leveraged in conjunction with Active Users. Additional functionality was implemented on the GMP365™ platform to further identify and track user behaviors, which were then integrated with Google Analytics.

In the stage of data analysis and visualization, a custom dashboard was designed in Google Analytics to facilitate the data analysis and visualization. This dashboard displayed data captured by the custom dimensions and metrics, enabling the comparison and analysis of user behavior among different user types and modules (see details in Chapter 6).

Finally, the evaluation step involved evaluating whether the gathered data and insights met the organization’s objectives. The analysis of user behavior based on the captured data was compared against the initially defined key aspects: total time spent by agencies, advertisers, and auditors on the platform, time spent on different modules by these user types, geographical distribution of active users, and variations in time spent patterns across different modules (see details in Chapter 6).
6 GMP365™ Implementation Details

In order to track user interactions with the GMP365™ platform, a class called GoogleAnalyticsService was created in the front-end service component. This class included two crucial methods: getUserType and getModuleName, which were designed to identify user types and module names respectively and then integrated with Google Analytics for data analysis.

The getUserType identifies the user’s role based on their account information and returns either 'Agency', 'Advertiser', 'Auditor' or 'Other'. As soon as a user logs in, the user type is identified.

The getModuleName extracts the module name from the URL path and is implemented as a part of the application’s routing system, where it listens for navigation events and extracts the module name based on predefined patterns. For example, if the URL path is "https://www.gmp365.com/campaign-media-plan-list-tv", the pattern would recognize "campaign-media-plan-list-tv" as the module name "Campaign Media-Plan List TV".

6.1 Custom Dimensions and Metrics

To segment the data according to different user types and module names, the two custom Google Analytics dimensions User Type and Module Name were created. Instead of using the built-in path dimension, the custom Module Name dimension was employed to provide a more visually appealing representation of module interactions, without the need for URL paths. In addition to the custom dimensions, the built-in Average session duration metric from Google Analytics was employed. This metric calculates the average duration of users’ sessions. Furthermore, the built-in Active users metric provides the number of unique users who engaged with the platform during a specific period [13].

As users log in to the GMP365™ platform, they are automatically assigned to a specific user type in accordance with their role, as illustrated in Figure 6.1. The process of
extracting and matching paths against a predefined set of patterns to identify and associate user activity with corresponding module names is demonstrated in Figure 6.2.

In the example shown in Figure 6.3, an advertiser logs in to the platform and a session is initiated. Upon login, the user lands on the Dashboard module (.../dashboard) and the getUserType method is called to identify the user as an advertiser based on their account information. When the user then navigates to the Campaigns module the getModuleName method is then called to extract the module name from the previous path ’/dashboard’ and is translated to ‘Dashboard’. Furthermore, the sendDataToGoogleAnalytics method is called and the module name and user type is sent to Google Analytics. If the user logs out or the user’s activity on the platform ceases and a period of inactivity

Figure 6.1: Auditors, Agencies, Advertisers and Others.

Figure 6.2: Campaign Media-Plan List TV, Cost Guarantee, Dashboard, etc.
surpasses the session timeout limit (30 minutes by default), the session ends. If the user navigates to a new module, the getModuleName method is called again to get the new module name. In both cases, the gathered information - user type and module name - is sent to Google Analytics for further analysis and insight generation. Google Analytics then uses this information, in combination with the built-in session tracking, to calculate the Sessions and Average session duration metrics for each unique combination of User Type and Module Name.

6.2 Custom Dashboard

A custom dashboard was designed in Google Analytics to provide a comprehensive view of the user interactions within the GMP365™ platform, utilizing the custom dimensions and metric discussed in the previous section. The dashboard aimed to facilitate the analysis of user behavior by presenting the data in a clear and organized manner.

In the setup of this custom dashboard, three separate segments were created in Google Analytics: Auditors, Advertisers, and Agencies. These segments were created using the 'User segment' option and in the 'Include users when:' field, the custom dimension 'User Type' was selected. A filter condition of 'exactly matches (=)' was then applied
Figure 6.4: A local test data example, collected from April 17, 2023 to April 24, 2023, illustrating GMP365™ user interactions via a custom dashboard table.

along with the corresponding segment name (Auditor, Advertiser, or Agency). These segments were then applied to the analysis using the ‘SEGMENT COMPARISONS’ field in the Tab Settings. The setup can be seen in the Tab Settings and Variables field in Google Analytics, shown in Figure A.1 in Appendix.

The custom dashboard was structured as a table, incorporating the dimensions and metric in the following configuration:

- Rows: The Module Name dimension was placed in the rows, enumerating the specific modules within the GMP365™ platform with which users engaged.

- Columns: The columns were left unchanged. However, data in the columns were categorized based on the created segments - Agencies, Advertisers, and Auditors.

- Values: The Average session duration and Active users metrics served as the values. The Average session duration metric displayed the average duration of users’ sessions from each user type on each module, while the Active users metric showed the total number of active users for each user type on each module.

To ensure the custom dashboard’s functionality and structure, it was tested locally by logging into different accounts representing various user types, using fictitious accounts created for testing purposes. The testing process involved accessing the website and interacting with different modules, sometimes waiting for several minutes to verify if the dashboard accurately collected the necessary data. This approach ensured that the dashboard worked as intended before deploying and collecting real data from the platform. The custom dashboard, shown in figure 6.4, displays the average session duration.
duration and the number of sessions on each module by each user type. A local test data example is provided to illustrate the custom dashboard’s structure and functionality.

Figure 6.4 provides a breakdown of average session durations and the number of active users for each user type across different modules. For instance, Auditors have a total average session duration of 0m 17s. On the other hand, Advertisers display an average session duration of 16m 56s.

A more detailed perspective can be found in the full dashboard view (Figure A.2 in Appendix), where the overall average session duration, calculated from all sessions, is given as 15m 50s. This allows for comparison, showing that Auditors’ session duration is 98.14% less, while Advertisers’ is 7.01% higher than the overall average. However, it is crucial to note some inaccuracies in the data, especially in the ‘Totals’ row. For example, in the ‘Dashboard’ module row, the Auditors’ average session duration is 0m 00s, and the Advertisers’ is 5m 28s. Despite this, the Totals row inaccurately displays an average of 4m 52s, when the expected value is (0m 00s + 5m 28s) / 2 = 2m 44s, not the reported 4m 52s.

The calculations in the ‘Totals’ row could possibly be due to a bug in Google Analytics or might be attributed to a particular computational method employed by the platform that is not entirely transparent [19] [20]. Therefore, when interpreting Google Analytics data, it is crucial to be aware that some presented data points may not align exactly with intuitive or to expected calculations.
The geographical distribution of user interactions was visualized using the Geo map in the ‘VISUALIZATION’ field, as shown in figure 6.5. The Auditors and Advertisers segments were added (excluding Agencies since no activity was logged as an Agency during the test period from April 24th to April 27th). The ‘City’ option was selected in the ‘GEO BREAKDOWN’ field to display the geographical distribution at a city level. In the ‘VARIABLES’ field, the metric ‘Active users’ was chosen to represent the number of unique user interactions within the selected timeframe and geographical location. The user activities were logged in Uppsala as an Auditor, and as an Advertiser in Uppsala, Stockholm, and Täby during the test period. This visual representation provides insights into the geographic distribution of platform interactions among different user types.
7 Results and Findings

The custom dashboard, shown in figure 7.1, shows real user interactions on the GMP365™ platform from April 24, 2023, to May 7, 2023. It presents the Average session duration and Active users for each Module Name and User Type combination during this period. To focus on the more significant interactions, a filter has been applied to the data using the ‘FILTERS’ field in the custom dashboard within Google Analytics. This filter was set to display only those Module Name and User Type combinations with an average session duration greater than 180 seconds (3 minutes).

![Figure 7.1: Data collected from May 1, 2023 to May 13, 2023, presenting GMP365™ user interactions via a custom dashboard table. A filter was applied to show interactions with an average session duration greater than 3 minutes.](image)

The Active users metric is useful for determining each user type’s engagement levels, as it represents the number of unique users who interacted with the GMP365™ platform during the specific period of May 1, 2023, to May 13, 2023.

From figure A.3 (see Appendix), the total Active users for each user type can be observed:
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- Auditors: 48 total active users
- Agencies: 360 total active users
- Advertisers: 16 total active users

Additionally, the average session duration metric reveals the time spent by agencies, advertisers, and auditors on the GMP365™ platform. By evaluating the average session duration in conjunction with the number of active users for each user type across various modules, differences in usage patterns can be identified.

Auditors tend to spend more time on modules such as "Campaign View" where 33 out of 48 active auditors engaged with the platform, and they have an average session duration of 10m 27s in that module. "Campaign Import-Logs" is another module with significant auditor engagement, with 1 out of 48 active auditors and an average session duration of 11m 50s. The "Insight" module attracts 17 out of 48 active auditors, with an average session duration of 10m 46s. 34 out of 48 active auditors have been in the module "Pitch" with an average session duration of 7m 50s. Lastly, 35 out of 48 auditors visited the "Cost Guarantee" module with an average session duration of 6m 31s.

Agencies also show higher engagement in the "Campaign View" module, similar to Auditors, with 173 out of 360 active agency users and an average session duration of 11m 39s. The "Pitch" module has 234 out of 360 active agency users with an average session duration of 4m 35s. In the "Cost Guarantee" module, 185 out of 360 active agency users engage with an average session duration of 3m 18s. Lastly, the Campaign Media-Plan List Digital had 86 out of 360 agencies engaged with an average session duration of 3m 06s.

Advertisers have a longer average session duration in the "Campaign View" module, with 15 active advertisers engaging in the platform with an average session duration of 8m 19s. In the "Budgets" module, 5 out of 16 active advertisers engaged, with an average session duration of 3m 06s.

Note the inconsistency in the reported Average session duration for the “Totals” row in Figure A.3 in Appendix. As an example, in the "Campaign View" module, the stated average session durations for Agencies, Auditors, and Advertisers are 11m 39s, 10m 27s, and 8m 19s, respectively. However, the presented average in the “Totals” row is 11m 12s, when the expected average is (11m 39s + 10m 27s + 8m 19s) / 3 = 10m 08s . This misalignment was also observed in the local testing phase, as discussed in Section 6.2.
Figures 7.2, A.4, and A.5 (see Appendix) present the geographical distribution of GMP365™ auditors, agencies, and advertisers within Europe, America, and Asia respectively, from May 1, 2023, to May 13, 2023.

In Europe, as shown in Figure 7.2, the majority of auditors are concentrated in Madrid, Sofia, London, and Stockholm. The highest number of advertisers are found in Madrid, Munich, Marseille, and Stockholm, whereas London stands out as the predominant location for agencies.

In America, as shown in Figure A.4 in Appendix, the majority of advertisers and agencies are primarily in New York, with a significant agency presence also observed in Toronto.

Lastly, Figure A.5 in Appendix demonstrates that within Asia, there are no recorded advertisers or auditors using the platform during the observed period. However, a number of agencies are notably active in Shanghai.
8 Discussion

This thesis presents a workflow (see Workflow 4) to analyze user behavior in media plan and investment management platforms. The workflow was evaluated on a case study at GMP Systems and the GMP365™ platform. The evaluation showed that the process of applying the workflow is more iterative than linear. It was often necessary to revisit and adjust earlier stages based on insights gained in subsequent ones.

Comprehending the context was a challenge due to the complexity of the organization and the distinct modules and user types in the GMP365™ platform. This in turn influenced the determination of KPIs, underscoring the significance of a thorough understanding of the context before proceeding with later stages. The workflow requires flexibility and adaptability. For example, continuous refinement of understanding and re-adjustment of KPIs ultimately led to a more efficient and insightful analytics setup.

In the data gathering process ethical aspects and user privacy was considered. To comply with the GDPR, a strict principle of data minimization was followed, collecting only the data essential for addressing the objectives. The data gathered only reveals user types and not user identities or IP addresses.

Understanding whether the behavior of different user groups on the GMP365™ platform aligns with their roles is vital for interpreting the data accurately and identifying usage trends. In the collected data (see section Results and Findings 7) in Google Analytics, all user groups (Auditors, Advertisers, and Agencies) show significant engagement in the ‘Campaign View’ module. This observation aligns with their roles as media campaigns are central to their functions, requiring planning, execution, and monitoring. Auditors, whose tasks focus on ensuring accuracy and compliance, also spend considerable time in ‘Campaign Import-Logs’ and ‘Insight’ modules, as well as interacting with ‘Pitch’ and ‘Cost Guarantee’ modules. These engagement patterns underscore the auditor’s role of checking and verifying campaign data, as well as auditing cost guarantees.

Agencies, demonstrate significant activity in the ‘Cost Guarantees’ module, which reflects their role in managing pricing agreements. They also show high engagement in the ‘Pitch’ module, which resonates with their role of securing and managing business proposals. The data also highlights the advertisers’ usage patterns, who, while having a
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longer average session duration in the 'Campaign View' module, display limited activity in the 'Budgets' module. This could suggest that Advertisers primarily use the platform for overview purposes, with less focus on detailed budget management.

Following the examination of data alignment with user roles, attention should also be given to the accuracy of the collected data. One primary concern involves the reliance on cookies for tracking user activity. Google Analytics uses first-party cookies to distinguish unique users and track their behavior. However, if a user clears their cookies or access the platform from a different device, this distinction gets disrupted, potentially leading to inaccurate user counts.

Another concern is the discrepancy observed in the calculated Average session durations in the 'Totals' row (as seen in Figure A.3 Appendix), deviating from the traditional average calculation we would expect. This inconsistency might be due to a non-transparent computational method or even a bug in Google Analytics. Therefore, despite the insights Google Analytics can provide, it’s vital to take into consideration that some data points may not align with intuitive or expected calculations. The issues around cookie-based tracking and possible calculation inaccuracies should be considered when deciding to use Google Analytics for data analytics needs.

Impacts such as business performance improvements or platform development requires analytics of data collected over a longer period of time. The time frame for the case study performed in this work did not allow for long-term insights.

In future applications of this workflow, understanding and embracing the iterative nature of the process is fundamental. Expect to revisit stages and make adjustments based on evolving insights. Moreover, anticipate numerous discussions and meetings, these are essential to developing an understanding of the organization’s needs and aligning the analytics strategy accordingly.

It’s essential to consider ethical aspects and user privacy during the entire data gathering process. Organizations should ensure ethical considerations are not overlooked, taking care to respect user privacy while gathering meaningful data. It’s important to balance the need for comprehensive data collection with the responsibility to protect user information, underlining the delicate balance required when employing such a workflow in an organization.

In the case study, the evaluation step of the workflow was performed in a short time frame. In future applications of the workflow, the evaluation should be based on data gathered during a longer period of time.


9 Conclusion

This thesis presents a workflow to analyze user behavior in media plan and investment management platforms, using the GMP365™ platform as a case study. The proposed workflow (see Method 4) is iterative, involving understanding context, determining KPIs, selecting analytics tools, ethically and privacy-consciously choosing data, implementing data gathering, visualizing data, and evaluation. Ethical considerations and user privacy are crucial throughout the process.

The accuracy of the results depend on the accuracy of the collected data and analysis tools. For example, in the case study inconsistencies were observed in metrics computations.

The workflow can be applied by other companies in the same field as GMP Systems to gain a deeper understanding of user behavior on their platforms. This can lead to better-informed decisions regarding feature development, user support, and platform optimization. The results can also inform future research on user behavior in media plan and investment management platforms.

In future applications of the workflow, the evaluation should be based on data gathered during a longer period of time. Longitudinal use of analytics enables evaluation of for example impact of decisions and changes regarding the platform on business performance in relation to the selected KPIs.
Literature


This appendix contains a series of screenshots from the Google Analytics dashboard developed during the GMP365™ case study.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tab Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration Name: KPI</td>
<td>TECHNIQUE</td>
</tr>
<tr>
<td>Custom: Apr 17 - Apr 24, 2023</td>
<td>Free form</td>
</tr>
<tr>
<td>SEGMENTS</td>
<td>VISUALIZATION</td>
</tr>
<tr>
<td>Auditors</td>
<td></td>
</tr>
<tr>
<td>Advertisers</td>
<td></td>
</tr>
<tr>
<td>Agencies</td>
<td></td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>Module Name</td>
<td></td>
</tr>
<tr>
<td>METRICS</td>
<td></td>
</tr>
<tr>
<td>Active users</td>
<td></td>
</tr>
<tr>
<td>Average session duration</td>
<td></td>
</tr>
<tr>
<td>SEGMENT COMPARISONS</td>
<td></td>
</tr>
<tr>
<td>Auditors</td>
<td>Drop or select segment</td>
</tr>
<tr>
<td>Advertisers</td>
<td></td>
</tr>
<tr>
<td>Agencies</td>
<td></td>
</tr>
<tr>
<td>ROWS</td>
<td></td>
</tr>
<tr>
<td>Module Name</td>
<td></td>
</tr>
<tr>
<td>Drop or select dimension</td>
<td></td>
</tr>
</tbody>
</table>

Figure A.1: Tab Settings and Variables field in Google Analytics showing the created segments: Auditors, Advertisers, and Agencies, along with the dimensions and metrics used for the custom dashboard.
Figure A.2: A local test data example, collected from April 17, 2023 to April 24, 2023.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Advertisers</th>
<th>Average session duration</th>
<th>Auditors</th>
<th>Average session duration</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active users</td>
<td>18% of total</td>
<td>Active users</td>
<td>18% of total</td>
<td>Active users</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3m 16s</td>
<td>1</td>
<td>0m 38s</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5m 26s</td>
<td>1</td>
<td>0m 30s</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3m 21s</td>
<td>1</td>
<td>0m 39s</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0m 23s</td>
<td>0</td>
<td>0m 30s</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0m 44s</td>
<td>0</td>
<td>0m 30s</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0m 01s</td>
<td>0</td>
<td>0m 30s</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0m 11s</td>
<td>0</td>
<td>0m 30s</td>
<td>1</td>
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<tr>
<td></td>
<td>8</td>
<td>0m 12s</td>
<td>0</td>
<td>0m 30s</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>3m 28s</td>
<td>0</td>
<td>0m 30s</td>
<td>1</td>
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<td></td>
<td>10</td>
<td>0m 01s</td>
<td>0</td>
<td>0m 30s</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure A.3: Data collected from May 1, 2023 to May 13, 2023. Full table

<table>
<thead>
<tr>
<th>Segment</th>
<th>Agencies</th>
<th>Auditors</th>
<th>Advertisers</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active users</td>
<td>Average session duration</td>
<td>Active users</td>
<td>Average session duration</td>
</tr>
<tr>
<td>Module Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>360 4.90% of total</td>
<td>8m 35s Avg: -14.1%</td>
<td>48 11.32% of total</td>
<td>75m 41s Avg: -53.70%</td>
</tr>
<tr>
<td>1 Pitch</td>
<td>334 4m 5s</td>
<td></td>
<td>34 7m 50s</td>
<td></td>
</tr>
<tr>
<td>2 Campaign View</td>
<td>173 11m 27s</td>
<td></td>
<td>33 10m 27s</td>
<td></td>
</tr>
<tr>
<td>3 Cost Guarantee</td>
<td>185 3m 15s</td>
<td></td>
<td>35 6m 17s</td>
<td></td>
</tr>
<tr>
<td>4 Campaign Media-Plan Digital</td>
<td>86 3m 58s</td>
<td></td>
<td>15 3m 17s</td>
<td></td>
</tr>
<tr>
<td>5 Report Campaign Order</td>
<td>25 3m 00s</td>
<td></td>
<td>0 6m 0s</td>
<td></td>
</tr>
<tr>
<td>6 Campaign Media Plan Other Media</td>
<td>20 3m 00s</td>
<td></td>
<td>2 3m 17s</td>
<td></td>
</tr>
<tr>
<td>7 Campaign Import Logs</td>
<td>16 4m 40s</td>
<td></td>
<td>1 11m 10s</td>
<td></td>
</tr>
<tr>
<td>8 Campaign Media-Plan Ltd. TV</td>
<td>0 0m 00s</td>
<td></td>
<td>17 3m 9s</td>
<td></td>
</tr>
<tr>
<td>9 Insight</td>
<td>0 0m 00s</td>
<td></td>
<td>17 10m 46s</td>
<td></td>
</tr>
<tr>
<td>10 Report Campaign Totals</td>
<td>0 0m 00s</td>
<td></td>
<td>16 5m 25s</td>
<td></td>
</tr>
<tr>
<td>11 Activation</td>
<td>0 0m 00s</td>
<td></td>
<td>15 5m 25s</td>
<td></td>
</tr>
<tr>
<td>12 Inflation</td>
<td>0 0m 00s</td>
<td></td>
<td>10 4m 25s</td>
<td></td>
</tr>
<tr>
<td>13 Budgets</td>
<td>0 0m 00s</td>
<td></td>
<td>2 4m 45s</td>
<td></td>
</tr>
<tr>
<td>14 Campaign Flowchart</td>
<td>0 0m 00s</td>
<td></td>
<td>2 4m 38s</td>
<td></td>
</tr>
</tbody>
</table>
Figure A.4: Geographical distribution of GMP365™ auditors, agencies, and advertisers in Americas from May 1, 2023, to May 13, 2023.

Figure A.5: Geographical distribution of GMP365™ auditors, agencies, and advertisers in Asia from May 1, 2023, to May 13, 2023.